2015 CITY OF LIVINGSTON, MONTANA URBAN FOREST MANAGEMENT PLAN

Proposed Strategies to Establish a Cooperative and Interactive Community- Based Street & Park Tree Program

Written & photographed by:
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Funded by:
Montana Department of Natural Resources & Conservation
In co-operation with:
The City of Livingston, MT

ACKNOWLEDGEMENTS

Funding for this project provided by:

MONTANA DEPARTMENT OF NATURAL RESOURCES & CONSERVATION

In Cooperation with:

THE CITY OF LIVINGSTON, MONTANA

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SUMMARY

The 2014 i-tree™ inventory of Livingston's public trees should be utilized to schedule and manage a pro-active 5 year plan for tree maintenance. The plan should consider trees as an essential component of the City's infrastructure and urban ecosystem; sustained in cooperation with various partnerships and volunteers to connect the community and its trees in a cost efficient and safe operational manner.
Note: For efficient ease of reading this document, the City of Livingston is referenced as "the City", or "Livingston" and the Urban Forest Management Plan is referenced as "the Plan". The abbreviation "UF" is used to reference Urban Forest.

PURPOSE OF THE PLAN:

The purpose of the management plan is to assess the current components and operations relative to the management of publically-owned trees; and to assist the City of Livingston in creating and establishing new clear set of priorities and objectives to safely and efficiently manage the City's public park, cemetery, and boulevard street trees for the next 5 years. The Plan's main objectives are to take into account all the benefits, costs, hazards, and risks associated with future decisions related to the retention, remedial mitigation, removal, and replacement of publically-owned trees; and to explain and relate that data to diverse segments of the City which include:

- Elected public officials
- City Administrators, Department Heads, Staff, employees
- Tree Board Members
- Community residents
- Business owners

This management plan document is directly based on collected data from the 2014 i-Tree® complete tree inventory of Livingston's public trees. The inventory is the basis of the "*City of Livingston, Montana, 2014 Inventory Report of Municipal Park, Boulevard, and Cemetery Trees*".
The inventory and report can be found on the City's official website: www.livingstonmontana.org. and it is suggested that reading the document will be beneficial in understanding the UF plan.

BACKGROUND INFORMATION

The UF Plan is funded through a grant provided by the Montana Department of Natural Resources & Conservation (MT DNRC) and is administered by the City of Livingston, MT.

Several agencies and people were interviewed or contributed information needed to write the Plan and include:

- City of Livingston Public Works
- City of Livingston Parks & Recreation

- The Livingston Tree Board
- Montana State University Extension Service
- Northwestern Energy

The City also hosted an online questionnaire survey related to several topics of local tree issues that community members could express their opinions and offer suggestions.

A review of the existing City Tree Ordinance (Livingston, MT Code of Ordinances. Sec.23-2 thru Sec.23-28) was performed, as well as the documents pertaining to the City's

- Application For Removal/Trimming/Pruning Of Trees On Boulevard
- Application For Permit To Plant Trees On Public Street Right Of Way
- List Of Recommended Trees For Planting In Public Right-Of-Ways
- List Of Trees Not Suitable For Planting In Public Right-Of-Ways

Ancillary documents also referenced for the UF Plan include:

- City of Livingston Parks & Trails Master Plan
- City of Livingston Capital Improvement Plan
- City of Livingston 2015 Annual Budget Report
- Livingston Urban Renewal Agency: Downtown Tax Increment District Fund Financial Analysis

Several on-site visits and observations in many City parks and streets, as well as City functions such as the 4th of July parade and the art/craft fair at Depot Park were conducted throughout the summer.

INTRODUCTION: WHAT IS URBAN & COMMUNITY FORESTRY?

The terms "urban forestry" and "community forestry" are frequently used when talking about management of a city or town's trees. According to the National Arbor Day Foundation, the term "urban forestry" originally dates to 1965, and is accredited to Erik Jorgenson of the University of Toronto, when he defined it as "not city trees or single tree management, but rather tree management in the entire area influenced by and utilized by the urban population."

Although this first known reference to urban forestry is only 50 years old, the first recorded tree ordinance occurred in 1700, when the city of Philadelphia required property owners to plant trees outside of their home doors (hence the antiquated term "door trees".) Subsequently, Philadelphia hired its first "chief forester" in 1896, and in 1899 the State of Massachusetts enacted the "Tree Warden Act" which specified that all towns in the State must elect a person who would be in charge of municipal tree care.

In 1872, J. Sterling Morton created "Arbor Day" in Nebraska to encourage school kids to plant trees, yet the concept of community tree value and organized public tree care was brought to the forefront by the widespread devastation of American elm trees caused by a fungus known as Dutch Elm Disease.

In 1972, Congress passed legislation that put the U.S. Forest Service in charge of urban forest program development; and the 1990 Congressional Farm Bill enacted urban forestry legislation that allowed the Forest Service to offer state governments grant money to create, design, and implement urban forestry programs. To date, State urban forestry programs are funded by the Forest Service through federal Farm Bill funds.

For the purpose of this UF Plan, the terms urban or community forestry are considered interchangeable and are characterized by using the National Arbor Day Foundation's definition:

> *"Urban or Community Forestry is the systematic management and care of amenity, or landscape, trees, collectively, in human settlements."*

EXAMPLES OF URBAN & COMMUNITY FORESTRY PROGRAMS:

Establish in 1875, American Forests is our country's most enduring national nonprofit conservation organization. Its notable achievements include the founding the U.S. Forest Service and the national park systems.
www.americanforests.org/urbanforests

Managing the Urban Forest by Connecting People and Trees to Promote Partnerships & Sustainability

Over the past 10-15 years the concept and definition of urban & community forestry has evolved to include the factor of "sustainability" by means of focusing on a systematic and collective strategy of tree management. This relatively new direction of thinking is best described by the National Arbor Day Foundation:

> *"Sustainable urban forestry is based on the concept of sustainable urban ecosystems, or landscapes designed and managed to minimize impact on the environment and maximize value received for dollars expended in the long term."*

To further illustrate and inform the City of contemporary sustainable urban forest challenges and successful strategies developed by communities to solve those challenges; the following examples from diverse communities should be considered food for thought as Livingston addresses the challenges and opportunities of managing trees in the next 5 years. These examples, with the exception of Sidney, Montana, are documented in the 2012 *"Urban Forests Case Studies: Challenges, Potential and Success in a Dozen Cities"*, published by American Forests.

SIDNEY, MONTANA

- "Re-Tree Sidney" was a 2014 DNRC grant-funded program started by Sidney's Parks Superintendent to educate community members about the environmental and monetary importance of trees; and to help homeowners select, plant, and successfully care for a variety of diverse tree species intended to replace the hundreds of dead and diseased American elms that once shaded a large portion of Sidney.
- The success of Re-Tree Sidney caused the program to expand and in 2015 it was renamed "Re-Tree Richland County" to accommodate the wishes of property owners outside the City limits who wanted to learn about and successfully plant and care for new trees.
- Participants ***must*** attend a workshop to learn about tree biology, tree identification, soils, insects & diseases, and modern tree care practices. Upon learning about local tree ordinances and regulations, attendees are given a choice of selecting one free tree (from a choice of 9 species) that is site appropriate.
- Site evaluations are reviewed by the local Tree Board and the attendees are responsible for planting the tree at their own cost and time. Trees that die from owner neglect automatically make the homeowner ineligible for future trees and the homeowner must remove the dead tree and stump at their own cost.

"I always tell people to look up at trees…Trees are an asset to our community that provide comfort and increases to property value."
-Stephanie Garvey-Ridl
City of Sidney, Montana
Park Superintendent

- In 2015, Montana-Dakota Utilities partnered with the City of Sidney to donate money for the purpose of planting trees on public grounds.
- In 2015, the Sidney Country Club partnered with the City's Park Superintendent to host a tour of the golf course trees to show community members tree-related issues such as tree hazards, problems caused by tree topping, and Emerald Ash Borer (EAB) insect traps.

PORTLAND, OREGON:

- In 2008, Portland's Bureau of Environmental Services (BES) created the "Grey to Green" initiative. The goal is to utilize green infrastructure activities to support basic city functions. Emphasis is managing stormwater as a resource than a waste product and trees are considered a major component of that effort. For example, the City planted 2 million trees along the rivers leading into the municipal water treatment plant that in effect saved the City $50 million dollars in construction of new gray infrastructures designed to treat wastewater

.

- The creation of the nonprofit "Friends of Trees" started out as a one-person grassroots effort to plant neighborhood trees and has evolved to training volunteers to correctly plant up to 250 trees per season. Volunteers called "summer inspectors" also survey and document the plantings-resulting in a 97% first year survival rate.
- Portland's "Urban Forestry Neighborhood Tree Steward" program provides a 7 session training course that instructs volunteers about basic tree care, with an emphasis on tree biology, planting, and preservation. These volunteers then partner with their Neighborhood Tree Steward Coalition to tackle needed projects like small street tree pruning and maintenance.
- "Treebate" is an incentive strategy designed for private property owners to plant trees. This program allows homeowners to plant any tree species from a pre-approved list, then the homeowner submits a receipt to the BES and receives a utility bill credit for half of the tree's purchase price up to $50.00

"The strength of our program certainly is our partnerships."
-Jennifer Karps, Grey to Green Canopy Coordinator, Portland BES

PHILADELPHIA, PENNSYLVANIA

- TreePhilly, a 2012 Parks & Recreation program, partners with other tree advocacy groups with the intent of engaging community members in tree planting and management endeavors. Using GIS technology, TreePhilly identifies specific neighborhoods that need trees and tree management skills by networking with knowledgeable arborists and horticulturists.

"Tree Tenders is a really powerful network. You have these advocates in a lot of the neighborhoods in Philly, where they plant trees twice a year or have pruning clubs. It's a nice network of community-oriented work."
-Erica Smith Fichman
TreePhilly manager

- The nonprofit Pennsylvania Horticultural Society (PHS) established the Tree Tenders Program that focuses on basic training for understanding tree biology, tree identification, proper planting techniques, and maintenance.

WASHINGTON, D.C.

- The District of Columbia's street tree program dates to 1860. In 2000, the responsibility of tree maintenance was transferred from the Department of Public Works to the newly-created District Department of Transportation.

"Moving to DDOT was a good move; it allows us to put more emphasis on the importance of street trees and protection of trees in projects."
-John Thomas
District Department of Transportation, Urban Forestry Administration

- D.C.'s "Water By-Cycle is a program that utilizes bicycle power to water trees in areas where large water trucks cannot easily access.
- Summer Crew is a partly funded U.S. Forest Service summer job training program for high school students. Up to 10 students are employed to weed, mulch, and water trees that have been planted in the past few years.
- Canopy Keepers is a D.C. Urban Forestry Administration (UFA) program that enables community members to apply to adopt a tree near their home. UFA then delivers a free, 10 gallon slow-drip watering bucket which the homeowner is responsible for filling throughout the growing season.

SACRAMENTO, CALIFORNIA

- Created in 1911, the Sacramento Parks & Recreation Department was organizationally changed in 2003-04. A best management practices (BMP) study was adopted by the City which moved urban forestry out of Parks into its own division headed up by an Urban Forester/Division Manager. In 2007, this division was transferred to the Department of Transportation. And, in 2012, urban forestry was moved to the Department of Public Works.

- The Sacramento Tree Foundation created the "Greenprint Initiative". Among the goals are to connect businesses, governmental agencies, elected officials, and volunteer groups to develop urban forests initiatives.

- Sacramento established a 3-5 year tree pruning cycle in 2007-which matches industry standards for tree pruning

"Urban trees are all about people and their value and benefits."
-Ray Tretheway, Executive Director, Sacramento Tree Foundation

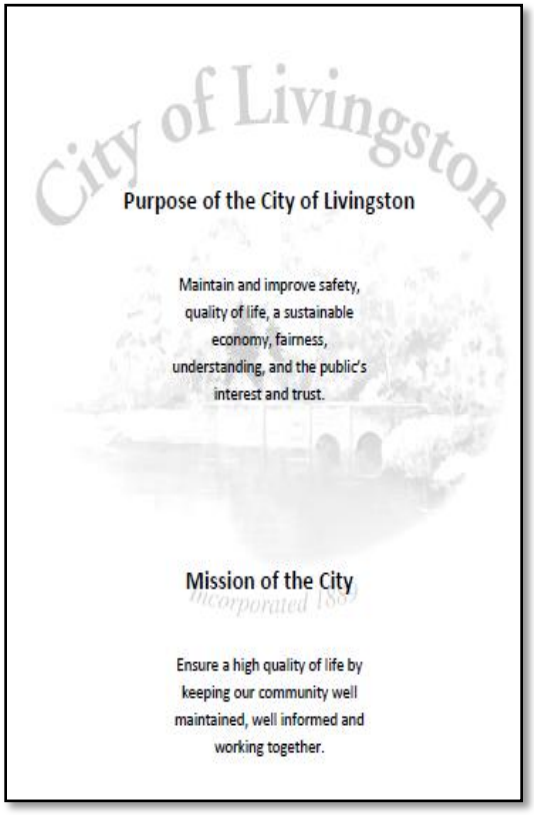
"Trees are not always considered part of the necessary infrastructure. They're considered an amenity rather than a necessity."
-Joe Benassini, Urban Forester, City of Sacramento

DENVER, COLORADO

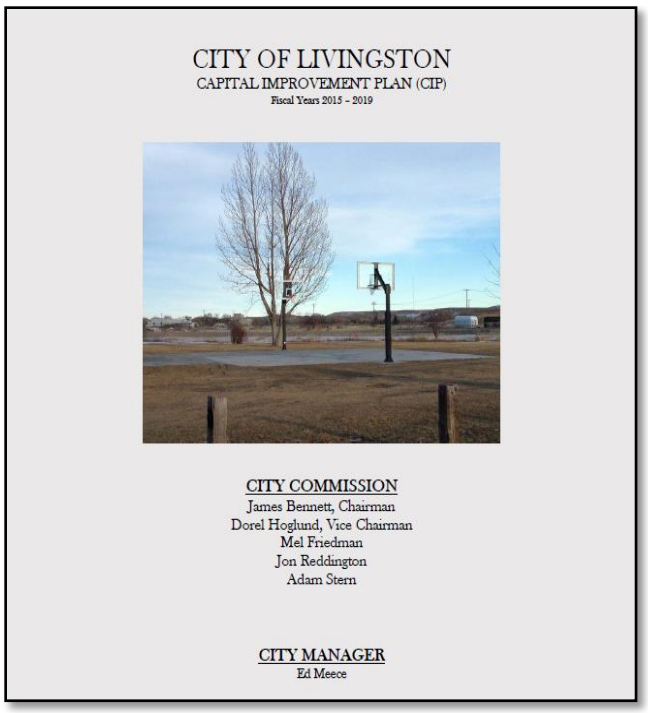
- The "Park People" program was establish in 1969 by numerous public park supporters who realized that Denver Parks & Recreation Department lacked sufficient funds to adequately support the City's park system.
- "Denver Digs Trees" was founded over 20 years ago in the garages of outdoor-mined residents who combined their concern and appreciation of trees with their community organizational skills to promote neighborhood tree projects.
- Denver's Community Forester program began in 2003 with the goal of recruiting volunteers to aid the City's Forestry Division in planting and managing trees. The program consists of 4 training workshops that include field time experience in pruning and tree identification.

Upon completion of the Community Forester workshops, graduates are qualified to lead tree planting projects to new participants

LINKING LIVINGSTON'S 2014 TREE INVENTORY DATA FINDINGS TO EXISTING PUBLIC DOCUMENTS:



Purpose of the City of Livingston:
"Maintain and improve safety, quality of life…"
**Tree inventory rated 49% (1,890 trees) as High Risks.*
Each public tree in Livingston contributes and average annual benefit of $151.85 in energy savings, carbon dioxide sequestration, improved air quality, stormwater reduction, and amenity property values.
Mission of the City:
"Ensure a high quality of life by keeping our community well maintained"
**Tree inventory lists 3,188 out of 3,880 public trees in need of some form of pruning*


CITY OF LIVINGSTON
CAPITAL IMPROVEMENT PLAN (CIP)
Fiscal Years 2015 - 2019

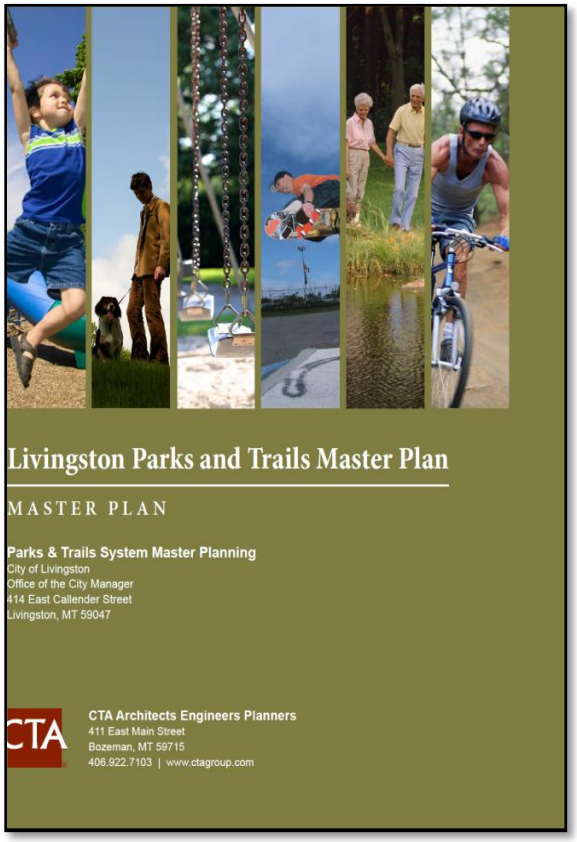
CITY COMMISSION
James Bennett, Chairman
Dorel Hoglund, Vice Chairman
Mel Friedman
Jon Reddington
Adam Stern

CITY MANAGER
Ed Meece

CIP needs assessment of infrastructure maintenance, replacement, or purchase programs list includes:

- ✓ *Playground equipment*
- ✓ *Water storage tanks*
- ✓ *Water well fencing*
- ✓ *Roof replacement*
- ✓ *Water mains*
- ✓ *Lift station rehabilitation*
- ✓ *Storm drain cleaning*
- ✓ *Telemetry base station*
- ✓ *Exterior staircase*

**No specific line item or mention of tree care & maintenance is included on programs list (excluding $50,000 bucket truck aerial lift)*
Tree inventory identified 1,366 sidewalk heave conflicts caused by trees


Livingston Parks and Trails Master Plan

MASTER PLAN

Parks & Trails System Master Planning
City of Livingston
Office of the City Manager
414 East Callender Street
Livingston, MT 59047

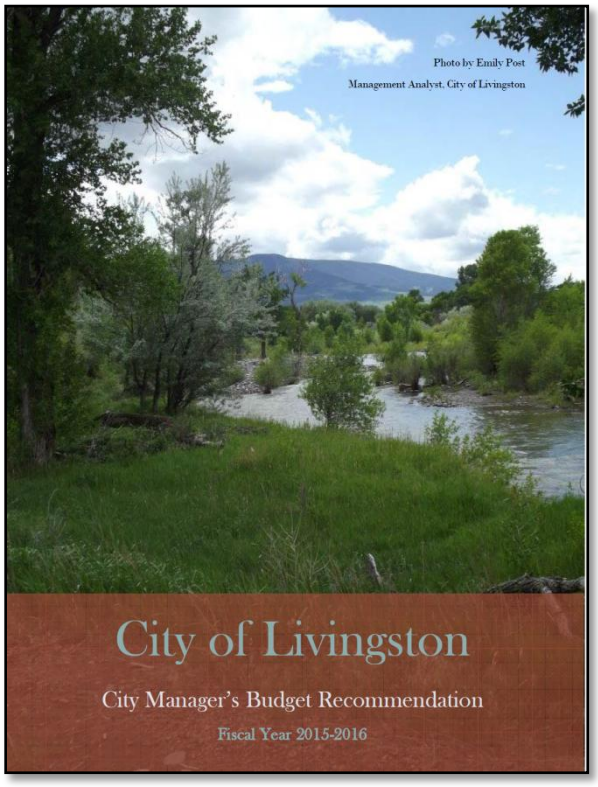
CTA Architects Engineers Planners
411 East Main Street
Bozeman, MT 59715
406.922.7103 | www.ctagroup.com

Livingston Parks & Trails Master Plan: Narrative Observations:

Sacajawea Park: *"Park has large concentration of shade trees in the S. W. corner around the picnic area and in the center of the park around Pompey's Playground."*
****Tree inventory lists only 4 out of 354 trees located in Sacajawea Park as no maintenance needs***

Depot Park*: "Lots of mature shade trees and evergreens. Great overhead canopy and a wonderful sense of enclosure…"*
****Tree inventory lists 147 trees in need of some form of pruning maintenance.***

North Side Park*: "Several new shade trees…have been installed. Great screening and an excellent buffer on both the east and west sides of park."*
****Tree inventory records10 trees on east-west boundaries as dead. (Planted: 2010)***



- ✓ *City of Livingston FY 2015-2016 Budget Recommendations lacks specific line item funds for tree maintenance.*
- ✓ *$13,000.00 non-budgeted funds had to be spent to pay for removal of high-risk, hazardous trees identified in the 2014 tree inventory.*
- ✓ *Tree inventory lists 1,770 green ash trees potentially susceptible to succumbing from Emerald Ash Borer (EAB) insects. Yearly estimated costs of protective insecticide application could total over $150,000.*

LIVINGSTON, MONTANA CODE OF ORDINANCES: Chapter 23-TREES

***Section23-1.A.2**. "ANSI A300 Standards shall apply to any person or entity engaged in the business, trade, or performance of repairing, maintain or preserving trees.."*

***Section23-14. Tree topping**: "It shall be unlawful as a normal practice for any person, firm, or City department to top any street tree, park tree, or other tree on public property."*

**The tree inventory recorded hundreds of topped trees similar to the ash tree in photo*

***Section23-15. pruning and corner clearance:** "Every owner of any tree overhanging any street right-of-way within the City shall prune the branches so that…such branches shall not obstruct the view of any intersection…"*

**The tree inventory recorded numerous trees that obscured signage such as the stop sign in photo*

Section 23-10. Distance from street corners and fireplugs*: "No street tree shall be planted within 35 feet of any street corner."*
**The tree inventory recorded numerous trees located in close proximity of street corners and fireplugs.*

Section 23-11. Utilities: *"No street trees other than those species accepted as small trees by the Tree Board may be planted under, or within 10 feet of any overhead utility line."*
**Honeylocust trees shown in photo are listed by the Tree Board as large trees over 40 feet at maturity, and are a recommended species for planting in public right-of-ways.*

Downtown Tax Increment District Fund: FY2015, 17, 18

Downtown Livingston
August 2015

Project Description: *"Sidewalk furniture (benches and bicycle racks) enhances the walk-ability and accessibility of downtown, providing many health and economic benefits."*
Advantages of Approval:
"Sidewalk furniture enhances the overall friendliness of an area, making it more inviting to visitors, and leading to an increase in retail sales."

Downtown Livingston
4th of July, 2015

"Relatively inexpensive enhancements such as flower baskets create a sense of place and add color & interest to the downtown area. Improves the overall appearance of the downtown area, inserting the natural environment into the more structured downtown."
NOTE: *Flower baskets cost $10,000 annually.*
Trees are not mentioned in the Downtown Tax Increment Funding District.

The tree inventory calculates that each boulevard tree contributes a yearly average of $49.75 in environmental benefits and $116.28 in aesthetic & monetary value

CITY OF LIVINGSTON ON-LINE TREE QUESTIONAIRE SURVEY

The City hosted a tree survey (June-July, 2015) on the official city website to gather information related to community members opinions and beliefs about general tree issues. Note: A total of 55 people completed the survey. *Open-ended, multiply choice questions can exceed 100%
Survey result summary:

What are the top 3 most important benefits of trees?:

1. 41% - Clean the air
2. 30% - Reduce greenhouse gases
3. 14% - Provide food & shelter for animals/birds
4. 13% - Shade streets
5. 6% - Increase property value
6. 6% - Stabilize soil
7. 12% - Other reasons

In your neighborhood are there too many or too few public trees?

1. 53% -Too few trees
2. 44% - Enough trees
3. 02% - Too many trees

What are the top 2 concerns relating to tree planting and care?

1. 38% - Sidewalks and pavement cracking
2. 38% - Block traffic signs & street lights
3. 25% - Creating safely problems from falling
4. 19% leaves & fruit dropping
5. 12% - Trees cost too much money
6. 07% - Attract bugs & pests
7. 12% - Other concerns

What are you willing to do to ensure Livingston's trees are maintained and protected for future generations?

1. 83% - Plant new trees on my property when trees need to be removed or die
2. 51% - Vote in support of creating a tree district that would tax residents for tree care
3. 36% - Volunteer to plant and maintain trees on public property

How much would you be willing to pay annually in an additional tax to pay for tree planting, care, and dead tree removal?

1. 46% - $25.00
2. 22% - $00.00
3. 13% - $10.00
4. 13% - $ 5.00
5. 06% - $15.00

Why are trees important to you (personally) and your family? *Top 2 responses

1. Shade – 8 responses
2. Beauty-6 responses

Comments/suggestions

"I think there is some confusion as to who is in charge of the boulevard trees

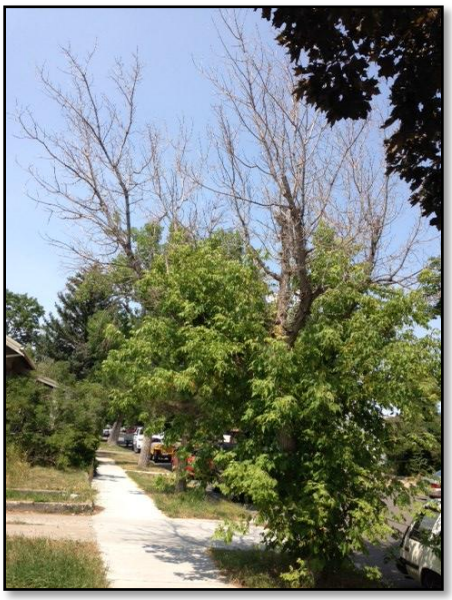
No more taxes!!! Maintain what the city has and don't expect property owners to maintain City trees on boulevards."

"Please don't tax us for trees, just promote their benefit to the public."

PUBLIC WORK PROJECTS, PARKS, AND TREES

While the mention of and budget items related to Livingston's public trees are scarce in the public documents reviewed in this Plan, the fact remains that trees are indirectly and directly affected by the day-to-day operations and municipal infrastructure projects that have occurred over the past years.

The following photos show scenarios where lack of tree management planning in conjunction with infrastructure replacement & repair projects may have damaged trees, and/or made them more of a risk liability.



Dying trees where newer walks were installed.

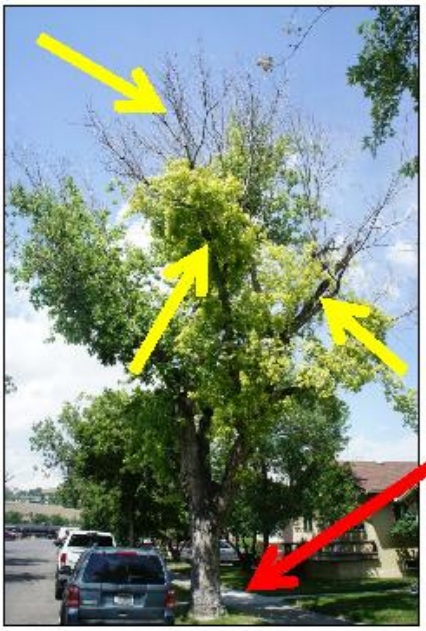
New tree with root damage from 2014 line installation

Maple tree with symptoms of decline in health where new sidewalks have been installed (2014)

Same tree one year later. Arrows point to dead/dying branches that had leaves in 2014

NEW SIDEWALKS – OLD TREES:

NO FORMAL SPECIFICATIONS FOR TREE RETENTION, REMEDIAL AFTERCARE, OR REMOVAL OPTIONS. *Red arrow points to recent walkway work. Yellow arrows point to structural & biological tree deficiencies



DAMAGE TO TREES AT PUBLIC FUNCTIONS:
Arts & Crafts Fair at Depot Park 2015

THE FACE OF FAILURE: LACK OF WATER FOR NEW TREES AT NORTHSIDE PARK

"Several new shade trees…have been installed. Great screening and an excellent buffer…"
-Livingston Parks & Trails Master Plan

REVIEW OF LIVINGSTON'S CURRENT MUNICIPAL TREE MANAGEMENT

The City of Livingston does not have a municipal tree management or maintenance plan, yet it has taken the first and most important step of developing a program by completing the 2014 Citywide i-tree™ inventory of parks, cemetery and boulevard trees.
At the present time, there is no scheduled tree maintenance pruning cycles and most trees are managed when residents contact the City with concerns or requests, or when trees are damaged and fallen by abnormal weather events. This sort of "reactive" tree management is not cost effective ($13,000.00 in unscheduled removals last year of high hazard/high risk trees identified during the tree inventory field work), and increases the risk that high value targets such as people and personal property will be harmed by hazardous tree failures in the future.

The City's Tree Ordinance refers to a "City Forester" [Sec.23-12-Public tree care] yet the City does not have a full time employee (FTE) with a formal degree or Certification in the fields of Arboriculture and/or Municipal Forestry, and whose specific responsibilities and duties are solely related to the care of public trees.
A City employee is in the process of becoming an International Society of Arboriculture (ISA) Certified Arborist and has field experience of trimming/pruning trees, but lacks trained experience in working in trees from the aerial bucket truck that the City recently purchased.

This document's previous section that linked the 2014 tree inventory data to extant City documents shows that:

- Municipal tree management is not a budgeted item
- Numerous tree ordinances are not enforced or monitored
- Numerous public works projects and lack of aftercare management have adversely affected municipal tree health & condition
- Public works projects related to parks and the downtown district omit tree planning

CONCLUSIONS

The existing City policies of reactive funding for regular tree maintenance, exclusion of tree care management practices and funding relative to infrastructure projects, and lack of adhering to existing municipal tree code ordinances are economically unsustainable, environmentally destructive, and create higher risks to residents and their property.

The 2014 inventory data of 3,880 trees list:

- 710 trees (18%) should be removed. *283 (7%) are listed as dead/dying
- 2,478 trees (82%) need some form of maintenance pruning
- 329 trees (8%) are conflicting with overhead utility lines
- 1,372 trees (35%) have caused sidewalk heave (tripping hazards)
- 990 trees (26%) rated at moderate risk
- 1,890 trees (49%) rated at high risk

The EAB Factor:

1,770 green ash (*Fraxinus pennsylvanica*) trees make up 46% of all public trees. Over the past 13 years, green ash trees across the country have been attacked by an invasive beetle known as the emerald ash borer (EAB). To date, over 10 million ash trees have died from EAB and although it is not yet confirmed in Montana, in 2014 it was confirmed in Boulder, Colorado. EAB can kill an ash tree within 2 years and the application of insecticides to protect ash trees from EAB have averaged about $150.00 per tree for an average-sized tree. **NOTE**: Data from Ohio estimates the total costs for EAB management ranges from$157,000-$665,000 per 1,000 residents.

***SEE SUPPORTING MATERIAL: EAB. PAGE 33**

NOTE: EAB preventative treatments must be made yearly. The City would need to budget around $42,000.00 per year for treatments of ash trees located in the parks and cemetery. If all ash trees were to be applicated the costs would exceed $265,000.00 per year. The potential and worst-case scenario costs associated with the total removal of 1,770 dead ash trees due to EAB would cost the City $1,062.000.00 (based on an average removal cost of $600.00 per tree).

MANAGEMENT PLAN RECOMMENDATION OPTIONS

*Management option considerations should be based on the premise that sustainable community forest programs are best constructed by input from, and in partnership with, all segments of: public agencies, business entities, local media, private utility companies, schools, volunteers, and private sector homeowners.

*Management options should utilize the full data sets compiled in the 2014 itree™ inventory to best compare the costs of tree management in relation to the overall value of public trees.

Management Option 1:

Budget: Keep annual funding based on Tree City USA® minimum requirements of $2.00 per capita. The July 1, 2014 estimated population of Livingston was 7,136. At $2.00 per capita funding = $14,292.00. Budget should consider the following line item budget formulated by i-tree™. **NOTE**: To date, the budget maintains an approximate balance of $18,000.00.

Livingston

Annual Management Costs of Public Trees

8/18/2015

Expenditures	Total ($)	$/Tree	$/Capita
Purchasing Trees and Planting	0	0.00	0.00
Contract Pruning	0	0.00	0.00
Pest Management	0	0.00	0.00
Irrigation	0	0.00	0.00
Removal	0	0.00	0.00
Administration	0	0.00	0.00
Inspection/Service	0	0.00	0.00
Infrastructure Repairs	0	0.00	0.00
Litter Clean-up	0	0.00	0.00
Liability/Claim	0	0.00	0.00
Other Cost	0	0.00	0.00
Total Expenditures	0	0.00	0.00

Note: Due to the high numbers of recently planted trees that have not survived or are in poor health & condition, it is recommended that no new trees be planted for at least 1 year or until new policies & specifications for tree planting and aftercare management are enacted & enforced.

FY2015 Budget should include costs of attending the September 30-October 2, 2015 "Northern Rockies Trees School" to be held in Livingston. The tree school is featuring two internationally-known speakers, Dr. Kathleen Wolf, University of Washington, and Dr. Tom Smiley, Bartlett Tree Research.

- Dr. Wolf's topics will include:
- Trees and Human Health
- Planning for Trees Commercially: Livability & Retail Response
- Sanitary, Sustainable, Sacred: Understanding Human Interactions with Trees

Dr. Smiley's topics will include:

- Growing Trees Near Concrete
- Tree Risk Assessment: Root Cutting & New Inspection Techniques

Additionally, the tree school is featuring a presentation *"Trees and Sidewalks: Risks and Liability*" from Alan Hulse, Montana Municipal Interlocal Authority.

COST OF ATTENDANCE: $150.00 PER PERSON

Recommendation that at least one City employee from Public Works, Parks & Rec, and the Livingston Tree Board should attend

COST OF 3 ATTENDEES: $450.00

FY 2015 Budget should also include costs of training & travel for the City employee who will have the responsibility and duty of pruning trees in the newly-acquired City aerial bucket truck, and who has been delegated by extant Tree Ordinance's to inspect and make recommendations for remedial action concerning dead or diseased trees that constitute "hazards to life and property."

Estimated Costs of attending an accredited training program: $3, 000.00. (travel,lodging,registration costs).

Livingston Tree Board:

The Livingston Code of Ordinances, Section 23-5. Duties and responsibilities of states:

> *"It shall be the responsibility of the City Tree Board to study, investigate, counsel, develop and administer a written plan for the care, preservation, pruning, planting, replanting, removal or disposition of trees and shrubs in parks, and in other public areas.*

Such plan will be presented annually to the City Commission and upon their acceptance and approval shall constitute the official comprehensive City tree plan."

These duties and responsibilities should be integrated with Capital Improvement Plans in advance of infrastructure work related to sidewalks and streets that directly affect the health and condition of public trees. The Tree board should have timely access to pertinent information from the Planning Department in public works projects that will directly affect the health and condition of public trees, particularly damage to root systems and proposed specifications for such trees relative to their retention or removal during or after infrastructure work.
The Code of Ordinance, Section 23-5 also states:

"The Board shall promote and supervise the establishment of a tree inventory for street and park trees. The inventory shall be updated with the results of the ground inspections every three (3) years."

The Board should have full knowledge of and utilize the i-tree™ data from the 2014 inventory as the "template" of fulfilling this particular duty and responsibility. The Board should make available in a timely manner to the Planning Department any and all updates compiled from the 3 year ground inspection cycle.

The Tree Board should consider holding at least two meetings per year at one of the City parks. Meeting at a park brings the trees closer to the Board and it can be a useful way of connecting with residents who live near and recreate in a neighborhood park. Conducting "listen and learn" on-site sessions are also useful tools for gathering creative ideas and in potentially recruiting volunteers for projects involving parks and trees.

Volunteers and Partnerships
The City of Livingston was honored last year as Montana's "Tree City of the Year" in conjunction with national and state Arbor Day celebrations. The Governor of Montana was the keynote speaker, Park County High School band members donated their time and wonderful talents during the program, several organizations hosted informational booths, lunch was donated, and over 200 adults and school kids attended the celebration and participated in planting trees.
The premise of this management plan is that the City does not currently have enough time, funds, equipment, and personnel to fully carry out the priority tasks and maintenance needs of approximately 3,880 public trees. Subsequently, it is recommended that the City embrace, emulate, and promote some of the listed examples of managing the urban forest by connecting people and trees to promote partnerships & sustainability; as found on pages 3-7 of this document.
The logical starting point to establish a network of new volunteers should be the City's existing Tree City USA® program. The major annual effort of local accredited Tree City USA® communities is the planning for national Arbor Day tree planting celebrations. It is recommended that the local planning committee for this event expands the educational efforts to include tree issues related to: tree identification, tree biology, proper tree selection, proper tree planting techniques, after care plans such as watering, mulching, protection from trimmers/mowers, insect & disease identification, etc.

POTENTIAL PARTNERSHIPS & VOLUNTEERS TO HELP MAINTAIN PUBLIC TREES

"Strengths: community involvement and capacity."
-2002 Park County Comprehensive Development Strategy

**36% respondents of Livingston's on-line tree survey said they would volunteer to plant and maintain trees*

The *"Urban & Community Forestry: A Practical Guide to Sustainability*" written by James R. Fazio(National Arbor Day Foundation®.2003) lists the following work that is especially suited for volunteer projects:

- ✓ Planting trees
- ✓ Watering trees mulching
- ✓ Tree stake removal
- ✓ Distribution of door hanger tree brochures
- ✓ Yard beautification contests
- ✓ Staffing fair booths
- ✓ Monitoring tree vandalism
- ✓ Advocating tree ordinance, planning
- ✓ Cleaning tree wells (grates over trees in boulevards)

The use of volunteers for needed but over-looked tree maintenance would be especially beneficial to the City as the i-tree™ inventory lists 1,196 recommended immediate and routine maintenance on small trees

The use of volunteers to staff informational booths at Livingston's fair, downtown festivals and farmers markets, and park arts/crafts/music festivals would be of great service. Promoting the care and benefits of trees at such venues may reduce human-caused tree damage that is shown on page 16 of this document.

Also, trained volunteers could be of great service to the City by helping to install and monitor emerald ash borer (EAB) traps, and to help conduct EAB pest monitoring protocols. Please refer to the Supporting Material on page---of this document for more information.

Partnerships

Three partnerships could provide valuable resources and benefits to the City:

- ✓ Northwestern™ Energy
- ✓ Montana State University Extension Service
- ✓ Livingston's existing "sister city" exchange program with Japan

<u>Northwestern™ Energy</u>

This utility company provides electrical service to residential and business customers in Livingston and by law are responsible for and have the right to keep overhead utility lines clear of contact interference with trees. Northwestern™ has developed partnerships with several Montana communities to offer free removal service for trees interfering with electric lines and also offer a generous rebate coupon to help purchase a new recommended tree appropriate for the site property for property owners who participate in the program.

The following letter gives more details:

NorthWestern Energy

Kevin T. Deckert
Utility Arborist
Telephone: 406-490-3359
Facsimile: 406-655-2511
Kevin.Deckert@northwestern.com

40 East Broadway St.
Butte, MT 59701
Telephone: 406-497-3000
Facsimile: 406-497-2535
www.northwesternenergy.com

Northwestern Energy has been striving to deliver reliable electric service to our residential and business customers. Tree caused outages are the most frequent on our system statewide. The Vegetation Department has been working hard to establish partnerships with the communities in which we service. We developed a program in conjunction with the City Forestry departments in Townsend, Helena, Billings, Bozeman, and Missoula where the utility would remove undesirable species that are growing in the boulevard, and are in conflict with the overhead conductor. These species include but are not limited to Poplar, Elm, Maple, and Ash. Northwestern Energy offers the customer with tree's that fit our criteria a free removal that will be done by either Asplundh or Davey Tree. The crew will chip all of the brush that is small enough to be processed. The contractor's will also block up the remaining wood to be used or given away by the customer. Northwestern Energy will also offer a tree voucher up to $225.00 to be used by the customer on a species of tree that has a mature height of 25 feet or less. We have a list of approved trees on our website. The city accepts responsibility to grind the remaining stump, and properly plant the replacement tree. This program has existed for approximately three years and is working exceptionally well.

Thanks,

Kevin Deckert

It is recommended the City incorporates and promotes this program as the i-tree™ inventory data lists a total of 389 trees (including 332 boulevard trees) in present and conflicting contact with utility lines. The majority of these trees are green ash that are in poor condition and health, and whose shape and form are disfigured by chronic utility line clearance pruning methods. The removal of these trees would also lessen the costs associated with future EAB management.

Montana State University-Extension Service

It is recommended that the City (Parks & Rec, Tree Board) make contact with and re-establish a partnership with the University's Extension Service Agents. This renewed partnership could be beneficial in terms of a once popular but abandoned volunteer group called the "Green Thumb Program." In the past this group of volunteers who had practical experience in the care of new trees would perform duties such as trimming/pruning/mulching/weeding trees. As mentioned previously, these services are greatly needed to improve the health and condition of numerous small trees.

It is recommended that the local Extension Agent be invited to an upcoming Tree Board meeting so that exchange of information such as the current list of recommended trees for planting in right-of-ways, and the list of trees not suitable for planting in public right of ways. Although this might appear as an insignificant idea, it should be noted that the Extension Service is not aware of the City's tree list, and the City probably isn't updated on recommended tree species lists that the Extension Service promotes.

City of Livingston-Japan "sister city" exchange program

This on-going international exchange program has already resulted in the development of a Japanese-style garden located on the grounds of the old City water building by Riverside Drive. Most recently a group of Japanese exchange students were visiting Livingston and were introduced at the August City Council meeting (see photo).The Japanese culture features extensive knowledge and respect of trees, and it would benefit the City to expand and cultivate this relationship to include asking the Japanese for advise on tree care and management. This would also be a most interesting public relations promotion for both Livingston and its sister city.

Livingston, MT Code of Ordinances. Chapter 23: TREES

It is recommended that the Tree ordinance be updated and revised to include a purpose or intent statement. The revision could follow along the lines of what is included in Livingston's Code of Ordinance, Chapter 31: Historic District Overlay Zoning. This ordinance clearly specifies three purposes and intents:

A. "To promote the tourist industry in the City of Livingston through the preservation of historically significant building structures and the creation of a central business district that reflects the cultural and architectural past of the City."

B. "To provide a means of informing owners of property and building structures with the historic districts of potential tax incentives and federal grants that might be obtained through the preservation of those historic structures."
C. "To enhance the property values and to increase economic financial benefits to the City of Livingston and its inhabitants through the preservation of historic buildings."

It could be considered that by changing the term "historically significant building structures" to "trees" would almost suffice for an adequate purpose or intent tree ordinance statement. By including a purpose and intent statement to the tree ordinance, the following ordinances would be easier to understand and enforce.

It is also recommended the following tree ordinance sections be reviewed and/or changed to better improve Livingston's tree management guidelines:

Section 23-1.D: "Qualified Arborist" should be changed to "International Society of Arboriculture (ISA) Certified Arborist." By specifying ISA Certified Arborist, especially as it relates to Section 23-13, Pruning and trimming standards, the City should see improved standards in the art and science of modern arboriculture as it relates to industry-accepted pruning techniques, ANSI standards of care and safety, and a general improvement in the professional operations of commercial tree companies

The too vague verbiage of "Qualified Arborist" could be applied to virtually anyone who has field experience from working for another "Qualified Arborist". The title "Certified Arborist" has to be earned and those passing the test to become Certified have proven their level of competence and knowledge as recognized by one of the tree industry's most respected organizations: the International Society of Arboriculture.

Section 23-7: Tree species to be planted.

It is recommended that the sentence "*Efforts shall be made to ensure a sufficient diversity of* tree *species*" be amended to include quantifiable figures such as "*no more than 30 % of one tree genus*" or "*no more than 20 % on one tree species*." Updating this ordinance will make the list of recommended trees for planting more understandable and have a more direct affect of actually diversifying the tree species in Livingston.

Section 23-14: Tree topping.

The vast majority of mature trees in Livingston public places have been topped, and this practice has been on-going for an extended period of time. It is recommended that this ordinance be fully enforced and fines increased from $300.00 to $500.00 (see tree ordinance Sec. 23-28 Penalty) to cover the cost of enforcement.

Section 23-18: Protection of trees. The ordinance reads: *"In order to maintain the overall forest, reasonable efforts shall be made to replace tree that are removed and to protect quality trees that are endangered".* And, *"Trees of desirable species and good health shall be protected as much as possible from damage during construction, sidewalk repair, utilities work above and below ground, and other similar activities. The zone of protection shall include the ground beneath the canopy of the tree."*

It is recommended that this ordinance be updated to include language that deals with removal specifications for trees in poor health and condition. Please refer to pages 15 and 16 of this document for examples of trees that have not been protected or should have been budgeted for removal before or during the construction work. It is also recommended that the definition of "quality tree" be updated to include some language of "quantification". For instance, *"trees that*

show over50% dead limbs and branches…" or, "trees that are leaning over a 40% angle… will be removed before the sidewalk excavation project begins."

Management Option 2

Management Option 2 includes all the recommendations listed in Option 1, with the exception of the Budget. In Option 1, the budget remains the same and as such, the existing management procedures of reactive scheduled tree work that occurs when someone reports a tree problem or performing tree work requests based on a "first-come, first-serve" approach until the budget is depleted is left intact.

The Management Option 2, the budget is based on the following recommendations:

- Municipal tree work is scheduled on a 5 year cycle where all trees on public property are trimmed or pruned at least one time (or removed) within a 5 year period.
- The recommended maintenance and priority tasks for public trees are based on the 2014 i-tree™ inventory data, which includes various factors of: tree size, structural wood condition, failure probability, failure target impact, failure risk rating.
- Municipal tree maintenance should focus on pruning for safety first; economic concerns second, so that branches less than 2 inches in diameter are not removed and aesthetic pruning or "shaping" concerns are for the most part not specified.
- A full time City employee should be solely dedicated to the maintenance, management, and monitoring of public trees.
- That City employee should have practical field experience or training in working with trees and should be at a minimum, an ISA Certified Arborist or be able to attain Certified Arborist credentials within one year of the City's formal approval and implementation of this management option. The employee should have practical experience or training in aerial bucket tree work, ANSI tree industry safety standards (or have attained experience/training within one year of the City's formal approval and implementation of this management option). Preferably, the City employee should have a Municipal Forester accreditation and have adequate grant-writing, interpersonal communications, and computer skills.
- A seasonal, part time employee should be hired to water park trees during the months of July and August. Recently planted and establishing trees require more water than what turf irrigation provides. This employee could also weed/mulch around tree bases while watering, which would eliminate the cost and time of applying herbicide.

The budget costs of employing a full time arborist would range from $38,791.00 to $40,444.00 (base pay-excluding benefits). These figures are in line with existing budgeted base pay rates for City Public Works maintenance employees, Leadman-Water, Leadman-Sewer, Leadman-Solid Waste, Leadman, Roaming Crew, Leadman-Streets, Animal Control Officer, WWTP Operator in Training.

It is recommended that the title of this proposed position is "City Arborist". If the position is filled by a person with a Municipal Forester accreditation, the title should be "Community Forester".

The seasonal, part time "tree tender" base pay costs could be funded by existing Roaming Crew overtime budget ($11,000.00).

How to fund Option 2

It is beyond the scope of this Plan to perform a full analysis of the City's FY2015-16 annual budget to find areas (funding districts i.e.) in the budget that could fund the hiring of a full time City Arborist. However, it is assumed that since the City has already purchased an aerial bucket truck, the previous costs of contracting private tree companies could be greatly reduced. The employment of an ISA Certified Arborist who has accredited ANSI safety training could also reduce the costs of liability insurance premiums paid by the City.

Additionally, a partnership agreement with Northwestern™Energy to remove trees under power lines for free and pay for new trees to be planted would significantly reduce field and operating costs of municipal tree maintenance. Other volunteer/partnership recommendations listed in this Plan could reduce labor costs for the City relative to the costs of buying, planting, and maintaining new trees on public property. Enforcement and collection of existing tree ordinance fines could also help fund tree maintenance. To this end, the following recommendations are offered:

Creation of an annual tree district fund

Background history:

It was reported in the past the City failed in its efforts to pass a voter-approved Tree District tax paid by property owners to fund public tree maintenance. It has been speculated that a principal reason the tree district tax proposal failed was because there wasn't a management plan in place to account for how, where, and when the funds would be spent. It also was reported that the tree district tax proposal failed because of issues related to street, or boulevard, tree ownership and responsibility. That is, many residents felt that they should not be required to "pay" for the upkeep of a "City tree" located in the property owner's adjacent boulevard.

While collecting field data for the 2014 tree inventory, numerous homeowners freely offered their opinions that they should not be "forced" to pay for trees that "the *City* owns."Conversely, many of these same homeowners also mentioned "I love *my* tree."

The recent online public opinion survey hosted on the City's official webpage reflected similar attitudes and beliefs. Over half (51%) of the survey respondents said they would vote in support of creating a tree district fund, and 78% said they would be willing to pay between $5.00 -$25.00 annually to fund public tree maintenance.

However, open-ended comments about the confusion of boulevard "tree ownership" were noted. One comment in particular seems to sum up one significant problem the City has in terms of successfully explaining to Livingston residents why funding for tree maintenance should be approved. The comment is:

"Please don't tax us for trees, just promote their benefit to the public."

The attitude, the belief, the culture, regarding trees by many residents of Livingston appears to be that the benefits of trees are unending and don't cost anything to maintain.

It is the recommendation of this management plan option that the City disseminate the tree benefit calculations from the i-tree™ inventory data to the general public by means of:

- ✓ The City's official website
- ✓ Local media (The Livingston Enterprise newspaper has printed at least four stories relating to the tree inventory and EAB, and one favorable editorial supporting the maintenance of trees)
- ✓ Tree Board meetings
- ✓ Informational booths at public events (which could be staffed by volunteers)
- ✓ Signage at parks and City owned vehicles
- ✓ Civic clubs/organizations

The key point that the City needs to make is:

i-tree™ tree inventory data calculates that the average boulevard tree contributes annual benefits of ecological, environmental, and home amenity values that total $166.00
5 year benefits = $830.00

The key question that the City needs to ask its residents is:

Would you be willing to pay $25.00 per year to safely manage a tree that provides you, your family, your home property, your community, $166.00 in annual benefits?
5 year benefits = $830.00
5 year $25.00 tax= $125.00
Net Benefit: 5 years=$705.00

These key points are best illustrated by the following photograph. It shows a dying green ash boulevard tree that the homeowner had paid a "*Qualified Arborist*" [see Livingston's Code of Ordinances: Chapter 23.TREES: Sec.23-1.D] $300.00 to trim.

NOTE: The homeowner freely offered this information while the tree was being inventoried for inclusion to the City's 2014 i-tree™ data base: *Tree was listed as dead/dying.

Key Points:

- A proposed $25.00 annual tree district tax that specifies a 5 year pruning cycle for all public trees would have cost this home owner $125.00 over 5 years, and $250.00 over 10 years: a saving of at least $175.00 for this homeowner.*Not counting the added cost of removal.
- A proposed change to Livingston's tree ordinance 23.1D [see page 25 of this document] definition of "Qualified Arborist" to "Certified Arborist" would greatly reduce or eliminate unskilled and/or unethical tree trimming practices.

Recommendations for raising revenue to fund a tree maintenance district

1. Propose an annual $25.00 tax/assessment fee paid by property owners. The City's base of approximately 3,300 property owners would generate $82,500 ($25.00 x 3,300).
2. Propose an annual .10¢ (ten cents) tax/assessment fee based on per linear foot on all properties abutting public rights-of-way. This could generate approximately $61,000.00 annually based on 58 miles of Livingston's streets. Example: 1 mile = 5,280 feet x 58 miles =306,240 feet x 2[both sides of street] =612,480 feet x .10 per foot =$61,248.00. A property owner who has 100 feet of street abutment would pay $10.00 per year. **NOTE**: The City of Cincinnati, Ohio assesses .12¢ per foot for its 1,000 miles of streets. This assessment generates about $1.25 million dollars annually to fund the street tree program
3. Propose to include street tree maintenance in state or federal grants that help fund public work projects. Several municipalities across the country have discovered that classifying trees as a component of public utility infrastructure has led to the increase of grant funding, especially through state and federal transportation projects. It is beyond the scope of this document to estimate a dollar amount that this proposal could generate in Livingston, but it is a viable option being employed by progressive communities.

Justification for an annual tree maintenance district that specifies a 5 year pruning and inspection cycle

A 2 person crew, that includes a full-time Certified Arborist with experience in aerial bucket work and 1 grounds person can inspect and crown clean (removal of only dead, dying, diseased, crossing, broken branches larger than 2 inches diameter, measured at the branch union) at least 3-4 trees per day. At that rate, a total of 15-20 trees can be pruned weekly, which equates to 60-80 trees per month, for a total of 720-960 trees annually. Livingston has about 3,880 public trees, and at an average rate of 840 trees per year (720+960=1680÷2=840), a total of about 4,200 trees can be crown-cleaned pruned in 5 years.

When performing aerial bucket tree work the Certified Arborist can efficiently observe the condition and health of the tree and make note of serious disease and/or insect activity, especially EAB. These observations can be recorded and updated as part of, and in fulfillment of, the duties and responsibilities listed in the Livingston Code of Ordinances: Sec. 23-5.

Annual tree district tax/fee assessments save homeowners money. At a proposed annual rate of $25.00, a homeowner would only spend $125.00 over 5 years in exchange for having their tree(s) safely & skillfully maintained at least once during that timeframe. The example and photo on page 29 of this document records that a homeowner paid $300.00 to a private tree company to trim a tree that should have been recommended for removal. In this case, the homeowner paid $175.00 more than if an approved 5 year cycle tree district management plan was in place. <u>This example does not include the future costs of removal.</u>

How to establish a 5 year pruning/inspection cycle of public tree maintenance: the utilization of the 2014 i-tree™ inventory data base

In general terms, the cycle should be based on the following i-tree™ data:

- There are 99 trees rated as "probable" tree failures, 45 are boulevard trees, 18 trees are in Sacajawea Park, and 10 trees each are located in Miles Park and the cemetery
- There are 3,162 trees rated as "high target impact", 2,228 are boulevard trees, 371 are in the cemetery, 227 are in Sacajawea Park
- There are 1,890 trees rated as "high risk", based on probability and high target, 1,404 are boulevard trees, 201 are in Sacajawea Park, 122 are in the cemetery, and 57 are in Bozeman Park
- There are 117 trees rated "large tree immediate maintenance", 41 are boulevard trees, 42 are in Sacajawea Park, 21 are in Miles Park, and 7 are in Riverside Park
- There are 1,364 trees rated "crown cleaning priority task", 922 are boulevard trees, 118 are in the cemetery, 111 are in Sacajawea Park, and 54 are in Miles Park
- There are 283 trees rated as "dead or dying", 208 are boulevard trees, 15 are in the cemetery, 13 are in Sacajawea Park, 12 are in Bozeman Park, and 11 are in Mars Park
- There are 303 trees rated as "poor condition", 216 are boulevard trees, 27 are in Sacajawea Park, 16 are in the cemetery, and 13 are in Mars Park

NOTE: Tree failure rating does not exclusively mean the whole tree will fall at one time. It includes the potential for large diameter >2 inch limbs/branches to fail even as the tree in whole still stands. Dead or dying tree ratings includes small trees that are rated at low risk failures.

How to access data on i-tree™. Note: the i-tree™ software suite is already installed on the City's mainframe computer.

Open i-tree streets™ program

Click: File

Click: Open

Click: Existing Project

Click: City of Livingston2 ISTREETS File

Note: After opening i-tree™, to access spreadsheet data fields:

Click: Input

Click: Records *Records include: Tree ID number, GPS coordinates, zones, species code, maintenance recommendations, maintenance priority, sidewalk damage, overhead utility line conflict, comments, failure probability, target impact, risk rating. **Note**: "other one" lists failure probability, "other two" lists target impact, "other three" lists risk rating.

NOTE: To access report data: benefit-cost analysis/resource structural analysis/replacement value: after opening the City of Livingston2 ISTREETS File:

Example:

Click: Reports

Click: Resource Structural Analysis

Click: Maintenance

Click: Recommendation and or Priority

Note: at the left side of the page, you will see a "Report by" tab. The 2 selections in this tab, "Species Citywide" and "Zone" give specific data to each zone listed in the inventory. Export and Print tabs are on the left side of the page, under the "Report by" tab.

Supporting Material: Emerald ash borer (EAB) references

Draft Montana Urban and Community Forestry Association (MUCFA)

Montana Emerald Ash Borer (EAB) Sampling Protocol and Documentation Form

History of Emerald Ash Borer Agrilus planipennis 'Fairmaire' (EAB) Problem: EAB has been causing extensive damage to forest and community ash trees in eastern Canada and the Midwest US, creating a tremendous loss in forest cover, shade, aesthetics, and property values. This aggressive beetle was introduced from Asia, likely in shipping material and was first identified in the US in Michigan in 2002. The insect may have been in the state for 6 years before detection. Adults feed on tree foliage but the real damage occurs when the young beetle larva, bore into the tree and feed on the inner bark. More than 30 million trees have been killed in Michigan alone.

Green ash, Fraxinus pennsylvanica, is a vital component of many eastern Montana hardwood draws and has been extensively planted in Montana communities. Green ash is equally susceptible to this destructive pest. We have not yet encountered EAB in Montana but are concerned that this pest could be introduced into the state, possibly via infested firewood, nursery stock, wood packing materials, or other human-assisted movement. The EAB problem is summarized in the EAB Pest Alert (http://na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf). Since the Pest Alert was published EAB has spread to other states. Minnesota, Kentucky, and New York detections were in 2009; Iowa and Tennessee detections were in 2010; and Connecticut, Kansas, Missouri, and Massachusetts detections were in 2012. For a March 2013 map of EAB distribution in the US go to: http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/multistateeab.jpg

An EAB quarantine map is located at: http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/downloads/eab_quarantine_map.pdf

Need for Sampling Protocol: As mentioned in the EAB Pest Alert cited above, evidence suggests that EAB is generally established in an area for several years before it is detected. Current programs for early detection in Montana have been limited to insect traps. The Montana Department of Natural Resources and Conservation (DNRC), in conjunction with the Department of Agriculture and the US Department of Agriculture Animal and Plant Health Inspection Service (APHIS), deployed purple traps coated with a sticky material, and baited with manuka oil throughout the state in an effort to catch any insects as soon as they arrive. There are many common native insects in Montana that feed on ash or look like EAB so suspected beetles caught in traps will be sent to an expert entomologist for identification.

This EAB Sampling Protocol recommends a research documented method that tree workers can use to sample asymptomatic as well as symptomatic green ash trees to verify the continued

absence of EAB and increase the potential for early detection in Montana. The protocol includes a sampling form to be used to document the sampling method used and location of the trees sampled. Amy Gannon, DNRC entomologist (agannon@mt.gov) will maintain the Montana database of trees sampled using the protocol to track tree location, number of trees sampled, and need for sampling in other areas of Montana. Montana sampling information will be forwarded to the USDA Integrated Plant Health Information System (IPHIS) database.

Insect Identification: EAB identification is summarized in the EAB Pest Alert

(http://na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf). EAB looks similar to other insects including birch bronze borer (Foley, I. A. (2008). The Agrilus species of Montana (Coleoptera: Buprestidae). Montana Department of Agriculture outreach poster, Helena, Montana).

Life Cycle: The EAB life cycle is summarized in the EAB Pest Alert: (http://na.fs.fed.us/spfo/pubs/pest_al/eab/eab.pdf). For more info about EAB go to: http://www.emeraldashborer.info.

Research Summary: Canadian Forest Service (CFS) researchers sampled 97 asymptomatic ash trees and 50 percent of the trees were already hosting EAB (K. L. Ryall, J. Fidgen, J. Turgeon. Canadian Forest Service-Great Lakes Forestry Centre. www.nrcan.gc.ca/cfs-scf). The research developed a branch sampling method that can detect EAB presence at low populations with an 80 percent probability of detection. CFS stressed the need for an effective and efficient sampling tool for early detection. The sampling method can be used as an early warning system. The sampling can be combined with GIS mapping to show the current EAB "footprint". The researchers stressed there is no need to wait for the late-stage (D holes) indicators in a tree to confirm an infestation.

Recommended Sampling Method: Sample open grown, semi-mature green ash trees

- 20 -50 centimeters (cm) (8 -20 inches (in)) DBH
- Two branches per tree minimum; 5-8 cm (2-3.25 in) diameter
- Mid-crown, south aspect
- One 50-cm (20 in) sample per branch

Place branch in a vice; then using a drawknife (such as a "Nalco 13" straight blade bark knife" or Victorinox Model V-9300 pruning knife) remove bark on the branch exposing the xylem tissue. Examine for galleries (See photo of EAB gallery below). Samples should include trees that are EAB asymptomatic and those that are potentially EAB symptomatic (i.e., basal sprouting/upper canopy dieback/etc.)

Reporting Method: (link to EAB Reporting Form) (See draft form on next page). Report results of sampling to Montana EAB Protocol Database c/o: Amy Gannon, DNRC entomologist: (agannon@mt.gov).

Treatments: Potential treatments can be found at: http://www.emeraldashborer.info/treatment.cfm#sthash.BqmDfZme.dpbs.

Ramifications Once EAB Reaches in MT: An inventory of 10 Montana community tree inventories in 2010 found that green ash made up 34 percent of the total trees (Fred Bicha 2013. Personal communication to Patrick Plantenberg. March 11). APHIS and DNRC have a survey detection/delimitation response plan. APHIS does not have a management plan and is not likely to have funding for management. Those significant costs, likely in the tens of millions of dollars, will probably be borne by local communities with EAB.

Characteristic EAB gallery in Green Ash

EABMontanaProtocol20130320draft

EAB Sampling Protocol Reporting Form (Use One Form per Tree)

Date

County

City

Address

Description of site (front yard, back yard, etc.

GPS coordinates (Lat/Long)

Size of tree sampled (DBH in cm and inches)

Height sample was taken (mid-crown, etc.)

Aspect sample was taken (south, etc.)

Number of branches sampled

Length of branch sampled in cm and inches)

Results (positive or negative presence of EAB galleries)

Destructive sampling (Was tree removed or just branch removed?)

Name of sampler

Sampler contact information: (phone number, email address, affiliation

Notes:

Extension Bulletin E-2938 Reprinted December 2005

Signs and Symptoms of the Emerald Ash Borer

Mary Wilson, MSU Extension. Eric Rebek, Michigan State University Dept. of Entomology

Adult

A

Michigan State University

B

Michigan State University

- Bright, metallic green (Figs. A, B).
- 1/2 inch long, flattened back (Figs. A, B).
- Purple abdominal segments beneath wing covers.

Larva

C

D. Cappaert, MSU

- Creamy white, legless (Fig. C).
- Flattened, bell-shaped body segments (Fig. C).
- Terminal segment bears a pair of small appendages.

Canopy Dieback

D

E. Rebek, MSU

E

E. Rebek, MSU

- Begins in top one-third of canopy (Fig. D).
- Progresses until tree is bare (Fig. E).

Epicormic Shoots

F

J. Smith, USDA APHIS PPQ

G

J. Smith, USDA APHIS PPQ

- Sprouts grow from roots and trunk (Figs. F, G).
- Leaves often larger than normal.

Emerald Ash Borer

MICHIGAN STATE UNIVERSITY EXTENSION

THE OHIO STATE UNIVERSITY EXTENSION OARDC

Signs and Symptoms of Emerald Ash Borer

Bark Splitting

H

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I

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- Vertical fissures on bark (Fig. H) due to callous tissue formation (Fig. I).
- Galleries exposed under bark split.

Serpentine Galleries and D-shaped Exit Holes

J

D. Cappaert, MSU

K

D. Cappaert, MSU

- Larval feeding galleries typically serpentine (Fig. J).
- Galleries weave back and forth across the woodgrain.
- Packed with frass (mix of sawdust and excrement).
- Adults form D-shaped holes upon emergence (Fig. K).

Increased Woodpecker Activity/Damage

L

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M

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- Several woodpecker species (Fig. L) feed on EAB larvae/pupae.
- Peck outer bark while foraging (Fig. M).
- Create large holes when extracting insects (Fig. M).

MINNESOTA DEPARTMENT OF AGRICULTURE

FEBRUARY 2012

Emerald Ash Borer Insecticides: Label Guidance for Use Limits

Overview

Some insecticides used to control emerald ash borer (EAB) have annual per acre use limits. The Minnesota Department of Agriculture (MDA) offers this label guidance to help applicators and others comply with label directions, meet tree treatment objectives, and minimize environmental impacts. The MDA completed a special registration review of EAB insecticides in 2011. The review concluded that insecticides commonly used to control EAB are not likely to harm human health or the environment when used according to label directions. **Please remember, applicators have a legal responsibility to read, understand, and follow all current label directions for the specific insecticide product being used.**

- ✓ A treatment area is the total area within the boundaries of a property where a single treatment will occur. Include all surfaces (e.g., paved surfaces and buildings) and water bodies in treatment area delineations. Adjacent, not-to-be treated properties cannot be included in the calculation of the total treatment area or the annual per acre use limits.
- ✓ Annual per acre active ingredient (a.i.) use limits may mean that not all ash trees in a treatment area can be treated in the same year using the same product. If previous use of an insecticide with a per acre use limit in the treatment area is known, include it in the calculation of the annual per acre use limit for that insecticide.
- ✓ When an annual per acre use limit in a treatment area is reached using soil-applied or basal trunk spray methods, a different product (with a different a.i. or application method) can be used to treat additional trees.
- ✓ Along with other application information, applicators must record units (acres) treated when completing a category E pesticide application record.

Treatment Areas

Less than One Acre

Pro-rate the per acre use limit to correspond to the size of the treatment area.

Greater than One Acre

Each acre is subject to annual per acre use limits. Divide the treatment area into approximately equal one-acre sections before an insecticide application, and adhere to the use limit for each one-acre section.

It is not appropriate to calculate the total acreage on a multi-acre treatment area, determine a volume of insecticide allowed based on that acreage, and then apply that volume to a section of the treatment area.

Miscellaneous (e.g., along a city boulevard)

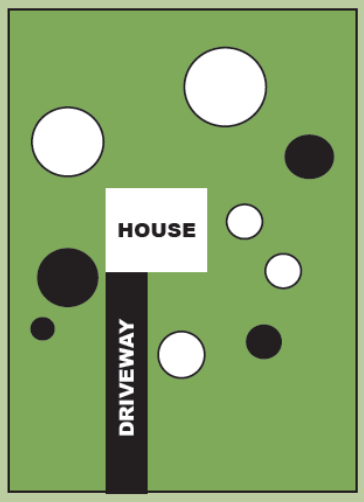
Each acre is subject to annual per acre use limits. Divide the treatment area into approximately equal one-acre sections before an insecticide application, and adhere to the use limit for each one-acre section.

Treatment areas may be defined in a variety of ways. It is the responsibility of the applicator to be familiar with the boundaries of the treatment area.

For Example: An applicator has a contract to treat all trees between the sidewalks on both sides of a boulevard. The boulevard stretches for 2 miles. The distance between the far edges of the treatment area is 50 ft., so one acre is 50 ft. by approximately 870 ft. Under this contract there are approximately 12 acres to be treated (i.e., treatment area). The area can be divided into approximately equal one-acre sections along the contours of the boulevard.

Annual Per Acre Use Limit Example

The figure at right depicts a treatment area. Circles represent ash trees. The applicator chooses to treat ash trees with an insecticide product that has an annual per acre use limit. To remain compliant with the label, not all ash trees in the treatment area can be treated with the chosen insecticide product before reaching the use limit.



- White circles indicate ash trees chosen to be treated with the insecticide product based on the size of the tree—calculated as the diameter of the trunk at breast height (DBH inches)—and the amount of insecticide allowed per acre.
- Black circles indicate trees that cannot be treated with the chosen insecticide product because the annual per acre limit has already been reached in the treatment area.

When not all trees in a treatment area can be treated with insecticide products having per acre annual use limits, consider these options:

- Other active ingredients can be used in the treatment area
- Insecticides with application methods that do not have use limits can be used
- Some trees may be candidates for removal

Calculating Use Limits

Use Limits for Soil Applied and Basal Trunk Spray Applications Expressed as Diameter at Breast Height (DBH) inches

Active Ingredient	Formulations	Max/ Acre/Year	Annual/ Acre Use Limit (Lbs a.i.)	Treatment Area (Acre)	Max Product/ Area/Year	Total Treatable DBH Inches Using the Min Label Rate	Total Treatable DBH Inches Using the Max Label Rate	Total Treatable DBH Inches for Imidacloprid Products With an Increased Max Label Rate for Trees > 15 inches DBH
Imidacloprid	2 F	1.6 pints (25.6 fl oz)	0.4	⅛	3.2 fl oz	32	16	Exceeds Use Limit
				½	12.8 fl oz	128	64	32
				1	25.6 fl oz	256	128	64
	75 WSP / 75 WP	0.53 lbs (8.5 oz)		⅛	1.1 oz	32	16	Exceeds Use Limit
				½	4.2 oz	128	64	32
				1	8.5 oz	256	128	64
Dinotefuran	20 SG	2.7 lbs (43.2 oz)	0.54	⅛	5.4 oz	51	13	Not Applicable to Dinotefuran Products
				½	21.6 oz	206	52	
				1	43.2 oz	412	104	
	70 WSP	0.77 lbs (12.3 oz)		⅛	1.5 oz	44	13	
				½	6.2 oz	176	52	
				1	12.3 oz	352	104	

Read the label!

It is your legal responsibility to read, understand and follow all current label directions for the specific insecticide product being used.

Additional Emerald Ash Borer Insecticide Information

- "Frequently Asked Questions Regarding Potential Side Effects of Systemic Insecticides Used to Control Emerald Ash Borer" http://www.extension.umn.edu/issues/eab/potential_side_effects_of_eab_insecticides_faqfinal.pdf
- MDA "Homeowner Guide to Insecticide Selection, Use, and Environmental Protection" http://www.mda.state.mn.us/en/plants/pestmanagement/~/media/Files/plants/eab/eabtreatmentguide2.ashx
- For label compliance questions please contact the Pesticide and Fertilizer Management Division at 651-201-6121.

In accordance with the Americans with Disabilities Act, an alternative form of communication is available upon request. TDD: 1-800-627-3529. MDA is an Equal Opportunity Employer and Provider.