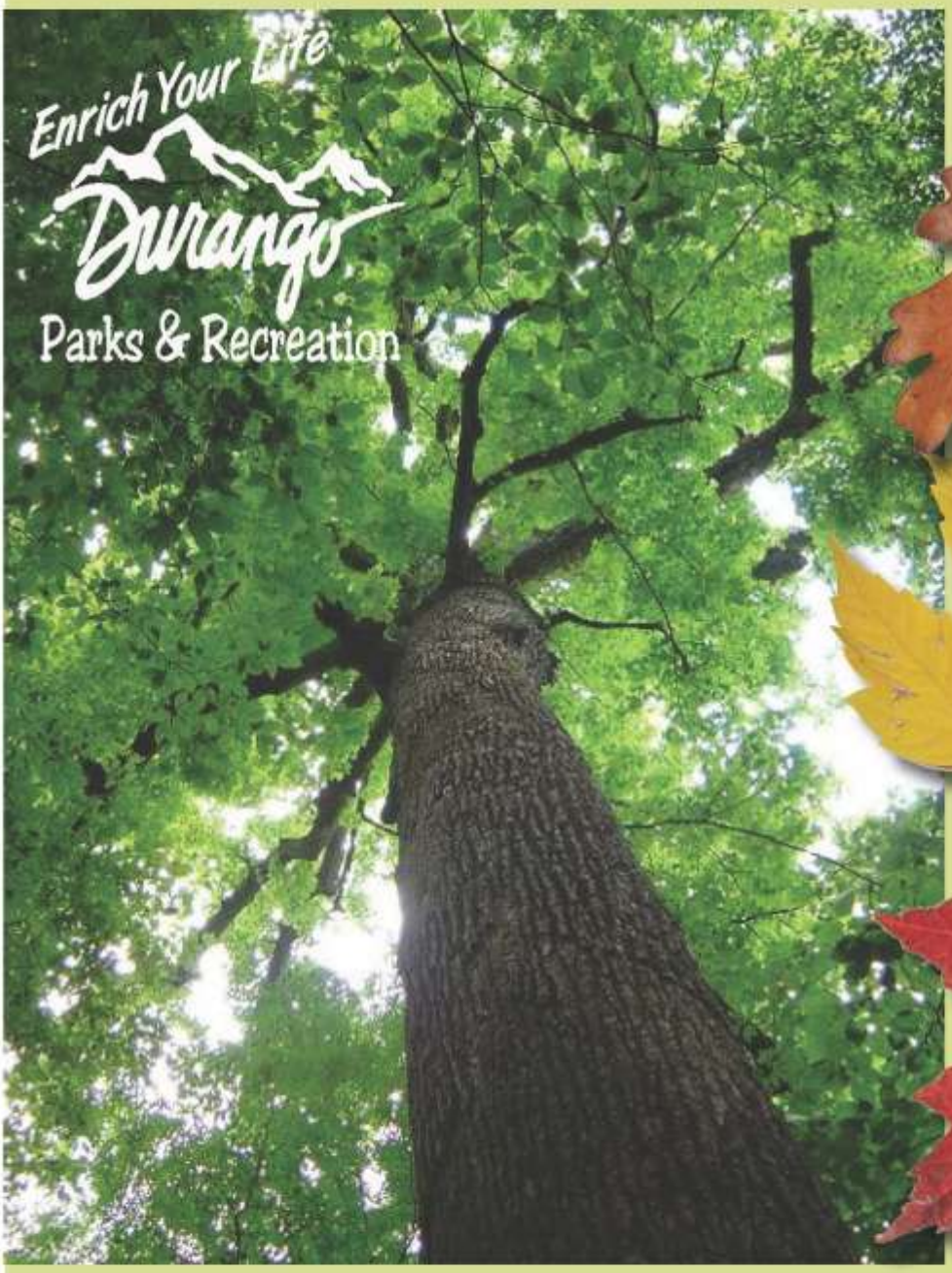
City of Durango

Community Forest Management Plan



A Mountain Town Oasis

Adopted July 9, 2014 by the Parks & Recreation Advisory Board

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Acknowledgements

The Community Forest Management Plan was developed with the technical assistance and contributions from Peter Schertz, Frank Viehmann, Chris Wilbur, Lindsay Gartner, Richard Szmajter, Lance Frisby, Scott White, Sandra Heise, Joanne Gantt, Ron Stoner and Cathy Metz.

WHAT IS A COMMUNITY FOREST?

Community Forest Definition

Community forestry is the art, science and technology of managing trees and natural systems in and around urban community ecosystems for the physiological, sociological, economic and aesthetic benefits vegetation and green spaces provide.

MISSION STATEMENT

The adopted 2010 Parks, Open Space, Trails and Recreation Master Plan identified the initiative to establish and implement a healthy forest management plan (11.1.3.2.3) as well as develop an urban forest management plan (11.1.4.2.6). The Master Plan also identified the community mission and vision for parks, open space, trails and recreation in Durango.

The Community Forest Management Plan fulfills the Master Plan initiatives and is consistent with the mission and vision. Our community forest significantly enhances the quality of life in Durango. Specifically, the Mission of the Community Forest Management Plan is to promote effective management of trees and natural systems as well as enhance the green infrastructure in an environmentally sustainable manner.

PLANNING DOCUMENT TIMEFRAME

The Community Forest Management Plan should be reviewed annually by the City Arborist and revised as needed to maintain relevance and keep pace with changing conditions. The Management Plan provides a 10-year strategic framework to meet a range of policy, educational and management goals.

EXECUTIVE STATEMENT

A mountain town oasis is a fitting description of the City of Durango today. Photographs of Durango just 100 years ago would depict an almost barren plain with a handful of native trees growing along the banks of the Animas River. A current photograph of Durango shows a canopy of green, a true oasis provided by forward thinking pioneers that appreciated the benefits trees can provide. The City of Durango Community Forest Management Plan will articulate the varied elements that the community forest can provide. The research and significant interest in the surrounding environment has led to a broader and holistic view of the community landscape. This encompassing aspect is known as the green infrastructure and many components make up the community forest. Green elements are composed of trees, wetlands, shrubs, grasses and other vegetation that interact with other natural systems including the air, water and soil to provide multiple benefits. At the forefront of these components is Durango's community forest – the trees. It is understood that woody shrubs and ground cover plant communities are part of, and integral to, the overall health of the urban forest, but the primary scope of this plan is to focus on trees – the largest, longest-lived and more significant member of the community goals. The information provided by the City's tree inventory of 7,283 trees initially developed in 2004 has been kept current with an updated inventory each year:

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Maintained Trees	7,128	7,192	7,340	7,441	7,494	7,775	7,883	8,113	8,540

The tree inventory will be used in conjunction with i-Tree software to provide a community forest analysis and benefit assessment. Among the benefits to be looked at will be energy savings, air quality, storm water mitigation and economic benefits. Other components will be to address the biological and management needs of trees and work toward a sustainable effort to foster community support through enhanced public interaction and education. The City of Durango was a 32 year Tree City USA recipient in 2012 from the National Arbor Day Foundation and a member of ISA International Society of Arboriculture. Both of these commitments show a high standard of pride and tree care in the community. The quality of life that Durango offers is undoubtedly intermixed with natural and planned beauty. The community forest and surrounding open space is an integral part in the green infrastructure, with long term planning and care the citizens of Durango will be able to enjoy the many benefits that our community forest provides.

As a strategic and forward-looking document, this Plan does not alter or supersede the existing policies and requirements of the Durango Municipal Code, the Comprehensive Plan or the Land Use and Development Code. The importance of the community forest is critical to the quality of life and wellbeing of area residents.

Durango 1888

Durango 1999

HISTORY OF TREES

By Duane A. Smith, Historian and Former Chairman of the Parks and Recreation Advisory Board

Durango, the "Magic Metropolis" on the Animas River, was founded in 1880, just as Americans were starting to be interested in parks. In large cities, such as New York, people were becoming aware of the significance of open space and parks amidst their crowded and growing communities.

Durango's original plat included two parks, one on the Boulevard (Third Avenue) and the other on the south end of town near the present Park Elementary School. Then, in 1888, Riverside Park in north Durango was created.

In a community that initially found few trees on its location, despite lying along the river, the City Council moved with haste to correct that. It instructed the City Engineer to spend $150 to plant trees along the Boulevard. This street was the most fashionable and upscale one in Durango with a median strip separating two street lanes.

The trees were planted, but, sadly they were apparently not well maintained. This lack of maintenance motivated the ever active Ladies Improvement Society to petition the Council, in June 1892, to water the trees "through the center of the Boulevard". This would be for an "estimated cost of about $10 per month" and, to the women, that seemed like a worthwhile expense.

Lack of water proved not to be the only threat to trees and parks. In September, the Council ordered that fences be put around the parks "to prevent the ingress of cattle and horses". Furthermore, the grass and weeds "were ordered cut and the latter burned".

Motivated now to improve the parks, the Council, in May 1893, ordered 500 trees "for the three City parks". A committee of Durangoans "set out 476 trees", while the Council sold twenty-four and "employed a man to look after and take care of the three parks at a salary of $50 per month". Apparently, all went well because in November a report stated that the parks "had been well watered and put in good shape for the coming winter".

Just when things seemed to be going smoothly, a new problem appeared. "Because of the practice of boys playing games in the City parks which was a detriment thereof, it was ordered that signs be displayed in said parks prohibiting the practice hereafter".

The expense of maintaining the trees and parks during the depression years of the 1890s worried some people. Finally, one Alderman stated that it was a "useless expenditure to go on trying to care for the City parks".

In the century that followed, trees and parks repeatedly arose as Council issues. "Dandy lions have overrun the parks so as to be unmanageable and no one did not know anything could be done with same". It was also noted that "several trees were broken by children who used the parks as a playground". Furthermore, the "Park keeper reported that the South Durango Park was being roughly used by a gang of 'hoodlums' and that they had been in the habit of bringing beer into the Park".

As Durango entered its second century, appreciation of its now tree covered site grew. The community was designated as a "Tree City USA" and received other awards. The "metropolis on the silvery San Juan" has become an "urban forest", loved and appreciated by its citizens and admired by visitors. The vision of the "founding fathers" has been achieved, as their community's quality of life has been enhanced by the trees and parks. Durango has been fortunate indeed to have had such a vision and carried the idea forward for over a century and a quarter.

Viles Park 1895

Viles Park 2007

Photograph courtesy of St. Columba School

As previously mentioned, community forestry is the art, science, and technology of managing trees and natural systems in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits vegetation and green spaces provide.

The community forest can be considered as the green infrastructure of the City and there are multiple benefits, including:

- Energy savings
- Air quality
- Stormwater mitigation and soil retention
- Social benefits
- Economic benefits
- Wildlife
- Buffering and noise reduction

Green Infrastructure

Green infrastructure is composed of trees, wetlands, shrubs, grasses and other vegetation involving an interconnected network that provides a multitude of benefits. At the local level, municipalities have begun dedicating resources to urban forestry programs and recognizing the role of urban forests as a component of a broader green infrastructure program, with the intent to create and retain economically-sound, livable communities. It is important to note that as growing communities need to upgrade and expand their built infrastructure (roads, sewers, utilities, etc.), they need to upgrade and expand their green infrastructure – the network of open space, woodlands, wildlife habitat, park and other natural areas that sustains clean air, water and natural resources and enriches our quality of life. The concept of green infrastructure repositions open space and parkland protection from a community amenity to a community necessity. Unlike traditional gray infrastructure capital improvements, such as transportation and water systems that begin to depreciate as soon as they are installed, green infrastructure accrues value, in part through direct cost savings, and provides greater environmental services with time.

Energy Savings

The relationship between trees and energy is complex in Colorado, which is a cold-weather climate. Trees can save energy that would otherwise be used for air conditioning in the summer and heating in the winter. Durango is described as a “heating” climate as opposed to a “cooling” climate, however, many commercial businesses in town use air conditioning in the summer. Many landscapes were not designed with energy conservation in mind and are thus, poorly designed for energy conservation.

There are a number of ways trees can contribute to a community's energy conservation strategies:

- Reducing outside air temperatures by shading asphalt and concrete.
- Reducing outside air temperatures through evapotranspiration.
- Reducing indoor air temperatures by shading windows.
- Reducing energy consumption by shading air conditioning units.
- Reducing infiltration of air (cold or warm) into conditioned buildings.

Trees near buildings can reduce energy demand for heating and cooling, thereby reducing emissions associated with electric power production and the consumption of natural gas.

Increasing the urban tree canopy is an effective way to reduce the overall outside air temperature thereby reducing the use of air conditioning. Urban areas with few trees experience the "Urban Heat Island Effect", a process by which air temperatures over urban areas comprised mostly of concrete and asphalt are up to 10 degrees F higher than in outlying areas with more vegetation (City of Boulder, 2002). Dark surfaces such as blacktop, parking lots, roofs, buildings and other impervious surfaces store incoming solar energy, convert it to thermal energy during the day and release it again at night, creating areas of warm air over the city known as "heat islands". This effect compounds over time if each night does not cool off, each subsequent day gets hotter. Meteorologists have noted significant differences in ambient air temperatures above a man-made surface and beneath a forested area of the same climate - as much as 25 degrees F. As each summer grows hotter, more air conditioners pump to keep city buildings cool and energy use and energy costs increase. Trees shading air conditioning units and windows can substantially reduce the amount of energy. Where trees are placed in relation to a building makes all the difference when it comes to energy savings. Strategically placed trees can be as effective as other energy saving home improvements, such as insulation and the installation of weather-tight windows and doors. Proper trees at the proper height, especially large coniferous trees, or evergreens provide very good windbreaks, which helps to reduce heating costs in the winter.

Planting Techniques should include:

- Plant deciduous trees, which shed their leaves during the winter. These trees provide shade and block sunlight during hotter months. By dropping their leaves in the fall they admit sunlight in the colder months.
- Place deciduous trees on the west and east sides of buildings.
- Shade all hard surfaces such as driveways, patios and sidewalks to minimize landscape heat.

Durango's abundant sunshine and solar energy potential needs to be strategically balanced with the benefits of the urban forest. The energy use and conservation impact of shading the south side of buildings is an important consideration.

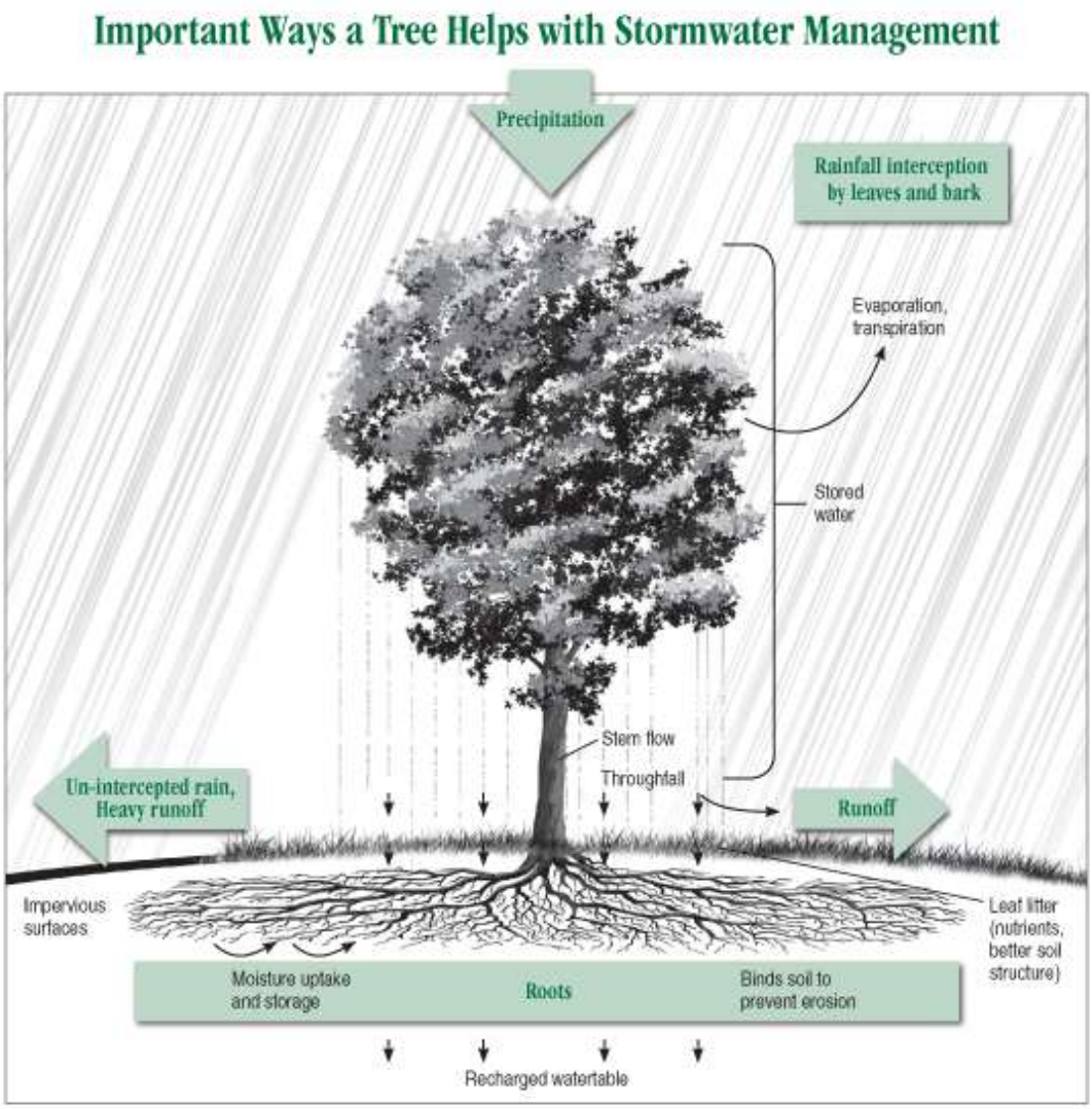
Air Quality

Trees alter the environment in which we live by moderating climate, in particular, trees have been shown to capture a wide range of chemical compounds in the air that are produced by fuel combustion and other processes, and which have been shown to be smog-producing and dangerous to our health. Air quality can be improved through the use of trees, shrubs, and turf. Leaves filter the air we breathe by removing dust and other particulates. Rain then washes the pollutants to the ground. Leaves absorb carbon dioxide from the air to form carbohydrates that are used in the plant's structure and function. In this process, leaves also absorb other air pollutants—such as ozone, carbon monoxide, and sulfur dioxide—and give off oxygen.

Stormwater Mitigation and Soil Retention

Increased attention is now being focused on the benefits trees provide in managing stormwater, especially in urban communities. Stormwater is run-off water produced during rainfall and snow melt. As stormwater flows over surfaces, it picks up pollutants in its path and carries these to surface water. This is called nonpoint source pollution and is considered to be the number one cause of water pollution today. In urban communities, the temperature of stormwater increases as it flows over impermeable surfaces like pavement and roof tops. When this water enters surface waters, such as a stream, it increases the temperature of that water, which can adversely affect stream ecology. This is called thermal pollution. With the amount of impermeable surfaces in urban communities, the volume and velocity of stormwater increases as it flows over surfaces. In fairly heavy rain events, this can become an amount that older gray infrastructure (curbs, gutters and storm drains) cannot handle, leading to flooding. To better manage stormwater, a number of practices are being used. One is to increase the amount of specially designed green space (planted areas) in communities that will capture and infiltrate rain water so more penetrates the soil and less runs off. Also referred to as bioretention, this is an example of green infrastructure. The benefits of trees for stormwater management include canopy interception, absorption of rainwater in soil, evapotranspiration and increased soil infiltration. Trees also can filter pollutants such as sediment and nutrients from stormwater; this includes metals, pesticides and solvents. Canopy interception is when rainfall is caught by leaves and stored or evaporated back into the atmosphere so less reaches the ground to become part of stormwater runoff. Interception is affected by intensity and duration of rain events, tree species and local climate. Trees, shrubs and grasses help to increase infiltration of rainwater into soil. Tree roots absorb rainwater, so it is returned to the atmosphere via transpiration after the tree has filtered potential pollutants. Tree roots create macropores, which allows better drainage and storage. More rainwater can infiltrate into and percolate through soil

during the next rainfall or irrigation. The roots of trees hold soil in place to reduce soil erosion and sediment pollution. The roots take up nutrients, a common stormwater pollutant, which reduces the amount in stormwater runoff. Trees and other plants are nature's filters.



Trees help reduce stormwater runoff in several ways. One is to intercept falling rain and hold a portion of it on the leaves and bark. Part of this intercepted water will evaporate and part will be gradually released into the soil below. At the surface of the soil, fallen tree leaves help form a spongy layer that moderates soil temperature, helps retain soil moisture, and harbors organisms that break down organic matter and recycle elements for use in plant growth. This important layer also allows rain water to percolate into the soil rather than rushing off carrying with it oil, metal particles and other pollutants. Below ground, roots hold the soil in place and absorb water that will eventually be released into the atmosphere by transpiration.

Arbor Day Foundation

TREE CITY USA

Figure 1: Trees benefit stormwater management

Social Benefits

We like trees around us because they make life more pleasant. Most of us respond to the presence of trees beyond simply observing their beauty. We feel serene, peaceful, restful, and tranquil in a grove of trees. We are "at home" there. Hospital patients have been shown to recover from surgery more quickly when their hospital room offered a view of trees. The strong ties between people and trees are most evident in the resistance of community residents to removing trees to widen streets. Or we note the heroic efforts of individuals and organizations to save particularly large or historic trees in a community. The stature, strength, and endurance of trees give them a cathedral-like quality. Because of their potential for long life, trees frequently are planted as living memorials. We often become personally attached to trees that we or those close to us have planted. Street trees keep streets and sidewalks cool in the summer and provide scale and interest in the winter. They also calm traffic and separate pedestrians and vehicles. Durango's system of tree-lined bike and pedestrian trails are well used and valued as a resource to promote exercise and a healthier lifestyle. Trees are often the primary architectural element in our developed parklands and, as such, define functional use areas, and add significant aesthetic character. Natural areas and parks give residents access to trails and environmental learning opportunities that help keep us connected to the needs of fish and wildlife and the experience of being in nature while in the city. The presence of many trees can often define a neighborhood, and conversely, the absence of trees can do the same. As mentioned earlier, many studies show that people enjoy trees and are more comfortable in the presence of trees than they are without them in a landscape.

Economic Benefits

Durango's urban forest provides significant economic benefits to the community. The environmental services that trees provide can be quantified and individual trees can be extremely valuable components of a property's landscape. The value of individual trees in the landscape can be appraised. Many of the majestic mature trees of Durango's urban forest have an estimated appraised value in the ten's of thousands of dollars (City of Durango Street Tree Inventory). Trees, landscaping and the benefits they provide also contribute to property values. It has been suggested that healthy, mature trees can add between 3-10% to residential and commercial property values. Business districts also benefit from having trees in the landscape. Consumers are more willing to frequent shopping districts with trees, spend more time there and are even willing to spend more money on goods and services. Trees are one of the reasons Durango is a desirable place to shop, work, visit and live. It makes economic sense to continue our stewardship of the community forest. The indirect economic benefits of trees are even greater. These benefits are available to the community or region. Lowered electricity bills are paid by customers when power companies are able to use less water in their cooling towers, build fewer new

facilities to meet peak demands, use reduced amounts of fossil fuel in their furnaces, and use fewer measures to control air pollution. Communities also can save money if fewer facilities must be built to control stormwater in the region. To the individual, these savings are small, but to the community, reductions in these expenses are often in the thousands of dollars.

Using the current City of Durango Tree Inventory, the total annual net benefits of City maintained trees is estimated to be $898,296. This annual benefit equates to approximately $120 per tree.

Wildlife Benefits

Trees located within Durango's community forest, in our open space, parks and along our river and stream banks contribute to the diverse cover, food and nesting needs for a wide variety of wildlife. A forest wilderness is inhabited by a wealth of wildlife – a community of birds, insects, reptiles, and mammals that live in and among the trees, often depending on them for their very survival. Although the community forest contains less biological diversity than its distant woodland cousins, the animals that occupy the community forest are still numerous, and they still need trees. At a larger scale, municipalities such as Durango recognize the multiple values of our open space, many of which create wildlife habitat in these parcels and on other public lands. The continuation of the acquisition of open space in and around Durango will be vital in the cycle of a vibrant wildlife habitat that surrounds our community.

Buffering and Noise Reduction

The community forest provides buffering or screening of adjacent uses and the built infrastructure in Durango. Trees and landscaping provides a psychological separation and sense of place between uses.

Noise can cause anxiety, tension, or even illness. Prolonged exposure to high levels of noise can cause hearing loss. Today we regard noise as a form of environmental pollution, and in some circles noise is considered an international health concern.

Trees and landscaping can make a difference. Planting "noise buffers" composed of trees and shrubs can reduce noise five to ten decibels (reduces noise approximately 50% to the human ear). To achieve this effect, the species and the planting design must be chosen carefully.

Generalized recommendations to reduce noise with rows of trees and shrubs include:

1. For best results, plant the noise buffer close to the noise source (rather than close to the area to be protected).

2. Plant trees/shrubs as close together as the species will allow and not be overly inhibited.

3. When possible use plants with dense foliage. A diverse tree species, with a range of foliage shapes and sizes within the noise buffer may also improve noise reduction.

4. Foliage of the plants should persist from the ground up. A combination of shrubs and trees may be necessary to achieve this effect.

5. Evergreen varieties that retain their leaves will give better year-round protection.

6. When possible use taller plants. Where the use of tall trees is restricted, use combinations of shorter shrubs and tall grass or similar soft ground cover as opposed to harder paved surfaces.

Noise buffers can also be planned to provide multiple products or uses. For example, a noise buffer oriented properly may also serve as a windbreak. When they contain native plants or habitat, noise buffers can also provide wildlife corridors. Species can also be selected to provide useful products such as fuel wood, fruits, or nuts.

CANOPY COVER IN DURANGO

i-Tree Data and Canopy Cover Analysis

The City is using available software to provide additional analysis of the tree inventory in Durango and calculate the canopy cover of the green infrastructure associated with the community forest.

i-Tree is a state-of-the-art software suite from the USDA Forest Service that provides urban and community forestry analysis and benefits assessment tools. The i-Tree tools will help the City strengthen the community forest management and advocacy efforts by quantifying the environmental services that trees provide and assessing the structure of the urban forest.

The two i-Tree software tools utilized by the City are i-Tree Streets and i-Tree Species Selector. The i-Tree Streets program focuses on the ecosystem services and structure of Durango's street tree population. The program makes use of the City's tree inventory to quantify and put a dollar value on the trees' annual environmental and aesthetic benefits, including energy conservation, air quality improvement, carbon dioxide reduction, stormwater control, and property value increases. The i-Tree Species Selector program is designed to help the City Arborist and urban foresters select the most appropriate tree species based on environmental function and geographic area.

The City partnered with the Fort Lewis College Geographic Information Systems (GIS) program to utilize the available United States Geological Survey (USGS) National Agriculture Inventory Program (NAIP) 2009 Imagery that is one meter resolution to analyze the percent of canopy cover of Durango's community forest. Vegetation was classified into four classes: (1) broad-leaf deciduous forest; (2) evergreen forest; (3) shrub/tall grass; and (4) short grass (i.e. lawn). To ensure the accuracy of the classification of the image data, the GIS imagery was compared against the City inventoried coniferous and deciduous tree data. Deciduous tree classes consistently posted accuracies of 85% whereas evergreen trees only registered accuracies of 25%. Much of the variance was due to the dense interspersion of the two tree types across the City which favored the broader canopy spread of the deciduous trees over the evergreens which are more closely clustered. However, the overall accuracy of the evergreen species improved with additional analysis by the Fort Lewis College GIS Program. In 2009, Durango's percent of tree canopy cover was 27% of the land within the Study Area (City limits and City owned property outside the City limits). According to the analysis, City owned property is 43.6% vegetated and the entire Study Area (including public and private land ownership) is 23.5% vegetated. Of the vegetated area within the Study Area approximately 27% are deciduous trees, 29% are coniferous trees and 44% are shrubs and grasses as described in the chart below.

Description	Pixels	Acres	Percent
TOTAL land area	33,339,232	8,232	100%
Impervious	17,178,167	4,242	52%
Vegetated	16,161,065	3,990	48%
Vegetation groups	16,161,065	3,990	100%
Deciduous	4,403,986	1,087	27%
Conifer	4,631,840	1,144	29%
Shrubs/grasses	7,125,239	1,759	44%

Table 1: Percent of Vegetation in Durango

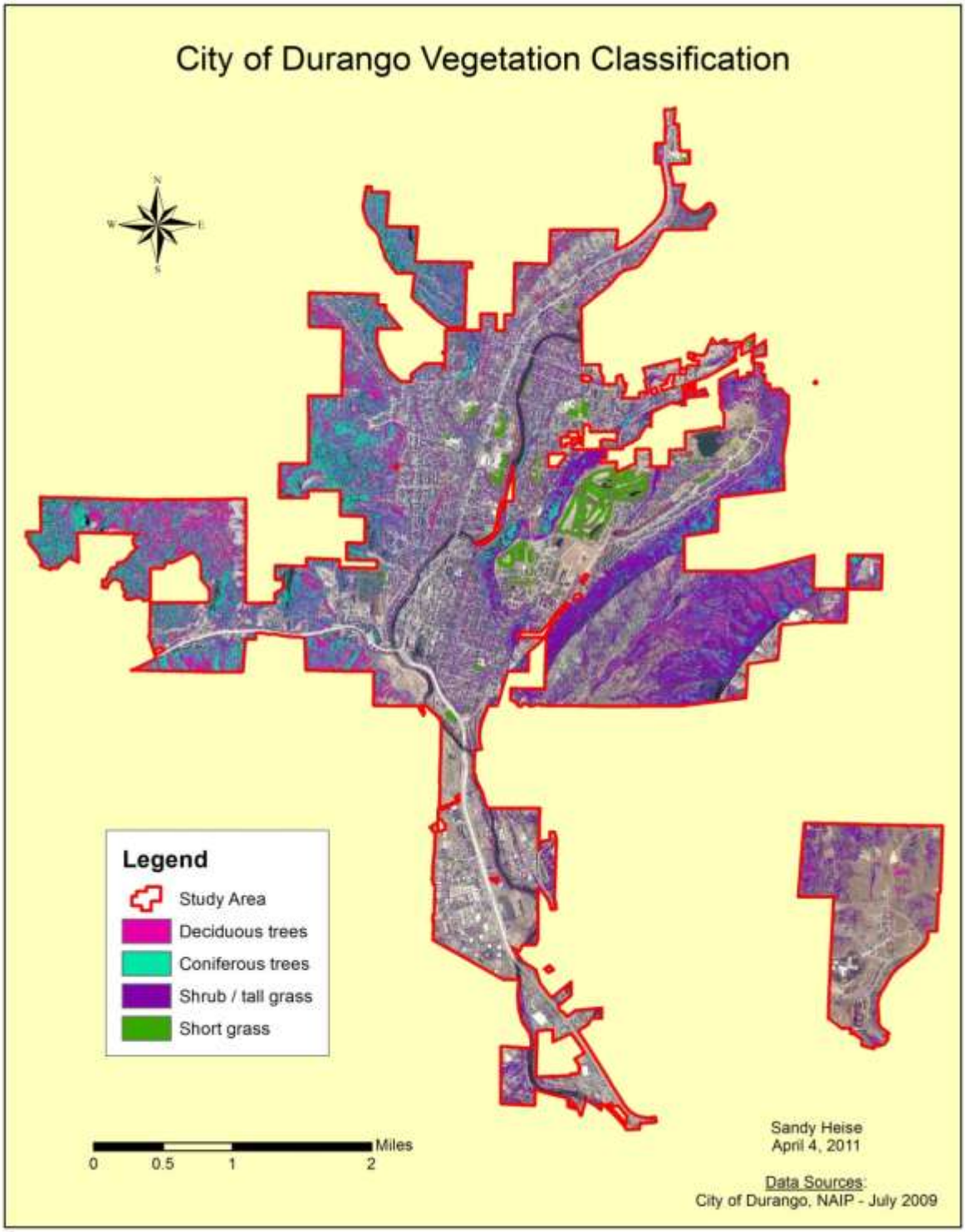


Figure 2: Durango Vegetation Map

Durango

Annual Energy Benefits of Public Trees By Species

3/29/2011

Species	Total Electricity (MWh)	Electricity ($)	Total Natural Gas (Therms)	Natural Gas ($)	Total ($)	Standard Error	% of Total Trees	% of Total $	Avg. $/tree
Green ash	42.3	2,693	4,474.6	4,057	6,750	(N/A)	9.8	7.1	9.20
Honeylocust	37.8	2,406	4,132.1	3,746	6,152	(N/A)	8.3	6.5	9.95
Siberian elm	110.4	7,021	10,292.7	9,331	16,352	(N/A)	7.4	17.3	29.57
Blue spruce	57.6	3,663	6,591.4	5,976	9,639	(N/A)	7.3	10.2	17.69
Rocky mountain juniper	9.2	583	936.3	849	1,432	(N/A)	5.8	1.5	3.28
Silver maple	68.8	4,379	5,707.4	5,174	9,553	(N/A)	5.4	10.1	23.70
Pear	9.1	577	1,121.6	1,017	1,594	(N/A)	5.0	1.7	4.26
Crabapple	10.2	650	1,141.7	1,035	1,685	(N/A)	4.3	1.8	5.25
Quaking aspen	18.5	1,177	2,199.4	1,994	3,171	(N/A)	4.0	3.4	10.60
American elm	56.7	3,604	4,348.1	3,942	7,546	(N/A)	3.7	8.0	27.54
Boxelder	29.8	1,895	2,608.4	2,365	4,259	(N/A)	2.9	4.5	19.90
Norway maple	16.0	1,021	1,712.7	1,553	2,573	(N/A)	2.6	2.7	13.27
Cherry plum	3.7	233	463.7	420	653	(N/A)	2.6	0.7	3.40
Common chokecherry	3.1	195	390.0	354	549	(N/A)	2.2	0.6	3.37
Freeman maple	6.2	397	699.2	634	1,031	(N/A)	2.0	1.1	6.97
White ash	9.6	612	1,185.3	1,075	1,686	(N/A)	1.7	1.8	13.07
Littleleaf linden	6.4	404	755.6	685	1,089	(N/A)	1.6	1.2	8.86
Pinyon pine	2.1	132	270.4	245	378	(N/A)	1.6	0.4	3.12
Austrian pine	3.1	195	367.9	333	528	(N/A)	1.5	0.6	4.59
Fremont cottonwood	24.6	1,564	1,901.1	1,724	3,288	(N/A)	1.5	3.5	29.62
Narrowleaf cottonwood	20.7	1,313	1,736.7	1,575	2,888	(N/A)	1.4	3.1	26.74
Broadleaf Deciduous Small	2.0	124	247.8	225	349	(N/A)	1.2	0.4	3.75
European white birch	7.6	486	749.2	679	1,166	(N/A)	1.2	1.2	13.25
Northern hackberry	3.8	241	448.2	406	647	(N/A)	1.1	0.7	7.71
Russian olive	3.1	200	345.2	313	513	(N/A)	1.1	0.5	6.11
Ponderosa pine	5.8	371	658.1	597	967	(N/A)	1.0	1.0	12.90
OTHER STREET TREES	52.4	3,330	5,328.7	4,831	8,161	(N/A)	11.9	8.6	9.16
Citywide total	620.5	39,466	60,813.5	55,133	94,599	(N/A)	100.0	100.0	12.63

Table 2: Energy benefits of Trees

Durango

Total Annual Benefits, Net Benefits, and Costs for Public Trees

3/29/2011

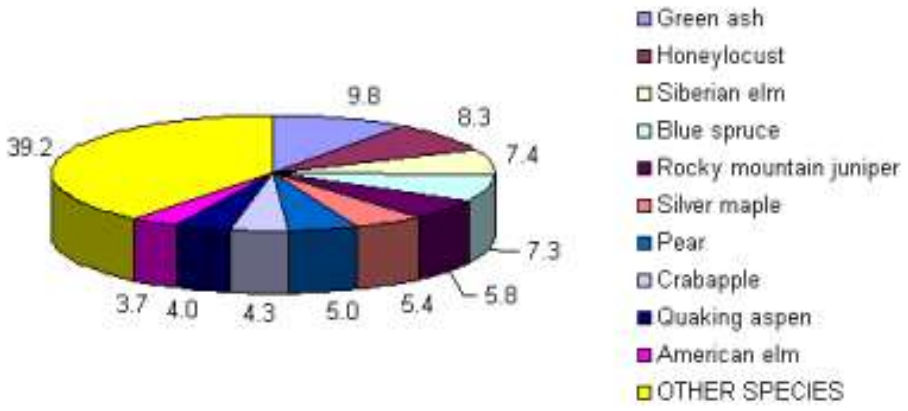
Benefits	Total ($)	Standard Error	$/tree	Standard Error	$/capita	Standard Error
Energy	94,599	(N/A)	12.63	(N/A)	5.56	(N/A)
CO2	17,254	(N/A)	2.30	(N/A)	1.01	(N/A)
Air Quality	8,944	(N/A)	1.19	(N/A)	0.53	(N/A)
Stormwater	131,783	(N/A)	17.59	(N/A)	7.75	(N/A)
Aesthetic/Other	904,129	(N/A)	120.71	(N/A)	53.18	(N/A)
Total Benefits	1,156,709	(N/A)	154.43	(N/A)	68.04	(N/A)
Costs						
Planting	41,000		5.47		2.41	
Contract Pruning	111,657		14.91		6.57	
Pest Management	20,502		2.74		1.21	
Irrigation	16,892		2.26		0.99	
Removal	19,842		2.65		1.17	
Administration	3,839		0.51		0.23	
Inspection/Service	4,551		0.61		0.27	
Infrastructure Repairs	0		0.00		0.00	
Litter Clean-up	40,130		5.36		2.36	
Liability/Claims	0		0.00		0.00	
Other Costs	0		0.00		0.00	
Total Costs	258,413		34.50		15.20	
Net Benefits	898,296	(N/A)	119.93	(N/A)	52.84	(N/A)
Benefit-cost ratio	4.48	(N/A)				

Table 3: Net benefits of Trees

Durango

Species Distribution of Public Trees (%)

3/29/2011



Species	Percent
Green ash	9.8
Honeylocust	8.3
Siberian elm	7.4
Blue spruce	7.3
Rocky mountain juniper	5.8
Silver maple	5.4
Pear	5.0
Crabapple	4.3
Quaking aspen	4.0
American elm	3.7
OTHER SPECIES	39.2
Total	100.0

Figure 3: Tree species distribution

Section 1: Biological Needs: The Tree Resource

** Increase species and age diversity to provide long term community forest health*

Diversity plays an important role in the long-term stability of an ecosystem. When an area has a high diversity of tree species, it is less likely to suffer catastrophic loss from diseases or pests. Planting a diversity of hearty tree species throughout Durango neighborhoods can reduce this vulnerability and create a separation of age classes by having consistent tree planting programs annually.

* *Complement species diversity with streetscape unity*

Maintain diversity while developing distinct identities for individual streets. For example, one street could be designated as "yellow fall color" or "light shade". Additional examples include red fall color, yellow fall color, light shade, height 40-50 ft., height 60-80 ft., fragrant trees, columnar trees, spreading trees and full crown trees.

Once streets are designated, plant only trees that will further the long term vision for the streetscape. Direct tree planting to provide unity and diversity on each street. On existing streets, identify patterns of existing street trees that provide a starting point for developing an identity for the street. As new trees are planted, use species that fulfill the desired look and identity. On new streets, designate a particular list of trees to carry out a defined vision and outcome for each street.

* *Increase tree and shrub plantings on City lands*

Identify areas that present maintenance challenges as potential tree and shrub areas. Map all areas under City ownership that have the potential for improved green infrastructure, including the planting of deciduous and evergreen trees, shrubs, grasses and perennials. Identify locations where it would be appropriate to plant conifers on City lands. While conifers are not allowed to be planted on City streets, they do provide a number of positive benefits including wildlife habitat, stormwater reduction, shade, year-round foliage, windbreaks and sound reduction. Some of these locations will likely include parklands, rights-of-ways without streets, road cuts, the Animas River greenway and natural lands.

** Increase tree and shrub plantings on non-City public lands*

Conifers in particular could be planted where screening or a forested effect is desired. Public lands include ownership by School District 9R, Fort Lewis College, La Plata County or state and federal lands.

** Develop priorities for tree and shrub plantings and include in the City budget*

Priority locations could include City greenway land south of Santa Rita Park, Rea open space property and Cundiff Park near the BMX track.

** Develop landscape restoration and revegetation plans for open space or natural land City properties*

Priority locations could include the Off Leash Area (Dog Park), Animas River Trail corridor, road cuts at the Fort Lewis College roundabout, and along Roosa Avenue and Schneider Park.

** Inventory and map all existing vegetation on City-owned lands*

In addition to the current inventory of street and park trees, inventory greenway trees, open space or natural lands prominent trees, landmark trees and non-vegetated areas on City properties.

** Provide sufficient tree planting to keep pace with community growth and offset tree removal*

Tree planting in Durango should always be a top priority and exceed tree removal. The City evaluates and educates the public on the community forest benefits and promotes the planting of trees by offering a cost share tree planting program to all of its citizens and tree removal occurs only as a last resort when evaluating tree health. The cost share program promotes planting trees in the City street right-of-way with adjacent homeowners funding 50% of the cost of planting a new or replacement tree.

** Increase the proportion of large statured trees in the community forest for greater canopy effect and emphasize species that will become large, mature trees where appropriate*

The environmental and cultural benefits of larger trees exceed those of smaller trees. Larger trees provide greater energy savings (shade, wind reduction, evaporative cooling), pollution mitigation (air and water), stormwater mitigation, visual impact, traffic calming, increase in property values and carbon sequestration.

** Ensure proper compatibility between trees and planting sites to reduce sidewalk damage and conflicts with overhead utilities that lead to premature tree removal*

The right tree in the right place is always the first step in the design of a long-term sustainable landscape. Correct species selection and site analysis from below the ground to overhead conflict will diminish the need for tree removal and set the standard for future design when working in and around hardscape and utilities conflicts. Avoid negative safety impacts of planting certain species of trees, such as dense conifer trees, in locations that shade roads, sidewalks, driveways and bike paths in the winter, by planting the right tree in the right place.

** Address Protection and Preservation of Current Trees*

The City uses the Geographic Information System (GIS) to identify and maintain the City's urban tree inventory. The City's Land Use and Development Code provide specific requirements for tree planting in new development. Protected trees should be preserved and the City should require the replacement of existing protected trees within new developments in accordance with the Tree Replacement Policy. Protected trees encompass any trees (except a prohibited tree) with a diameter at breast height (DBH) of 10 inches or more. The DBH is measured at 4.5 ft. above grade. A group of five (5) or more trees of the same species 3 inches in diameter and above are protected trees. Champion Trees, designated by the Colorado State Forest Service and Colorado Tree Coalition, have automatic protected status. Trees on historically designated properties (districts and landmarks) have special protection under the Historic Preservation Program and are also considered protected trees.

Upon designation of a tree for Protected status, preservation of these trees will be required and subsequent root zone protection. Pruning will only be provided by an approved City licensed tree company and/or City staff depending on the location of designated Protected trees. The City recognizes the importance to maintain the natural and native vegetation located within the community.

** Establish measurable goals such as plantings per year and plantings versus removals and develop a system to measure the percent of canopy cover for green infrastructure*

The tree planting program of the City of Durango Forestry Division has historically and is envisioned to continue to plant more trees each year than the previous year as well as plant more trees than are removed each year. Currently the City is maintaining a sustainable cost-share tree planting program with the citizens of Durango, promoting appropriate landscaping treatments with new developments and partnering with other agencies such as Durango School District 9-R to escalate the tree planting efforts on all school district campuses. The City has expanded the use of Geographic Information System (GIS) analysis of the green infrastructure by documenting the location, species and health of City maintained street and park trees. An analysis of the canopy cover within the City of Durango indicates that approximately 23.5% of the land within the City boundaries is

vegetated and comprises the City's green infrastructure. In the implementation section of this plan, realistic and measurable goals for the community's urban forest has been established.

Section 2: Management Needs: Short & Long-term Care and Maintenance

* *Develop adequate long-term planning to ensure the sustainability of the community Forest*

Defining sustainable community forest principles and integrating these into the City Land Use and Development Code will ensure proper planning and solid footing for long term sustainability of the community forest. A sustainable community forest is naturally occurring and includes planted trees which are managed to provide a continuing level of economic, social, environmental and ecological benefits today and into the future.

Long term planning of the sustainable community forest includes:

1. **Acknowledgment that City maintained trees provide a wide range of net benefits**
Planting, preserving and maintaining trees is neither simply a good thing nor an exercise. Rather, community forests are essential to the current and future health of the City and the residents.

2. Given the goal of maintaining net benefits over time, the regeneration of community forests requires intervention and management by humans.
To quote David Nowak, a Research Forester with the United States Department of Agriculture (USDA) Forest Service, "people want and need to direct the renewal process because natural regeneration does not meet most urban needs." Therefore, urban forests cannot be sustained by nature, but by people.

3. Sustainable community forests exist within defined geographic and political boundaries: those of cities. Moreover, sustainable urban forests are composed of all trees in the community, regardless of ownership.

* *Optimize the use of limited financial and personal resources including leveraging grants and other funding sources*

The increasing use of the concept of green infrastructure also transforms the usual understanding of environmental costs into one of cost-benefit ratios. If the net benefits are positive, then it makes sense to invest the necessary resources to reap the benefits. The increased awareness of the overall benefits that trees provide in a community and in general to the public have generated the opportunities to access numerous grant sources such as the Colorado Tree Coalition, U.S. Forest Service and the State of Colorado. Also partnering with the local Durango School District 9R and Fort Lewis College helps to show solid

direction in a common understanding of the benefits of trees and allow for joint funding opportunities. The City will continue to explore service fees and sponsorships to increase resources for the health and sustainability of the community forest.

* *Increase training and education for tree program employees to ensure high quality tree care*

The tree care profession has experienced rapid growth over the past decade and there is a significant amount of knowledge required to perform at the highest level. The required City of Durango Licensed Arborist credentials helps consumers identify qualified, knowledgeable tree care professionals. Being licensed to work in the City of Durango is mandatory, and it demonstrates that tree care professionals have the proper knowledge and skills and well as a high level of dedication to the profession and the community. Licensed Arborists and tree care companies in Durango understand the importance of continued education and how it helps to make the world a better place, one tree at a time.

* *Coordinate tree-related activities of municipal departments and other public Organizations*

The National Arbor Day Foundation created a new outreach program called Tree Campus USA. This program created a stepping stone for the City of Durango (34 year Tree City USA recipient in 2014) and Colorado State Forest Service to approach Fort Lewis Collage on becoming a certified Tree Campus USA and an opportunity to showcase their trees on the College's campus. Local business leaders have joined with the Colorado Tree Coalition (CTC) to solicit a grant to plant trees on school property in Durango. The City of Durango is partnering with these and other programs to make enhancement efforts attainable and become a sustainable component of Durango's community forest.

Adverse impacts can often be minimized or avoided but only if the input of tree professionals is obtained before damage is inflicted. The City Arborist has been given the responsibility to work with all City Departments to explore modifications to various activities that may adversely impact City maintained trees. Departments shall notify the Parks and Recreation Department of any proposed construction activity which might require the removal of or cause injury to any street tree, or interfere with the fulfillment of the street tree plan. To have a successful mature tree preservation plan, whether it is a single tree or multiple trees, it is necessary to require City departments, governmental agencies, utility companies and other organizations to communicate and cooperate with the community forest program when they conduct operations that can affect trees. In addition, all development proposals submitted to the City requiring landscaping plans are also reviewed and approved by the City Arborist.

Section 3: Community Needs: Public Interaction

* *Increase public awareness of values and benefits associated with trees and green Infrastructure and what it takes to maintain that value*

Continue to strive for community involvement in development practices that include the consideration of trees, parks, and green infrastructure. These practices should include new urbanism, smart growth, low impact and conservation development, walkable neighborhoods and multi-modal transportation systems. Emphasize that everything is connected to everything in the process and the benefits from trees and green infrastructure are an integral part of the design. Members of the community will appreciate how their actions affect the urban forest and consequently the benefits of the green infrastructure provides to them.

* *Promote better tree and shrub planting and care through public understanding of biological needs of vegetation*

Provide for the distribution of timely literature in the spring, summer and fall on proper planting techniques and the importance of the long term needs and care of trees and landscape to be established. Actively pursue community involvement in tree planting programs and systematically implement through individual neighborhoods.

* *Foster community support for the urban forest management plan*

Urban and community forestry is one of the numerous environmental issues that have risen to the forefront of public awareness. Enhanced education provided by a Community Forest Management Plan illustrating the benefits derived from Durango's community forest as well as the green infrastructure of parks, riparian corridors and City open space parcels will define some of the solutions to maintain a high standard for quality of life.

* *Promote conservation of the community forest by focusing public attention on all tree age classes, not just large heritage trees*

Conservation of vegetated areas, including urban (street and park trees) and surrounding open space (native vegetation), play a part in a communities green infrastructure. Durango's community forest as a whole provides the greatest set of ecological and economic benefits. Trees should be protected and used to show the potential of green infrastructure benefits that the entire community forest can provide through conservation efforts.

AREAS OF RESPONSIBILITY

The City of Durango Parks and Recreation Department is responsible for the management and oversight of the community forest. The City Arborist is responsible for the review and approval of new trees and vegetation to be planted on City property. All development proposals submitted to the City requiring landscaping are also reviewed and approved by the City Arborist.

The Parks and Recreation Department is also responsible for the stewardship and maintenance of all City owned land in Durango. The City Arborist ensures compliance with the national and state standards for the Tree City USA designation with the National Arbor Day Foundation. The City of Durango Tree Inventory, inclusive of street trees and trees in City parks, is maintained and kept current by the City Arborist. Additionally, the City Arborist will identify future planting sites for trees and other vegetation to ensure the health of the community forest on City owned lands.

Best Management Practices

City parks are maintained according to the type of use and visitor impacts.

Description	**Sports Fields**	**Developed Areas – Heavy Public Traffic**	**Semi-developed areas - Moderate Public Traffic**	**Undeveloped Natural Areas – Moderate to Low Public Traffic**
Mowing during growing season	As needed to maintain maximum height of 2½ inches	Maintain maximum height of 3 inches	Maintain maximum height of 3 inches	Areas are left in a natural state and not mowed
Edge sidewalks, borders, fences etc. during growing season	Once weekly	Once weekly	Once weekly	Not trimmed
Install seed or sod	As needed	As needed	Maintain turf coverage of 80%	N/A
Thatch layer	Inspect regularly and remove as needed	Inspect regularly and remove as needed	Monitor	N/A
Grass clippings	Remove if coverage is unsightly or impacts health of lawn	Remove if coverage is unsightly or impacts health of lawn	Monitor and remove only if impacts health of lawn	N/A

Description	Sports Fields	Developed Areas – Heavy Public Traffic	Semi-developed areas - Moderate Public Traffic	Undeveloped Natural Areas – Moderate to Low Public Traffic
Test soil and apply fertilizer according to plant requirements	Test soil and apply fertilizer as needed (2-3 times) during growing season	Test soil as needed and apply fertilizer 1-2 times during growing season	Fertilize only if plant health dictates	Not fertilized
Manage insects, diseases and rodents according to IPM standards	Inspect regularly and respond to outbreaks within 3 days	Inspect regularly and respond to outbreaks within 3 days	Inspect regularly and respond to outbreaks within 10 days	Monitor and respond to outbreaks as needed
Weed coverage	5% or less	10% or less	25% or less	Eradication of noxious plants
Aeration, top dress and over seed turf	Aerated 2-3 times per year, top dress as needed	Aerated once per year; top dress as needed	As needed	N/A
Removal or treatment of invasive plants	Within 5 days of discovery	Annually	As needed	According to legal requirements
Prune shrubs	As necessary	As necessary	Every 2 years	Safety related
Prune trees	As necessary	As necessary	As necessary	Fuels reduction
Use of once shredded cedar bark mulch	Maintain 4” depth around trees and shrub beds	Maintain 4” depth around trees and shrub beds	Maintain 4” depth around trees and shrub beds	N/A
Irrigation inspection to ensure optimal coverage and efficiency	Bi-weekly	Once per month	Once per month	Not irrigated

Table 4: Park Maintenance Practices

System-wide Park Maintenance Standards

- Trash and debris removal
- Inspect and repair site amenities
- Hazard reduction
- Graffiti and vandalism control
- Irrigation repairs

Sustainable Practices

The majority of high use City parks are treated with fertilizers, herbicides and pesticides by licensed applicators in accordance with Integrated Pest Management (IPM) standards. In response to citizen requests, the City has designed organically managed parks which limit maintenance practices to include the application of organic fertilizers and manually pulling weeds by volunteers. Organically managed parks do not adhere to City standards on the percentage of weeds in turf grass.

In addition to full and part-time City staff, maintenance of the parks and amenities is supplemented by volunteers to include trash and weed removal, in-field maintenance at ball fields and care of specialized assets such as the rose garden in Santa Rita Park.

COMMUNITY FOREST GUIDELINES AND SPECIFICATIONS

Protected Tree Retention Plan

The City of Durango has a protected tree retention and preservation plan for all public trees. The goals of tree preservation include:

- Reducing tree loss during development or redevelopment
- Reducing damage to standing trees during construction
- Providing for replacement of trees lost during construction
- Providing for planting trees where none occurred previously
- Providing for the maintenance of preserved trees after construction is completed

Community trees are subjected to wide variety of potentially damaging impacts from governmental entities, utility companies, and private contractors. Maintenance of above- and below-ground utilities and other infrastructure may lead to serious tree damage or tree

death. Adverse impacts can often be minimized or avoided but only if the input of tree professionals is obtained before damage is inflicted. The City Arborist should be given the responsibility to oversee City maintained trees. All City Departments shall contact the City Arborist for consultation regarding any activities that may adversely impact a City maintained tree. To have a successful mature tree preservation plan, whether it is a single tree or multiple trees it will be necessary to explicitly require that City Departments, governmental agencies, utility companies, and other organizations communicate and cooperate with the community forest program when they conduct operations that can affect trees.

The City of Durango should expand the tree preservation plan to include protected trees on private property, and in particular trees on properties being developed or redeveloped.

Tree Replacement Policy

The City of Durango Tree Replacement Policy specifies with construction projects impacting City maintained trees and protected trees, if trees have to be removed due to the lack of viable alternatives, trees are to be replaced according to the following criteria:

Diameter of the tree to be removed	Number of 3" caliper tree replacements
Group of 5 or more trees 3" diameter and above	1
Less than 10"	1
10 – 14"	2
15 – 19"	3
20" and above	5

NOXIOUS AND INVASIVE SPECIES IDENTIFICATION AND REMOVAL PLAN

In the community, there are two species of trees that are considered noxious and invasive and are listed for eradication within the City of Durango. The Russian Olive and Tamarisk are fast growing and capable of engulfing entire native ecosystems. In Durango the Russian olive is the more common species. The primary growing habitat in Durango is along the banks of the Animas River. A consistent eradication program has been in place for many years for both species but the resilient nature of the trees requires constant vigilance of identification and removal. Education of the public about the effects of these invasive trees is paramount in the success of eradication.

RUSSIAN OLIVE
(*Elaeagnus angustifolia*)

Description: Russian olive, also referred to as wild olive, oleaster, and silver berry, is a member of the Elaeagnaceae or Oleaster family. Russian olive is a fast-growing tree of moderate size that can reach heights from 10 to 25 feet. The trunks and branches of the tree are armed with 1 to 2 inch woody thorns. Leaves are simple, alternate, lanceolate to oblong, entire, and 1 1/2 to 3 inches in length. The upper surfaces of the leaves are light green and covered with silvery star-shaped hairs. The lower leaf surfaces are silvery white and densely covered with scales. Russian olive flowers are yellow, fragrant, and arranged in clusters. Fruits are olive-shaped, produced in large quantities, silvery when first formed, and tan to brown at maturity.

Distribution and Habitat: Russian olive is native to Europe and is primarily found throughout the central and western United States. The tree prefers sandy floodplains and can be associated with open, moist riparian habitats. Russian olive can tolerate a variety of moisture conditions from floods to droughts. The tree can tolerate shade and can establish on bare, mineral substrates. The tree is commonly found along streams, marshes, fields, open areas, and is abundant in riparian zones in the Great Plains.

Life History/Ecology: Russian olive is a hardy, long-lived shrub or small tree that grows rapidly and reproduces primarily by seed production, but may establish from underground root stalks

Russian olive mature bark, flowers and foliage fruit: Seedlings germinate anytime from fall to spring and develop a lateral root system. Russian olive is unable to bear fruit until the tree is three to five years old. The tree generally flowers from May to June and fruits mature from August to October. Seeds may remain viable up to three years.

History of Introduction: Russian olive is native to Europe and western Asia. The tree was originally planted in the United States in the late 1800s as an ornamental shrub or small tree. The tree was recommended for wildlife plantings, soil stabilization, and windbreaks up until the 1980s. Russian olive is now considered an escaped windbreak and horticultural planting that has become naturalized in riparian areas throughout the western United States. In North Dakota, Russian olive was widely planted as a windbreak in conservation plantings. Russian olive has been reported in the majority of the counties within the state with the exception of the north central part of the state. However, at this time the distribution of the invasive populations of the species has yet to be determined because Russian olive was likely planted in almost every county.

Effects of Invasion: Russian olive is an aggressive species that can quickly invade riparian areas. The tree forms dense, monotypic stands that out-compete and displace native vegetation, thus tree communities and wildlife habitats are quickly altered. Russian olive can also affect nutrient cycling and system hydrology by connecting lowland riparian forests with open, upland areas. Once infestations are established, stream bank stabilization is increased and river stage levels are reduced, creating a relatively dry upland site. As a result, desirable areas for native cottonwood and willow establishment become limited as these species cannot compete with advancing populations of Russian olive.

Control: Management objectives for Russian olive control should involve early detection and rapid response once populations are detected. Large, mature stands of Russian olive are almost impossible to completely eradicate, but small populations of the species can be adequately controlled. Seeds of Russian olive can remain viable in the soil for up to three years and plants can re-sprout or develop from root suckers from the root crown, therefore eradicated infestations should be monitored for several years to prevent re-establishment.

Mechanical - Hand pulling Russian olive is feasible when soil is moist. A weed wrench can be used to remove saplings with a trunk diameter less than 3 1/2 inches. Digging or pulling out larger trees is labor intensive and not recommended because the tree may re-sprout from root fragments left behind. Mowing can control young seedlings, but larger trees may re-sprout vigorously after being cut. Girdling or cutting is not effective unless combined with another control method. Prescribed burning may control small seedlings but will not adequately control larger trees.

Chemical - Triclopyr ester, glyphosate, and imazapyr can be effective in controlling Russian olive. Cut-stump methods can be effective if the trunk is cut as close to the ground as possible and herbicides are immediately applied to the cut surface of the tree. Foliar spraying or injecting herbicide capsules around the base of the trunk has also been shown to be successful.

TAMARISK
Tamarix ramosissima

Description: Tamarisk (also known as salt cedar) is a deciduous shrub or small tree from Eurasia. Tamarisk can grow as high as 25 feet tall. The bark on saplings and young branches is purplish or reddish-brown. Leaves are scale-like, alternate, with salt-secreting glands. Flowers are small and the petals are reddish, pinkish, or white. Each plant can produce as many as 500,000 seeds annually. The seeds are dispersed by wind, water, and animals. Seeds are small with a tuft of hair attached to one end enabling them to float long distances by wind and water. Seeds are short-lived and can germinate within 24 hours after dispersal, sometimes while still floating on the water.

History of Introduction: Eight species of Tamarisk were first brought to North America in the 1800s from Southern Europe or the eastern Mediterranean region. The species were first planted as ornamentals and later as windbreaks, and to stabilize river banks. Tamarix species escaped cultivation and are now widespread throughout the United States, with heavier concentrations in the Southwest.

Effects of Invasion: Tamarisk grows in dense, nearly impenetrable thickets. It also is well-adapted to alkaline (salty) soils. The soils of the southwest are naturally alkaline, but with the construction of dams, rivers are no longer able to flush salt from the ecosystems and soils are becoming even more alkaline, which deters general plant growth. Tamarisk creates even saltier soils by bringing up alkaline water which is deposited on the leaf surface. The salt returns to the upper soils via leaf drop. Tamarisk plants are thriving in the alkaline soils and replacing native vegetation, altering the ecosystem.

Tamarisk has additional negative effects on the surrounding environment by:

- narrowing and channelizing streams and rivers;
- displacing native vegetation such as cottonwoods, willows, and adjacent dryland plant communities;
- providing poor habitat for livestock, wild animals, and birds: the foliage and flowers of tamarisk provide little food value for native wildlife species that depend on nutrient-rich native plant resources;
- increasing wildfire hazards; and
- limiting human and animal use of the waterways.

Control: Chemical methods involve cutting the stump of a Tamarisk two inches above the soil surface and treating it with herbicide within minutes. Another herbicide can be applied near the base of the trunk when the bark is not wet or frozen. Tamarisk foliage can also be sprayed with herbicide in the fall. Unfortunately, re-growth often appears with any of these methods and re-treatment is necessary to kill the shrub.

Mechanical - controls include mowing, cutting and root plowing. However, these methods rarely kill the plant and often stimulate shrubby re-growth. Tamarisk is also adapted to fire and recovers more quickly than native riparian species after a burn because it sprouts vigorously from the root crown.

Biological - controls use living organisms to suppress Tamarisk. The extensive invasion of Tamarisk has justified the search for a suitable biological control agent. The Tamarisk or salt cedar leaf beetle, Diorhabda elongata, has been tested for 20 years and has been released at test locations in the western U.S.

The trees that make up the community forest have finite life spans and must be removed as they die. Living trees may also be removed when their health, appearance, or structural integrity decline substantially, or when they conflict excessively with utilities and structures. The likelihood that a tree will need to be removed for one reason or another increases as the tree grows older and larger. If areas are planted to a single species at one time, a large percentage of the trees will need to be removed over a short time period when they reach the end of their useful life. This results in a rapid reduction in canopy cover, and the loss of many of the benefits provided by the community forest. This undesirable situation is less likely to occur if the community forest is composed of a variety of tree age classes and species.

Serious pest outbreaks and epidemics can arise in communities in which large areas are planted to a single susceptible species or variety. These outbreaks can seriously impair the overall health, appearance, and longevity of the community forest. Species diversity and genetic diversity within species helps stabilize the community forest by buffering it from pest and disease epidemics. Many insect pests and plant pathogens can only attack one or a few tree species. The reproduction and spread of many tree pests and diseases will be slowed if the community forest contains a diverse mix of tree species. Furthermore, if an especially virulent disease or pest problem does develop on a given species; species diversity ensures that the condition of the entire community forest is not jeopardized.

The National Arbor Day Foundation
arborday.org

City of Durango Tree Inventory

The City of Durango initially completed a Tree Inventory in 2004 and this document is located on the City website at http://www.durangogov.org/parks/foresty.cfm#Inventory The inventory is updated annually by the City Arborist.

In accordance with the Land Use and Development Code, the City Tree Inventory currently functions as the Street Tree Plan. All new developments in the City of Durango have been required to submit a Street Tree Plan for review and approval by the City Arborist since 1982. The new development Street Tree Plans are incorporated into the City Tree Inventory once the trees are planted and accepted by the City for ongoing maintenance.

City of Durango Tree and Shrub Guide

The City of Durango Tree and Shrub Guide is available to the community on the City's website at http://www.durangogov.org/Forestry/trees.cfm

City of Durango Irrigation and Landscape Standards

The City of Durango Irrigation and Landscape Standards are available to the community on the City's website at http://www.durangogov.org/parks/Irrigation%20and%20Landscape%20Standards.pdf

Open Space is managed to preserve, protect, maintain and, where applicable, restore native ecosystems and passive recreational amenities. Native ecosystems may consist of plants, animals, water, soil, and geologic formations; aesthetic values such as scenic vistas; historic and cultural resources; and natural buffers from surrounding development.
Passive recreational amenities may include natural-surface trails; trail and trailhead signage; and other improvements consistent with the resource values of the specific parcel or area.

Baseline Assessment

At the time of acquisition, a baseline assessment will be completed on each property. The assessment will include a range of information that clearly defines the property characteristics and history; acquisition details; and resources to be protected. This may include assessments of native and non-native vegetation types, geologic and land formations, mineral resources; wildlife habitat; historic resources; potential natural hazards including fire, flood and soil resources; and existing and proposed uses of the property consistent with the resources being protected. The baseline assessment will include site photos, maps and supplemental studies that clearly delineate the resources identified. The assessment will be available to the public in both digital and written form.

Stewardship Components

Annually, a Stewardship Assessment will be prepared for the City's overall open space system. This assessment will be prepared based on information gathered during an annual physical inspection of each open space parcel by City staff, or other qualified individuals, who will identify resource degradation and/or maintenance needs of the parcel. Monitoring and proposed stewardship activities identified will be supplemented by input from City Advisory Boards, local citizens, and organized groups such as Trails 2000; Fort Lewis College students and faculty; and the Friends of the Mountain Parks.

The annual system-wide Stewardship Assessment will be used to prioritize system-wide stewardship expenditures for the coming year to be included in the City's Capital Improvement Program (CIP), and to be used as the basis for determining future volunteer efforts of City-sanctioned organizations and individuals.

Stewardship activities may include:

- Trash and debris removal
- Maintenance of the trail system and trailheads
- Elimination of social or unauthorized trails
- Elimination of illegal activities, including camping
- Monitoring impacts of public access
- Minimize impacts and conflicts with adjacent public and private lands
- Aquatic habitat protection, stream restoration and bank stabilization

- Protection of wildlife habitat
- Rare and endangered species protection
- Native species retention
- Reforestation, re-vegetation and landscape restoration
- Eradication of invasive and destructive non-native species
- Hazard reduction
- Ongoing fire management and healthy forest initiatives
- Seasonal closures for the protection or rejuvenation of specific resources, including wildlife and vegetation
- Compliance with City Codes and parcel specific conservation easement
- Promote local outdoor education

Reforestation

Because of the nature of the landscapes in town, low moisture and high temperatures, several considerations should be met. The reforestation planting will involve small seedlings (less than 1 inch stem and about 1 foot tall) that are scattered across a landscape. In a reforestation situation, a greater number of trees will be planted than expected to survive due to anticipated mortality. Only native species matched to the site will be selected for planting because they are adapted to the local soils, climate and other environmental conditions. No supplemental care, most importantly water, will be provided to the seedling trees, so it will be critical to select proper planting sites. A micro-site can provide protection from the sun, wind or wildlife, as well as minor water collection in a basin.

Wildland Fire Management

Wildfire is a natural and frequent event in southwest Colorado pine forests, pinon-juniper woodlands and gambel oak mountain shrub lands. Historically, frequent, low intensity surface fires thinned trees, reduced the forest of accumulated fuels and maintained biodiversity. Aggressive fire control over the last century has created unnatural fuel accumulations and changed the structure and composition of native wildland vegetation; resulting in hazardous wildfire conditions. Urban development and growth into the wildland areas has placed the City of Durango as well as natural resources at risk for wildfires. City parks and open space lands are wildland urban interface zones and require appropriate treatment.

The City initiated a fuels reduction program on natural lands in 2003 with the assistance of Durango Fire and Rescue Authority, San Juan Public Lands Fire Mitigation Specialists and the Colorado State Forest Service. Annually, high priority areas are treated using appropriate fuels reduction techniques including hand thinning, hydro-mowing and controlled burns.

The Community Forest Management Plan provides the foundation for the current and future stewardship of the community forest. Implementation goals are categorized as Ongoing, Short-term (up to 2 years), Mid-term (3 to 5 years) and Long-term (6 to 10 years) and include the following:

Increasing the Tree Inventory

- Update the City Tree Inventory annually and identify available planting sites on City property including street trees, park trees, Animas River greenway trees and natural lands trees. (Ongoing)
- Provide sufficient tree planting to keep pace with community growth and offset tree removal. Follow the Tree Replacement Policy which establishes the number of replacement trees based upon the size or caliper of the existing tree to be removed. (Ongoing)
- Increase species and age diversity to provide long term community forest health. Set a quantity limit for any one species. (Ongoing)
- Establish measurable goals such as plantings per year and plantings versus removals and continue the system to measure the percent of canopy cover for green infrastructure. (Short-term)
- Enhance City Tree Inventory with Action Plans identifying tree-deficient areas with quantification of number of trees needed and costs. (Short-term)
- Expand tree plantings and shrubs in the community forest including shading playgrounds and park benches, as well as reforestation of City lands. (Mid-term)
- Increase the proportion of large statured trees in the community forest for greater canopy effect. (Mid-term)
- Increase the overall vegetation canopy in Durango by 5% by 2025 by planting 3,000 new trees on public and private property. (Long-term)

Preserve and Maintain the Existing Community Forest

- Promote the protection of existing trees on private property during development or redevelopment in accordance with the Land Use and Development Code. (Ongoing)
- Ensure proper compatibility between trees and planting sites to reduce sidewalk damage and conflicts with overhead utilities that lead to premature tree removal. (Ongoing)
- All City projects are required to involve the City Arborist to ensure adequate protection of existing trees and vegetation. (Ongoing)
- Coordinate with La Plata Electric Association on planting within easements and maintaining clearances from utilities. (Ongoing)
- Protect the existing tree resource including park trees from turf maintenance machinery damage, and downtown and sidewalk trees from bicycle parking and high traffic. (Ongoing)

- Maintain the City's inventory for trees on City owned property and expand upon the i-Tree data analysis illustrating the benefits of the community forest. (Ongoing)
- Continue the designation of Durango as a Tree City USA. (Ongoing)
- Aggressively reduce Russian Olive Trees. Measures could include a public awareness campaign, resources for removal, and consider an ordinance that requires private landowners to take action or be subject to penalties based on impacts to adjacent properties. (Short-term)
- Increase training and education for tree program employees to ensure high quality tree care. (Short-term)
- Establish and maintain affiliate memberships to state and national tree organizations, including the Sustainable Urban Forests Coalition. (Mid-term)
- Improve the canopy/tree inventory data with ground-based observations and measurements on private property. (Long-term)

Compatibility with City's Environmental and Sustainability Goals

- Promote the community forest goals that are compatible with the environmental and sustainability goals of the City. (Ongoing)
- Coordinate with the Community Development Department on maintaining and implementing current tree and landscaping standards in the Land Use and Development Code. (Ongoing)
- Address safety aspects of winter shading of roads, sidewalks, driveways and bike paths. (Ongoing)
- Cooperatively work with public and private institutions to enhance the community forest. (Ongoing)
- Promote the reduction of the use of paper and provide The Community Forest Management as a paperless plan on the City website. (Ongoing)
- Annual stewardship assessment of City open space and implementation of identified goals. (Ongoing)
- Coordinate tree-related activities of municipal departments and other public organizations. (Short-term)
- Identify locations (basins) where limited stormwater infrastructure exist, and evaluate the potential for green infrastructure as a cost-effective measure for reducing flood risks and improving water quality. (Mid-term)
- Tailor the implementation plan to address energy/use and conservation for Durango's climate, including solar winter shading. (Long-term)

Foster Public Support

- Increase public awareness of values and benefits associated with trees and the green infrastructure. (Ongoing)
- Encourage private property owners to maintain live trees in perpetuity and replace trees in the public right-of-way when a tree dies or is removed. (Short-term)
- Create a volunteer citizen's Tree Advocacy Group, similar to the Animas River Task Force. (Short-term)

- Promote the celebration of trees with community events to include planting trees. (Short-term)
- Promote better private tree and shrub planting and care through public understanding of biological needs of vegetation. (Short-term)
- Develop a "Protected Tree" program through educational efforts and to ensure the preservation of exceptional trees. Invite citizens to nominate individual trees, on public or private land, to be declared "Protected Trees". (Mid-term)
- Survey Durango residents on their desired Community Forest improvements when exploring Parks and Recreation funding priorities. (Mid-term)

Secure Adequate Funding

- Optimize the use of limited financial and personnel resources including leveraging grants and other funding sources. (Ongoing)
- Obtain adequate funding to achieve the community forest goals including City funds, partnerships with private/business funding and grants. (Ongoing)
- Ensure Best Management Practices with adequate staff to maintain the community forest, consistent with the standards identified in the 2010 Parks, Open Space, Trails and Recreation Master Plan. (Ongoing)
- Provide adequate infrastructure to water trees in the Community Forest by installing automated irrigation or by volunteer watering agreements to ensure successful establishment and long-term health of the vegetation. (Ongoing)
- Annually budget for Community Forest improvements and quantify actual costs for tree plantings and maintenance. In 2013, the cost to plant one tree is $450 with an annual maintenance cost of $26. (Ongoing)
- Secure long term funding for the analysis of suitable planting areas estimated at $50,000 and contracted tree planting (3,000 trees x $450/tree) in the amount of $1,350,000.
- Expand the Tree Cost Share Program to allow planting of trees on private property where there is not sufficient space in the City right-of-way for planting trees. The City and homeowner would equally share in the cost to plant the tree and the homeowner would be responsible for the maintenance of the tree in accordance with City standards. (Short-term)

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