CITY OF WEST ST. PAUL

1616 HUMBOLDT AVENUE, WEST ST. PAUL, MN 55118

ENVIRONMENTAL COMMITTEE MEETING
OCTOBER, 7 2020 AT 6:00PM
MUNICIPAL CENTER
CITY COUNCIL CHAMBERS

1. Call To Order

2. New Business

2.A. Approve September 2, 2020 Minutes

Documents:

090220.PDF

2.B. City Ponds And Wetlands

Documents:

POND AND WETLAND LIST.PDF
POND AND WETLAND ID MAP.PDF
WEST ST PAUL POND AND WETLAND MAP.PDF

3. Old Business

3.A. Zoning Code Update Discussion

Documents:

DISCUSSION ON CODE UPDATES.PDF
TREE REPLACEMENT DEDICATION.PDF
MODEL_LANDSCAPE_ORDINANCE.PDF

3.B. 1010 Dodd Update

4. Updates

4.A. Subcommittee

4.A.1. GreenStep Cities Program

4.B. City Council

4.C. Staff

4.D. Park & Recreation Committee

4.E. Planning Commission

5. Other

5.A. Citizen Comments

6. Adjourn

If you need an accommodation to participate in the meeting, please contact the ADA Coordinator at 651-552-4100, TDD 651-322-2323 at least 5 business days prior to the meeting

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West St. Paul Environmental Committee
September 2, 2020
West St. Paul Municipal Center-City Council Chambers

1. **Call to order**
   The meeting was called to order at 6:00 pm.
   Committee members in attendance: Jade Pennig, Tara Wright, Jonathan Wagner, Rebecca McCarty, Polly Saatzer, Kristy Otte, Laura Zanmiller
   Non-voting members present: Dave Schletty, Lisa Eng-Sarne, Bob Gausman

2. **NEW BUSINESS**
   a. **Minutes** –The August 5, 2020 minutes were approved.

   b. **1700 Marthaler Lane Site Plan Review –** Schletty reviewed the site plan report memo for an expansion at 1700 Marthaler Lane, the Canine Coach facility. It is an expansion of the existing building. Most of the present site is open with "just a roof" covering. The expansion will allow courses year-round. There will be some new landscaping; a 12-inch cotton wood tree will be removed. Code requires that 30 percent tree replacement be done which would only be 4 inches. Code also necessitates that one quality tree is required for every 20 linear feet of property line. Staff would like new shrubs as well. However, the owner, has said that shrubs do not last long on the property because dogs likes shrubs very much. The owner, instead of replacing the shrubs, is planning to install planter boxes and just having annuals in them to "dress up the front end." Staff is comfortable with the option. Schletty said that there is nothing in the landscaping plan that pertains directly to the committee in regards to permanent plantings. Wright asked if the green space was being currently used for dog training; Schletty confirmed that it was and that it was fenced in. Wagner asked if they had any drainage issues. Schletty said they have no current issues. Wagner asked about how the facility deals with dog waste. Schletty said that the owners deal with it on site during the training. The dogs are usually there for only an hour. A committee member asked if there were a list of annuals [preferred by the City]. Schletty said that the City does not have a list.

   A motion was made by Pennig to recommend that the applicant adhere using non-neonicotinoid treated plants in the flower beds. A friendly amendment was made by Otte to recommend annuals that are pollinator friendly. Pennig amended the motion to include Otte's recommendation. McCarty seconded the motion. The motion carried. All Ayes.

   c. **Zoning Code Update Discussion-**Schletty said that the committee has been reviewing landscape plans for many years. The committee has been instrumental in getting the GreenSteps program advanced. Recently the Planning Commission discussed updating portions of code; the Commission would like to get input from the Committee on an ordinance involving pollinator and native species planting. If the suggestions from the Committee could be made part of ordinance, the Committee would not need to make recommendation every time [a site plan came into review.] The Planning Commission will also like feedback on updating energy and green building codes, and incorporating the GreenSteps recommendations. Schletty said that Michael Orange document would work well for part of committee discussion. Additionally, staff is considering a tree replacement dedication ordinance. It would work like the park dedication fund. A developer is required to dedicate part of a site to park land. For the tree replacement dedication, the applicant would be required to plant certain number of trees. If a developer cannot, they pay the city to plant the trees. Money would be

set aside specifically for the city to plant trees elsewhere in the city. Schletty said that the committee does not need to make final decisions yet. The committee would make recommendations to Council. Otte said it seems like there would be 3 ordinances: Landscape, Energy Code, and one for Tree Replacement. Schletty said that yes it would be three; the Committee can make more. Otte has a preference of Orange's draft; some cities only centered on trees only or pollinators only. She does like the idea of an all-encompassing ordinance that covers trees, rainwater conservation, and shoreline care. If the committee does it right and is comprehensive, the ordinance can cover three best practices just for the land use. Another part of the ordinance could cover the SB23 Energy standards, (Dark Sky and Green Roof stuff.) This could be built into Building Practices. McCarty thought the Orange document was very comprehensive. She referenced the pesticide use along with the pollinator-friendly stuff. She also noted the water resource capture was good too. Otte would like to sift through the document and start a draft. Schletty said that the Committee should definitely dive into it and not make a quick decision. Otte would like to cross reference both the Orange document and the GreenSteps documents to make sure the best practices definitions fit. Schletty said the committee does not need to limit themselves only to the documents before them. There are other city resources. Otte asked if the committee should draw up a deadline for the draft. Schletty suggested putting together a list of things they feel are important. It would be good to know what the current ordinance is, and "beef it up." Schletty will work with the City Planner to get a draft of what is out there. It was an exercise that was done about 8-9 years ago. A couple of interns looked at the code and updated some things at that time. Otte said the discussion will be continued on the next agenda. Schletty asked committee members to send questions only to himself in order to adhere to open meeting law.

3. OLD BUSINESS-NA

4. UPDATES

a. Green Steps –Otte reported that everything was put on hold this summer. It will get ramped up now. Wright said that the next step for the Bird City USA project was to hold a public meeting. This has been put on hold as well. She will reach out to Kathryn to see how to proceed without a community gathering. She will see if there is an alternative. Schletty said that if a meeting is handled using social distancing measures, the City may be able to have a public meeting. The City could also use virtual meeting technology as well. Otte said that the 2040 Plan could qualify the City for the GreenSteps program. The subcommittee just has to get these measures documented and entered into the system. Schletty confirmed that GreenSteps is still making assessments. Their main coordinator retired. There is a new staff person in place.

b. Council-Eng-Sarne said a lot has been happening lately. Last Thursday, they broke ground for the workforce housing at Robert and Annapolis. There has been advancement as to the trees and shrubs being planted at that corner. It will be a great entrance to the City. The Council will be talking about ponds. Some citizens raised some concerns about smell of ponds. She has learned a lot about the different categories of ponds and the conservation of wetlands and citizens' responsibility for treatment. She has heard "Let's pave around Mud Lake," and "Don't pave Mud Lake." Schletty said that staff is going to be doing a complete inventory of every pond in the City. They will investigate what ponds are private and what ponds are public. They will look at how many residents' properties abut the ponds and how much of the property is public. It will be an agenda item for next month. The Committee will talk about how the ponds are handled, be it educational or if there should be treatment plans in place. The committee will put forth a recommendation to

Council probably in late October. Otte asked if the City was going to check the water quality of the ponds. Schletty replied that the City works with Dakota County on this. Volunteers take samples and monitor a few ponds each year for water quality. An assessment is done at the end of the year. The City has some data from the last ten years from different ponds. The City has a baseline for these ponds. However, the City does not have data from all the ponds. There is no funding to do the testing. Schletty said that the committee would probably look at the information and determine if more water quality testing is needed and more improvements. Otte asked if a survey would be done of private property owners asking about things like lawn maintenance, and the use of lawn chemicals, how frequently they mowed and if there were a buffer zone. Eng-Sarne said there may be an education aspect to this; it is very preliminary.

c. **Staff-NA**
d. **Parks and Recreation Committee-**. Gausman reported that the art park subcommittee met. The project is shaping up. It is not only an art project but a system change. The County trail is under construction by the library; there are piles in Robert Street; they have cut up a path between the lake and the library. It is an interesting change**.**
e. **Planning Commission- NA**

5. **OTHER-Bullfrogs-** Gausman is doing a personal inquiry into bullfrogs. As a child in Wisconsin, there were big bullfrogs in his grandparents' lake. They could be 8 inches long and they were a regular chorus. It was fun. He remembers a Dayton Avenue Church cookbook from the 19th century featuring frog legs. The frogs were probably trapped for their legs during the Victorian Era. He has contacted the DNR to see about the possibility of bringing them back to the lakes in West St Paul. The bullfrogs would add another dimension to the lakes**.**
6. **ADJOURN**
With no other business before the Committee and with no objections, the Environmental Committee meeting was adjourned at approximately 6:35 pm.

Respectfully submitted,

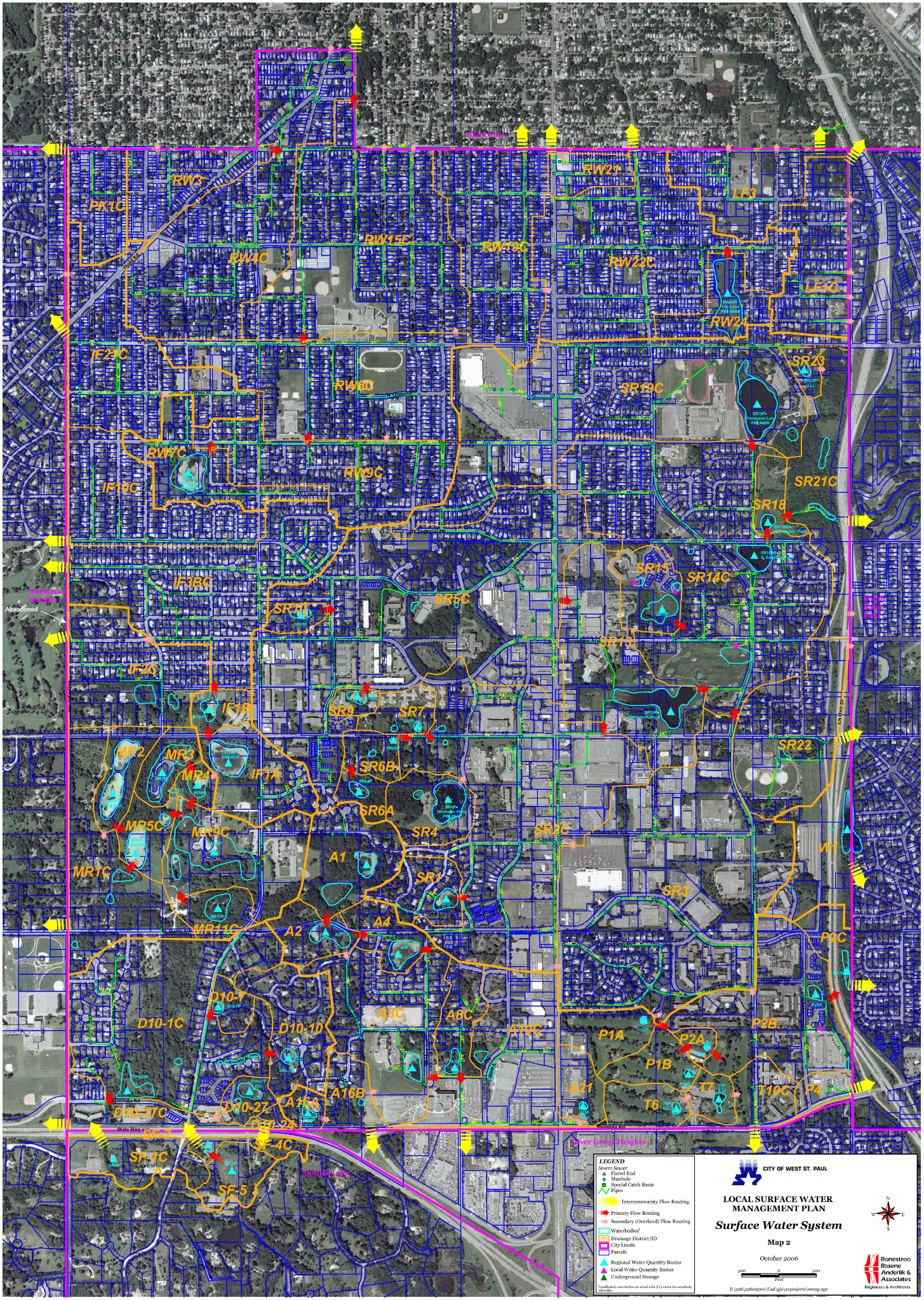
Sharon G. Hatfield

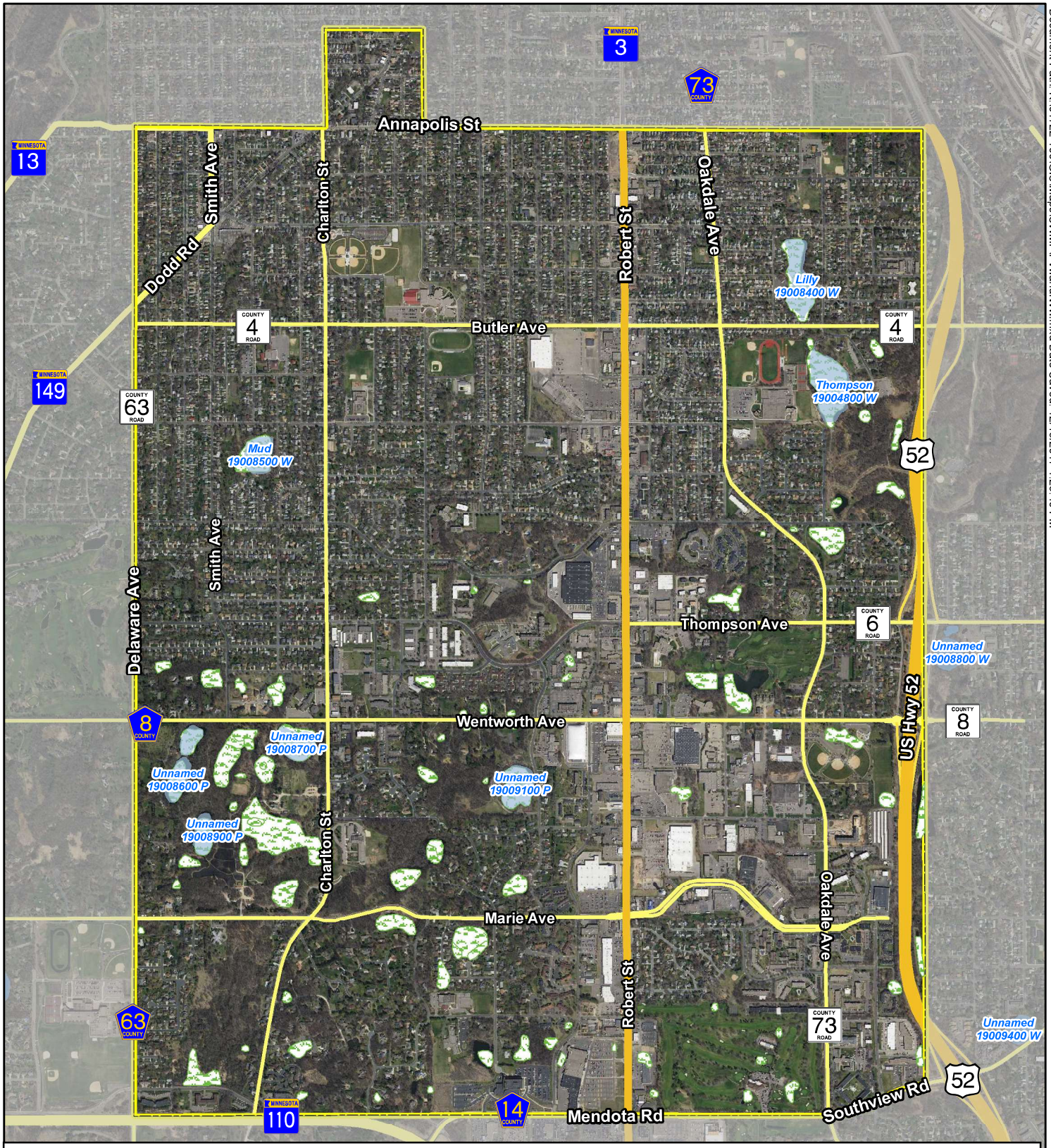
APPENDIX D
PONDNET MODEL SUMMARY

Pond	Mean Depth (Feet)	Surface Area at Normal Level (Acres)	Wet Pond Volume (Ac-Ft)	Direct Watershed T.P. Removal (%)
Riverview Tunnel				
RW7P- Mud Lake	1.5	4.4	6.6	48
RW24P- Lily Lake	3.0	6.4	19.2	61
Ivy Falls Creek				
IF1AP	1.5	4.4	6.6	43
IF1BP	0.0	1.3	0.0	0
Simons Ravine				
SR1P	3.0	1.5	4.6	59
SR4P- Marthaler Pond	3.0	4.5	13.4	52
SR6AP	1.5	0.9	1.3	41
SR6BP	1.5	0.1	0.2	32
SR7P	2.5	0.3	0.6	52
SR9P	3.0	0.8	2.4	62
SR10P	3.0	0.6	1.8	62
SR13P- Wentworth Pond	2.0	6.2	12.5	32
SR15P	1.5	2.6	4.0	50
SR19P- Thompson Lake	3.0	7.3	22.0	52
SR18AP- S. Emerson Pond	3.0	2.8	8.3	18
SR18BP- N. Emerson Pond	3.2	0.8	2.5	6
SR23P	1.5	0.6	0.9	48
Valley Creek (Marie)				
MR2P	3.0	5.2	15.7	50
MR3P	1.5	4.7	7.0	36
MR4P	1.5	1.6	2.4	29
MR11P	1.5	2.1	3.1	36
MR9P	0.0	10.1	0.0	0
MR8P	3.0	2.9	8.7	45
Valley Creek (Delaware/110)				
D10-7P	2.5	0.4	1.1	57
D10-10P	1.5	0.7	1.1	42
D10-19P	0.8	2.5	1.9	24
D10-27P	1.5	1.1	1.7	52

APPENDIX D
PONDNET MODEL SUMMARY

Pond	Mean Depth (Feet)	Surface Area at Normal Level (Acres)	Wet Pond Volume (Ac-Ft)	Direct Watershed T.P. Removal (%)
Highway 110-494				
A13P	1.5	1.1	1.6	21
A16AP	1.5	0.5	0.8	48
A1P	0.0	1.6	0.0	0
A2P	2.5	2.5	6.3	50
A4P	3.0	2.5	7.4	48
A7P	3.0	1.7	5.0	44
A21P	2.5	0.2	0.5	36
P1AP	3.0	0.2	0.5	44
P1BP	3.0	0.2	0.7	50
P2AP	3.0	0.2	0.5	30
P2BP	0.8	0.7	0.5	17
2PCP	3.0	0.8	2.3	31
T6P	3.0	0.3	1.0	51
T7P	3.0	0.6	1.7	44
Wentworth Street				
W1P	2.5	2.0	4.9	47


RW3
PK1C
RW4C
RW15C
RW19C
RW21
LF3
RW22C
LF1C
RW24
IF2C
RW6C
SR19C
SR23
RW7C
RW9C
IF10C
SR21C
SR18
IF3BC
SR5C
SR11
SR14C
SR13
IF2C
IF1B
SR9
SR7
SR22
MR2
MR3
MR4
IF1A
SR6B
SR6A
MR5C
MR9C
SR4
SR2C
W1
MR1C
A1
SR1
SR3
MR11C
A2
A4
P3C
D10-7
A3C
A8C
D10-1C
D10-10
A10C
P1A
P2A
P2B
P1B
T7
T10C
P4
A16B
A21
T6
D10-11C
D10-27
A16A
D10-28
SF-4C
SF-7
SF-1C
SF-5
Mendota Rd
State Hwy 149
Smith Lake
Silver Lake Heights
Abandoned
Mendota Heights
Robert Pool
LEGEND
Storm Sewer
Flared End
Manhole
Special Catch Basin
Pipes
Intercommunity Flow Routing
Primary Flow Routing
Secondary (Overland) Flow Routing
Waterbodies[1]
Drainage District/ID
City Limits
Parcels
Regional Water Quantity Basins
Local Water Quantity Basins
Underground Storage
[1]Landlocked waterbodies are noted with (L1) under the waterbody identifier.
CITY OF WEST ST. PAUL
LOCAL SURFACE WATER MANAGEMENT PLAN
Surface Water System
Map 2
October 2006
500 0 500
Feet
I:\226\2260500\Cad\gis\wrprojects\swmp.apr
Bonestroo Rosene Anderlik & Associates
Engineers & Architects



West St. Paul Boundary

MnDNR Public Waters

NWI Wetlands

West St. Paul Surface Water Management Plan
Figure 7
National Wetlands Inventory
MNDNR Public Waters Inventory

N

0 1,800 Feet
1 inch = 1,800 feet

WSB

Document Path: K:\01\22-100\GIS\Maps\SWMP\PVMandNWI.mxd Date Saved: 12/15/2017 1:25:40 PM

City of West St. Paul

TO: Environmental Committee

FROM: Assistant Parks & Rec Director

DATE: September 2, 2020

SUBJECT: Discussion on Zoning Code Updates

BACKGROUND INFORMATION:
The Environmental Committee has been review the landscape plans of submitted developments, and making recommendations to the Planning Commission and City Council, for many years. The Environmental Committee has also been instrumental in advancing in the GreenStep Cities Program. Many times these two actions cross paths as the Committee tries to make recommendations that will help advance the GreenStep Cities program.

The Planning Commission has recently discussed making updates to portions of the code. There are some specific updates that relate directly to the reviews the Environmental Committee does. The Planning Commission would like to get feedback from the Environmental Committee on the following sections of the code:

- Pollinator, naturalist, native plantings ordinance
    - improvement or addition to existing site plan requirements
- Energy code and green building requirements
    - Green Step Cities recommendations
    - incorporate things like LED lighting, dark sky ordinance, etc.

Earlier this year, Michael Orange, a WSP resident, former City planner and GreenStep Cities Advocate, submitted a Model Landscape Ordinance (attached). This document could be helpful for our discussion on code updates.

Additionally, staff has been looking into adding a tree replacement dedication ordinance. Essentially if a developer couldn't meet the tree minimum in the zoning ordinance, they would be required to pay a dedication fee to be used for future tree plantings by the City. Many Cities have already developed similar ordinances (attached)

STAFF RECOMMENDATION:
Staff recommends that the Committee discuss changes and updates to the West St Paul Zoning Ordinance.

Attachments: Model Landscape Ordinance; Tree Dedication Ordinance Examples

Roseville

7. Replacement trees may be utilized to meet landscaping and screening requirements if placement, species, and location are consistent with those requirements.
8. Replacement Tree Locations. Required replacement trees shall be planted on the site being developed unless doing so is deemed to be impractical (i.e. due to lack of space), inappropriate (available planting areas are not ideal for new plantings or would do little to enhance the site), or counterproductive to a property's intent (i.e. would entail too much screening for a retail business) as determined by the City Forester or other degreed forester or certified arborist as assigned by the Community Development Department. When such a determination is made, the applicant shall comply with replacement requirements in one of three ways in the following manner:
   a. As directed by the City , required replacement trees may be located on private property within 1000 feet of the subject development site with the consent of the property owner(s), on public improvement project sites that are not greater than 1000 feet from the development site, or on other public and private lands that are not greater than 1000 feet from the development site if such lands are deemed to be available, with priority given to locations near the affected area; or
   b. The City may accept a cash-in-lieu tree replacement payment in accordance with the required fee listed in the City Fee Schedule. In no instance shall a cash-in-lieu of payment exceed 10% of the Fair Market Value of the development site; or
   c. The City may approve a combination of tree replacement in accordance with "a" above and a payment consistent with "b" above to fulfill this requirement. (Ord. 1503 07-11-16)

K. Tree Protection Required

All trees which are to be retained on a site shall be marked and physically protected from harm or destruction caused by soil compaction, equipment and material storage within a tree's identified protection zone, bark abrasions, changes in soil chemistry, out-of-season pruning, and root damage during construction.

1. Before any construction or grading of any development project occurs, a "safety fence" per the approved tree preservation plan shall be erected meeting the following requirements:
   a. Must be at least 4 feet in height and staked with posts no less than every 5 feet.
   b. Shall be placed around the identified protection zone(s) of trees to be preserved per the approved tree preservation plan.
   c. Signs shall be placed along the fence line identifying the area as a tree protection area, and prohibiting development activities beyond the fence line.
2. The tree protection fencing shall remain in place until all grading and construction activity is terminated; failure to maintain tree protection fencing shall be grounds for issuance of a stop work order.
3. No equipment, construction materials, or soil may be stored within the identified protection zone of any inventoried tree to be preserved.
4. Care must be taken to prevent a change in soil chemistry due to concrete washout and leakage or spillage of toxic materials such as fuels or paints.
5. Drainage patterns on the site shall not change considerably causing drastic environmental changes in the soil moisture content where trees are intended to be preserved.
6. Pruning of oak trees and elm trees shall be subject to the following requirements:
   a. Pruning of Oak trees shall not occur from March 15th through July 1st.
   b. Pruning of Elm trees shall not occur from April 1st through August 31st.
   c. On a year to year basis, the City Council may alleviate or extend the above seasonal restrictions by resolution if, in its opinion, the same is necessary for the betterment of city wide oak and elm tree populations.

Sec. 67.208. - Replacement of trees.

(a) *Generally.* While development shall retain the maximum number of trees possible, it is recognized that a certain amount of tree removal is an inevitable consequence of urban development.

(b) *Replacement requirements.* Trees removed for development or reasonably anticipated to be lost due to development shall be replaced according to the following requirements:

(1) Individual trees of at least twelve (12) inches DBH but less than eighteen (18) inches DBH shall be replaced on the basis of one (1) replacement tree for every one (1) tree removed.

(2) Individual trees of at least eighteen (18) inches DBH but less than twenty-four (24) inches DBH shall be replaced on the basis of two (2) replacement trees for every one (1) tree removed.

(3) Individual trees of twenty-four (24) inches DBH or larger shall be replaced on the basis of three (3) replacement trees for every one (1) tree removed.

(c) *Transplanting permitted.* Trees designated for removal within the limits of disturbance may be transplanted within the site and counted as replacement trees.

(d) *Deciduous replacement trees.* Deciduous replacement trees of nursery stock shall be at least two and one-half (2 ½) caliper inches, of a species similar to the tree(s) lost or removed, and meet the standards in section 63.106, landscaping and plant materials. At the discretion of the superintendent of parks, coniferous trees may replace deciduous trees that are lost or removed.

(e) *Coniferous replacement trees.* Coniferous replacement trees shall be at least six (6) feet in height, of species similar to the tree(s) lost or removed, and meet the standards in section 63.106, landscaping and plant materials.

(f) *Inspection.* The applicant shall arrange for an on-site inspection of all replacement trees by the superintendent of parks prior to planting.

(g) *Time limit on planting replacement trees.* Replacement trees shall be planted no more than twelve (12) months after the removal of original trees, unless an extension is granted by the superintendent of parks. The applicant shall inform the superintendent of parks that all replacement trees have been planted, at which time the superintendent of parks shall inspect the site.

(h) *Off-site planting of excess replacement trees.* If the number of replacement trees to be planted exceeds the number of trees that can be accommodated practically on-site, as determined by the superintendent of parks, off-site planting may occur at locations to be determined by the applicant and the superintendent of parks, or a fee in lieu of off-site planting may be required as provided in paragraph (i) below. When determining off-site planting locations, priority shall be given to lots that are located within the TP tree preservation district and in close proximity to the lot(s) from which the trees were removed.

(i) *Fee in lieu replacement trees; expenditure of funds.* Where tree replacement on-site is not practical and a suitable off-site location cannot be determined and agreed upon by the applicant and the superintendent of parks, a fee in lieu thereof may be assessed for the replacement required in section 67.208(b). The fee amount, which shall be equal to or greater than the value of each tree established in the latest revision of "A Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs and Evergreens," prepared by the International Society of Arboriculture, plus ten (10) percent, shall be provided by the applicant and approved by the planning administrator. All funds collected shall be expended exclusively for tree planting and maintenance as administered by the superintendent of parks.

(j) *Replacement of or fee for trees designated for preservation or outside limits of disturbance.* Any trees designated for preservation on the tree preservation plan or that are outside the limits of disturbance, but that were subsequently removed or damaged, shall be replaced at the rate of one (1) new tree for every tree lost or according to the requirements stated in section 67.208(b), whichever is greater; or through payment of a fee in lieu thereof equal to or greater than the value of each tree lost as established in the latest revision of "A Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs and Evergreens," prepared by the International Society of Arboriculture.

(k) *Trees for which replacement is not applicable.* The provisions of section 67.208 shall not apply to:

(1) The removal of trees in areas to be occupied by buildings, private streets, driveways, areas required for accessory parking or within a distance of fifteen (15) feet of a building foundation;

(2) The removal of trees determined by the superintendent of parks to be

hazardous, diseased, dying or dead;

(3) The removal of trees transplanted from one (1) part of a development site to another; or

(4) The removal of trees from commercial nurseries or horticultural properties such as tree farms, orchards or commercial forests. This exception shall not be interpreted to include lumber harvesting incidental to the imminent development of land.

Sec. 67.210. - Penalty.

The removal of trees in violation of this subdivision shall be constitute a petty misdemeanor and subject to a fine as specified in section 1.05 of this Code. In determining the amount of the fine, the court is requested to take into consideration the value of the tree(s) removed as established in the latest version of "A Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs and Evergreens," prepared by the International Society of Arboriculture, plus the cost to replace the tree(s). The unapproved removal of each tree shall constitute a separate violation.

Shakopee

2) Replacement trees must meet the following standards at time of planting:

   a. A deciduous shade tree at a minimum of 1.25 caliper inches or #20 container; or

   b. A coniferous tree of a minimum 5 feet in height or #20 container; and

   c. Must be planted consistent with Section 7.05 and 7.18 of the City Code and meet specifications in the City's Forestry Specifications Manual.

3) All Replacement Trees must be installed during appropriate season for that planting stock.

4) Replacement Trees are not to be installed until exterior construction activities are complete in that area.

5) If there are ≥30 trees are required, they shall be composed of no more than 10% of one species, 20% of one genus, and 30% of one family. If <30 trees are required, one species shall make up no more than ¼ of the total.

6) Replacement Trees shall not be planted in a location that will interfere with other infrastructure or be in extreme competition for resources with other trees at maturity.

7) The City may accept other vegetative or environmental alternatives proposed by an Applicant if those alternatives are monetarily or ecologically equivalent to the value of the Replacement Trees required by this Section.

8) Replacement Trees shall be planted not more than 18 months from the date of the final approved tree replacement sheet as part of the Tree Preservation Plan. Extensions may be requested in writing to the City.

9) If the number of replacement trees cannot be met on site the following is required:

   a. A cash payment of $400.00 per replacement tree shall be provided to the City for the planting of trees that are as close as possible to the site that payment was received for or to subsidize trees sold to the City's residents; or

   b. Trees may be planted in City owned or managed land as approved by the Parks, Recreation & Natural Resources Director; or

   c. Replacement Trees may be installed on other properties owned by the Applicant within the City. If a Buffer area as defined by the Natural Resources Corridor Map is on said property, Replacement Trees shall be planted in this area first.

I) Unauthorized Significant Tree Removal.

1) Any person, firm, or corporation who removes or causes the loss of a Significant Tree identified to be preserved on an approved Tree Preservation Plan or without a permit allowing Woodland Alteration shall be required to complete one of the following as determined by the City:

   a. Installation of Replacement Trees within the same development at a 1:2 DBH (remove:replace); or

   b. Payment to the City of $500.00 for every 1 inch of Significant Tree removed that was unauthorized. Measurement of each tree will be at DBH or diameter of the stump, whichever is readily available. This amount may be taken by the City from

the financial security posted by the Applicant for Tree Replacement, if any. A minimum of $15,000 payment will be required if measurements are unavailable.

2) This provision also applies to a conservation easement area that is disturbed during or after development as well as removing a publically managed tree of any size without written City authorization.

3) The City may withhold permits from any person, firm, or corporation who fails to complete the requirements above.

J) Financial Security.

1) The Applicant shall provide the City with a cash escrow, or other form of security that the City deems acceptable, in the amount of 150% of the total Tree Replacement Estimate. Formula: Number of Replacement Trees x Tree Replacement Estimate x 150%= financial security due.

2) The financial security required for the Replacement Trees is due prior to the issuance of the grading permit or the commencement of any Woodland Alteration activity.

3) All Replacement Trees must be warrantied to guarantee survival. The warranty period shall begin upon inspection and acceptance by City staff of the installed trees for proper planting, size, species, health, and location. If at any time during the warranty period Replacement Trees are found to be unhealthy by City staff they are required to be replaced with the same size and species by the applicant at the soonest appropriate planting time.

   a. For commercial/industrial sites and residential developers, up to 75% of the financial security may be returned upon inspection and acceptance by the City of installed trees and the submittal of a City approved two year warranty from the landscape contractor who installed the trees. This warranty must cover tree health issues relating to excess or insufficient water. The remaining financial security will be held by the City for two years.

      i. When reducing the financial security, 75% will be returned unless City staff feels the trees have a heightened risk of failure.

   b. For builders of individual residential lots within a subdivision who receives a one year warranty from the landscape contractor who installed the trees, 100% of the financial security will be returned upon:

      i. Inspection and acceptance of installed trees by the City; and

      ii. Providing the lot buyer with the copy of the one year warranty from the landscape contractor and contact information to make a claim on the warranty.

4) If the financial security has not been returned in full after the inspection of the installed trees, at the end of a two year warranty period the Applicant shall schedule a final inspection with City staff. Prior to scheduling the inspection the Applicant shall confirm the following conditions are met:

Print

Minnetonka Code of Ordinances

14. Landscape Plan Requirements.

Landscape plans must be prepared by a landscape architect or other qualified person acceptable to the city planner, drawn to a scale of not less than one inch equals 50 feet and must show the following:

a) Property:
1) lot lines with accurate dimensions;
2) locations of existing and proposed buildings, parking lots, roads and other improvements;
3) existing and proposed easements;
4) proposed grading plan with two foot contour intervals;

b) Existing Vegetation:
1) All trees that will be removed, relocated, or preserved;
2) Any shrubs or planting beds that will be removed or modified;
3) Tree protection measures for tress to be saved;
4) Any other vegetation identified as significant by city staff.

c) New Plantings:
1) A planting plan with the location of each new plant with the species and size labeled;
2) A plant schedule with symbols, quanitites, common and botanical names, size, container/root type, and any details or remarks summarizing the plant material to be used;
3) Planting details for planting trees and shrubs.
4) Areas to be seeded or sodded, or otherwise established with groundcover. Note, gravel or landscape rock does not, by itself, constitute landscaping.

d) Other landscape elements:
1) Fences, retaining walls, patios, and other similar features, and associated construction details.
2) Berms and associated grading details.
3) Lighting and associated details.
4) Irrigation systems and associated details.

(Amended by Ord. 2019-16, adopted July 22, 2019)

15. Minimum Landscaping Requirements.

a) A reasonable attempt must be made to preserve as much existing vegetation as is practicable and to incorporate it into the landscape plan.

b) All open areas of a lot which are not used or improved for required parking areas, drives or storage must be landscaped with a combination of overstory trees, understory trees, shrubs, flowers and ground cover materials. The plan for landscaping must include ground cover, bushes, shrubbery, trees, sculpture, foundations, decorative walks or other similar site design features or materials in a quantity having a minimum value in conformance with the following table:

Project Value, Including Building Construction, Site Preparation, and Site Improvements	**Minimum Landscape Value**

below $1,000,000 = 2%

$1,000,001 - $2,000,000 = $20,000 + 1% of project value in excess of $1,000,000

$2,000,001 - $3,000,000 = $30,000 + 0.75% of project value in excess of $2,000,000

$3,000,001 - $4,000,000 = $37,500 + 0.25% of project value in excess of $3,000,000

over $4,000,000 = 1%

In instances where native or significant plant materials exist on a site prior to its development, the application of the standards in this subdivision may be adjusted by the city to allow credit for such material, provided that such adjustment is consistent with the intent of this ordinance. The city may permit the seeding of areas reserved for future expansion of the development if consistent with the intent of this ordinance.

c) At least 25 percent of proposed new plantings must be species beneficial to pollinators derived from the city's native or native cultivar plant list, unless approved by the city. The city may allow credit for existing, native and/or siginficant plant materials beneficial to pollinators that are preserved as part of the landscape plan.

d) Not more than 25 percent of the required number of trees may be composed of any one species unless approved by the city. The following trees are not allowed as new plantings:

1) a species of the genus Ulmus (elm), except thsoe elms bred to be immune to Dutch elm disease;
2) box-elder;
3) ash;
4) female ginkgo; or
5) Colorado spruce.

e) All new landscape trees and shrubs must meet the American Standard for Nursery Stock and American National Standard relating to planting guidelines, quality of stock and appropriate sizing of the root ball. Landscape trees must be balled and burlapped or moved from the growing site by tree spade. Deciduous trees will be not less than one and one quarter inches but not more than three inches caliper for balled and burlapped trees, and not less than three inches but not more than six inches caliper for spade-moved trees. Coniferous trees will not be less than six feet in height but no more than eight feet for balled and burlapped trees, and not less than eight feet in height but not more than fourteen feet for spade-moved coniferous trees.

The city may allow larger balled and burlapped or spade moved trees if these trees are accompanied with a three year guarantee.

f) In order to provide for adequate maintenance of landscaped areas, an irrigation system must be provided as part of each new development, except one and two-family dwellings and additions to existing structures that do not at least equal the floor area of the existing structure. The irrigation system must include a properly istalled and oeprating rain sensor or other smart irrigation controller, and must be installed in all landscaped areas except areas to be preserved in a natural state.

(Amended by Ord. 2019-16, adopted July 22, 2019)

(2) **Allowable Tree Removal.**

a. Following the concept plan review and alternative analysis, listed in Subsection 1107.2104, significant trees may be destroyed without any required replacement within the width of required easements for public streets, utilities and storm water ponding areas.

b. In areas outside of the exempted areas listed in subsection (a), up to 35% of the total dbh inches of all significant trees may be removed without replacement or restitution.

c. **Vacant Lot Development on Lots Platted Prior to January, 1996.** On individual lots, up to 35% of the total dbh inches of all significant trees may be removed for the installation of utilities, driveways and the building pad without tree replacement or restitution.

d. **Redevelopment of Lots Platted Prior to January, 1996, and Developed Lots.** On previously platted and developed lots, where the structures have been removed or destroyed to more than 50% of the current market value, up to 35% of the total dbh inches of all significant trees may be removed for the installation of utilities, driveways and building pads without tree replacement or resolution.

e. Significant trees in excess of the limitations of this Section may be removed, provided all trees removed in excess of said limitations shall be replaced in accordance with the Tree Replacement Formula.

(3) **Tree Replacement Formula**. Replacement of removed or disturbed trees in excess of the percentage allowed by this subsection shall be according to the following guidelines:

a. For development which exceeds the percentage of allowable removal of significant trees, all trees shall be replaced at the ratio of 1/2 caliper inch per 1 dbh inch removed.

b. For each heritage tree saved, the developer may receive credit towards the required replacement trees. This credit will be at a rate of 2 caliper inches for each 1 dbh inch saved. To receive this credit, the applicant must demonstrate that extraordinary measures have been taken to preserve the heritage trees that otherwise would not be saved.

c. The Community Development Director or his/her designee, in their sole discretion, may allow a portion of the requirement for replacement trees to be satisfied through an approved landscape plan that may include understory trees, shrubs, and landscape beds; however, in any case, 80% of the required replacement trees shall be satisfied through overstory trees. The overall landscape plan must be approved prior to construction of any lots within the development. This option is at the discretion of the Community Development Director or his/her designee.

d. Required replacement trees shall be planted on private property on the site being developed. If the applicant demonstrates to the satisfaction

of the Community Development Director or his/her designee that it is not practical or reasonable to plant all or some of the required replacement trees on private property on the site, the applicant may meet the tree replacement requirements through one or a combination of the following:

- Trees may be planted on City owned or managed land on the site being developed as approved by the Community Development Director or his/her designee; or
- Trees may be planted on City owned or managed land off the site being developed as approved by the Community Development Director or his/her designee; or
- Trees may be planted on other private property within the City with permission of the property owner developed as approved by the Community Development Director or his/her designee. If a buffer area as defined by the natural resource corridor map is on said property, replacement trees shall be planted in the buffer area first.
- Upon request of the applicant, applicant may make a cash payment to City to be used for planting of trees within the City or to subsidize trees sold to the City's residents; such payment shall be per caliper inch required as reflected in the current City of Prior Lake fee schedule.

*the above listed options are listed in the order that the City of Prior Lake will consider replacement.

e. Minimum sizes for replacement trees shall be:
   - Deciduous - 1 1/2" caliper or #20 container
   - Coniferous - 6 feet in height or #20 container

f. Replacement trees shall be from balled and burlapped, certified nursery stock as defined and controlled by Minnesota Statutes §18.44 through 18.61, the Plant Pest Act, as may be amended from time to time. Replacement trees may also be from bare root stock, provided the trees are planted no later than May 15th, and the planting is inspected by the City.

g. Replacement trees shall be covered by a minimum 1-year guarantee.

h. Replacement trees shall be of a species similar to other trees found on the site where removal has taken place, or shall be selected from the list of significant coniferous and deciduous trees found in the Public Works Design Manual. Selection of replacement tree types for use on public sites shall be at the sole discretion of the City.

i. Where heritage trees have been removed, replacement trees shall consist of the same species as the removed heritage tree, or a tree that has the same potential value as the removed heritage tree. This value shall be certified by a certified forester or arborist. For the purposes of this paragraph, value is defined as a species which has the same growth and life potential as the removed tree.

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credit, cash deposit or other instrument which provides an equal performance guarantee to the City.

(i) **Redevelopment Compliance.**

(1) Redevelopment or Large Addition. When either full redevelopment of a site is proposed or an addition that would increase total floor area on a site by 25 percent or more, a landscape plan for the entire site, demonstrating compliance with the requirements of this Section, must be submitted for approval.

(2) Small Addition. When an addition is proposed that would increase total floor area on a site by less than 25 percent, but would physically impact existing landscaping, a modified landscape plan for the portion of the site affected by the addition, demonstrating compliance with the requirements of this Section, must be submitted for approval.

(3) Constrained Sites. The City recognizes that highly constrained redevelopment sites may have difficulty meeting the requirements of Section 19.52. Given that the City seeks to encourage rather than impede redevelopment, highly constrained redevelopment sites may seek relief from landscape standards through the planned development process. In considering planned development flexibility to landscape standards, the City shall:

(A) balance the public interest in promoting redevelopment with the public interest in providing landscaping; and

(B) consider whether reduced landscaping levels are balanced by alternative methods of providing visual interest to the site including but not limited to sculpture, public art or higher quality landscaping materials.

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SEC. 19.53. RESERVED. [~~MAINTENANCE.~~

~~In all districts, all screening, including landscaping, fencing, and other structures, whether required or not, shall be maintained so as not to be unsightly or constitute a nuisance to adjoining property and so as to be in accordance with any approved plans. Screening is "unsightly" when it is dilapidated, when it is in need of paint or peeling, when its materials are broken, crumbling, decaying, warping, or falling apart, or, in the case of landscaping, when plant materials are diseased or dying.~~]

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SEC. 19.57.01. STEEP SLOPES.

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(d) **Special Provisions.**

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(3) **Mitigation.** When the City Council grants relief from the requirements of this Section by granting of a variance, approval of a Planned Development (PD) overlay district, approval of a conditional use permit for a Neighborhood Unit Development or other action, the City Council may require mitigation of the effects of surface runoff on steep slopes by any reasonable method, including but not limited to:

(i) **Trees.** The City Council may require applicants to plant additional trees to intercept rain water on open portions of the lot. Any [~~"shade" tree listed in Section 18.02(A) of this Code which has a diameter of two inches or more at breast height, or any "evergreen" tree listed in Section 18.02(C) which is five~~] overstory tree of 2 and ½ caliper inches or greater or any evergreen tree of

otherwise established by the Planning Department. An earth berm may be used, but shall not be used to achieve more than eight (8) feet of the required screen. The planting plan and type of plantings shall require the approval of the Planning Department.

b. A fence may also be installed, but not in lieu of the greenbelt. The fence shall be constructed of masonry, brick, or wood, except as otherwise provided herein. Such fence shall provide an eighty (80) percent opaque screening effect and shall be a minimum of six (6) feet in height but shall not exceed eight (8) feet in height. The grade for determining height shall be the grade elevation of the building or use for which the screening is providing protection, unless otherwise established by the Planning Department. The design and materials used in constructing a required screening fence shall be subject to the approval of the Planning Department. Fences in excess of eight (8) feet in height shall require an administrative permit subject to the approval of the Planning Department.

2. Screening Standards

a. Deciduous trees shall be planted not more than forty (40) feet apart. Evergreen trees intended for screening shall be planted not more than twelve (12) feet apart or depending on the plant spread.

b. Where plant materials are planted in two (2) or more rows, plantings shall be staggered in rows unless otherwise approved by the Planning Department.

c. Required screening does not count towards minimum landscape requirements identified in section 4-4-2.

4-4-2 Required Landscaping

The preservation of existing trees and vegetation, as well as the planting of new trees and vegetation, can significantly add to the quality of the physical built environment. Trees can provide the following benefits to the community:

- Provide buffers and screens again noise, air pollution, and unsightly and incompatible uses;
- Reduce the hazards of flooding and aid in the control of erosion and storm water runoff;
- Act to moderate extremes of temperature and provide shade;
- Aid in energy conservation

New or expanding utility, commercial, industrial, and institutional uses shall be subject to mandatory landscape plan and specification requirements.

1. General Landscape Standards

a. Said landscape plan shall include a narrative describing the overarching landscape architecture elements and how the design and placement of plant types and materials will complement the form and function of the developed site.

b. Said landscape plan shall be developed with an emphasis upon the entry focal areas, boundary or perimeter of the proposed site at points adjoining a public right-of-way, parking lot, other property and the immediate perimeter of the structure.

c. The number of plantings shall be the greater of a.) 1 landscape unit per 40 feet of the site perimeter or b.) 1 landscape unit per 500 sq. ft. of gross building area.

d. The target goal for site landscaping is that all existing and new tree canopies at full maturity cover at least five (5) to ten (10) percent of the entire developed site.

e. All landscaping incorporated in said plan shall conform to the following minimum sizes, standards and criteria:

A landscape unit shall be defined as one (1) of the following:

Landscape Unit	Potted/Container OR	OR	Balled and Burlapped
Deciduous/Shade trees	2.5 inch diameter/#25 container		2.5 inch diameter
Ornamental trees (flowering crabs, hawthorn, etc.)	6 – 8 feet in height/#7 container		2 inch diameter
Coniferous/Evergreen trees	---		6 feet
Tall shrubs and hedge material (evergreen or deciduous)	3 – 4 feet in height		3 – 4 feet in height
Low shrubs, deciduous Evergreen Spreading evergreens	18–24 inch potted/#2 - #10 container		24 – 30 inches 24 – 30 inches 18 – 24 inches

* Type and mode are dependent upon time of planting season, availability, and site conditions (soils, climate, groundwater, manmade irrigation, grading, etc.).

f. For all landscape plans, at least 10% of the evergreen and/or deciduous trees must exceed the minimum size (to 8 feet high and 3½ inches caliper balled and burlapped respectively) to establish some diversity in size or enrichment of design intent.

g. The complement of trees fulfilling the minimum requirements shall provide a variety of vertical and horizontal plantings and landscape features to maintain a mix of plant types.

2. Design and Placement: The landscape plan shall articulate, shape and form the landscape design of the exterior space using landscape elements of plant materials, walks, terraces, fences, creative grading, sculpture, lighting, etc to create hard and soft elements into a composition form.

a. All areas within the property lines (or beyond, if site grading extends beyond) shall be treated. All exterior areas not paved or designated as roads, parking, or storage must be planted into vegetation (lawns, ground covers, or shrubs).

b. At least 50% of the total building foundation perimeter shall be sodded or landscaped with approved ground cover, shrubbery, and trees.

c. Plant material centers shall not be located closer than three (3) feet from the fence line or property line and shall not be planted to conflict with public plantings, sidewalks, trails, fences, parking areas, and driveways based on the judgment of the Planning Department.

d. Where massing of plants or screening is intended, large deciduous shrubs shall be planted four (4) feet on center or closer, and/or, evergreen shrubs shall be planted three (3) feet on center or closer.

e. Turf slopes in excess of three to one (3:1) are prohibited, except as part of a rain garden design.

f. Trees and shrubs shall not be planted in the right of way.

g. All plants required as part of an approved landscaping plan shall be maintained and kept alive. Dead plants shall be replaced in accordance with the approved landscape plan.

3. Landscaping of Parking Areas (Landscaping provided in parking areas may be used to meet overall landscaping requirements):

a. At least 3% of the total land area within the required parking and driveway areas of a site shall be landscaped for lots with less than 30 spaces. At least 5% of the land area shall be landscaped for sites

Model Landscape Ordinance for a Municipal Zoning Code

Prepared by J. Michael Orange[1] for the GreenStep Cities Program, 4/1/17

Introduction

The following model ordinance focuses on the landscape requirements in a city's zoning ordinance that will regulate the review process for new developments.[2] City ordinances that incorporate state-of-the-art best practices improve the development review process. The City of Burnsville's zoning ordinance served as the primary base document for this model landscape ordinance to which information from several city ordinances were adapted and added.

The model ordinance strives to strike a balance between specificity and flexibility. Developers want clear rules. They want to know that everyone will get the same fair treatment and they are experts at building economically successful projects no matter whether they are at the low end or the high end of the quality spectrum. Since a city's code sets the minimum standards, more progressive standards will steer a project towards the higher quality end of what's economically feasible. Developers need to complete projects efficiently and earn a relatively quick return on their investment so that they can invest in another project. Without a state-of-the-art code, staff people, elected officials, or citizens concerned with the long-term health of the city might encourage higher quality (e.g. "greener," more sustainable development), but a developer can effectively argue it down to the minimum required to satisfy their demand for a short-term investment return. Also, a strong code makes the responsibilities of decision-making and enforcement much easier for city staff, planning commissioners, and elected officials. Being able to decisively tell a developer "it's the law" is a powerful enforcement tool.

Ordinances are, by design, difficult to change. Their clarity, relative permanence, and stability can generate investment confidence for developers and preserve existing property values. On the other hand, best management practices change as science evolves and circumstances vary, especially in response to the changing climate. Cities also need to accommodate unique site conditions and creative landscape designs not anticipated at the time of code adoption. It is not good policy to burden a city code with myriad detailed technicalities that may become obsolete and require periodic updating through the cumbersome code revision process. Rather, it is recommended that the city develop a separate document that includes a comprehensive compilation of best practices, technical requirements, etc. The working title for this document is the *Anycity Landscape Policy Guide* and a suggested version is included herein after the model ordinance. A city can easily keep this document up-to-date and posted on its website as a one-stop portal of important information for all of the actors in the development review process.

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[1] J. Michael Orange, Principal of ORANGE Environmental, LLC, can be reached at orange_michael@msn.com, 952-905-1448. Text review by Jeffrey M. Hafner, Director of Municipal Consulting, Rainbow TreeCare, by city code experts, and by tree experts from the University of Minnesota and Minnesota state agencies.

[2] The Minnesota Municipal Planning Act grants the authority to cities to regulate land use. Cities within the seven-county metro area regulate land use through three basic tools—the comprehensive plan, the zoning ordinance, and the subdivision ordinance; and the latter two tools must be consistent with the comprehensive plan and implement its adopted policies. Stormwater management ordinances also play an important role in land developments.

Landscape Requirements

Intent: The purpose of these regulations is to implement orderly business development and the environmental goals from the Comprehensive Plan; to conserve higher quality existing site features during planning and construction; promote biodiversity and preserve the natural richness of the site; restore natural areas damaged by construction so the site can sustain its water, soil, and plant cover functions; and prevent construction and other developmental impacts from damaging off-site natural resources. General requirements shall apply to all zoning districts and include the following:

1. GENERAL LANDSCAPE REQUIREMENTS

A. Landscape Plan: When applicable and as a part of a project's permit review process, a landscape plan shall be submitted to the city providing all information required in the *Anycity Landscape Policy Guide*. The city shall base its permit decisions regarding the matters addressed in the landscape plan on the best practices described in the *Anycity Landscape Policy Guide*.

B. Areas Disturbed By Grading, Other Construction Activities, and Permanent Changes to the Site:

1. When a landscape plan is required for a development, it shall include the following information as regards on-and-off-site trees that may be affected by construction activities and permanent changes to the site:
   a. The location and species of on-site and off-site trees having a trunk diameter of at least 8 inches measured at breast height (diameter at breast height or *DBH*) that have any part of its tree root protection zone (as defined in the *Anycity Landscape Policy Guide*) within the subject site.
   b. The determination by a certified arborist whether the subject trees are classified as "Significant," "Desirable," or "Undesirable," based on generally acceptable arboriculture standards and as described in the *Anycity Landscape Policy Guide*.
   c. Demonstration that no land-disturbing activities or permanent changes to the site will have a deleterious effect upon the tree root protection zones of either on-site or off-site trees categorized as "Significant" or "Desirable."
2. All areas disturbed by grading that are not built upon, paved, or retained as a natural area shall contain sod, be seeded, or defined as a landscape planting bed with approved vegetation, ground covers, shrubbery and trees with a mulch cover, unless specifically approved as part of the overall landscape plan.
3. A minimum of 75% of total vegetated area on the site shall be native to the local area. In addition, a minimum of 75% of all trees and shrubs, by quantity, are to be native material. Native is defined as naturally growing within a 200-mile radius of the site. The removal of existing, non-invasive vegetation is not required in order to achieve this threshold.[3]

[3] Cities may choose to modify this language to accommodate the evolving practice of "managed relocation" or "assisted migration," which involves the intentional movement of flora and fauna into new areas where they are expected to thrive in response to climate change.

4. Maintain or supplement the tree trunk area of the site so that there is no net loss of tree trunk area (square inches) at diameter at breast height (4.5 ft.). The calculation of pre-project tree trunk area may disregard existing trees less than 8 inches in diameter. Replaced tree trunk area may include trees of any diameter.

C. Prohibited Species: Prohibited species that shall not be planted within the city are identified in the *Anycity Landscape Policy Guide*.

D. Compliance: If the applicant and the city manager cannot agree on the proposed landscaping design, the applicant shall be required to make an application for a conditional use permit to prove compatibility.

E. Alternative compliance: The city manager may approve or recommend the city approve the substitution or reduction of landscaped plant materials, landscaped area, or other landscaping or screening standards upon finding any of the following:

1. The alternative meets the intent of this chapter and the site plan is similar in form, scale, and materials to existing features of the site and to surrounding development, and it includes amenities or improvements that address any adverse effects of the alternative. Site amenities may include but are not limited to additional open space, additional landscaping and screening, green roof, decorative or pervious pavers, state-of-the art stormwater management as described in the *Anycity Landscape Policy Guide*, ornamental metal fencing, architectural enhancements, transit facilities, bicycle facilities, preservation of natural features, restoration of previously damaged natural environment, and rehabilitation of existing structures and places that have been locally designated or have been determined to be eligible for local designation as having historic significance.
2. Strict adherence to the requirements is impractical because of site location or conditions and the proposed alternative meets the intent of this chapter.
3. Existing plant materials, walls, fences or the topography of the site and its surroundings make the required landscaping or screening less necessary.
4. The required landscaping or screening will hinder truck access and service necessary to the operation of the use.
5. The required landscaping and screening may obstruct views of traffic or reduce natural surveillance of the site.[4]

F. Alternative Landscape Options: The city encourages the use of special design features such as Xeriscaping, rain gardens/bio-retention systems, landscaping with native species, green rooftops, heat island reduction, and aesthetic design. All site development and redevelopment projects must include two (2) of the following alternative landscape options:

1. Xeriscaping: Xeriscaping is landscaping that uses plants that have low water requirements that make them able to withstand extended periods of drought.
2. Rain Gardens/Bio-retention Systems: Bio-retention systems are shallow, landscaped depressions commonly located in parking lot islands or within areas that receive stormwater runoff. For credit under this section, the rain garden/bio-retention system shall be aboveground and a visible part of the green or landscaped area. Stormwater flows into

[4] Refer to the Crime Prevention Through Environmental Design (CPTED) principles in the *Anycity Landscape Policy Guide*.

the bio-retention area, ponds on the surface, and gradually infiltrates into the soil bed. Pollutants are removed by a number of processes including absorption, filtration, volatilization, ion exchange, and decomposition. Filtered runoff can either be allowed to infiltrate into the surrounding soil (functioning as an infiltration basin or rainwater garden), or discharged to the storm sewer or directly to receiving waters (functioning like a surface filter). The use of under-drain systems is discouraged unless where infiltration is prohibited by the water resources management plan.

3. Lake-scaping to preserve or restore the natural buffer along a shoreline: The buffer shall be at least thirty feet (30') wide and be planted with grasses and species of plants included in the *Anycity Landscape Policy Guide*.
4. Green Rooftops: Green rooftops are veneers of living vegetation installed atop buildings, from small garages to large industrial structures. Green rooftops help manage stormwater by mimicking a variety of hydrologic processes normally associated with open space. Plants capture rainwater on their foliage and absorb it in their root zone, encouraging evapotranspiration and preventing much stormwater from ever entering runoff streams. What water does leave the roof is slowed and kept cooler, a benefit for downstream water bodies. Green roofs are especially effective in controlling intense, short duration storms and have been shown to reduce cumulative annual runoff by fifty percent (50%) in temperate climates.
5. Aesthetic Design: Sites shall be designed to include three (3) of the following: public art, fountains, plazas, perennial beds, entrance landscaping and walls or fences, or other amenities reviewed and approved by the city.

G. *Anycity Landscape Policy Guide*: The city shall develop a document to be maintained by the city manager that will serve as a policy guide and a complement to the landscape regulations in the City Code. It shall describe best practices regarding all matters pertinent to permit decisions regarding landscaping including (but not limited to) technical requirements regarding the following:

1. Protection of trees and soils
2. Stormwater management and erosion control
3. Sun and wind orientation
4. Submission requirements for land use permits
5. Acceptable and unacceptable plants
6. Plant diversity definitions and goals
7. Crime Prevention Through Environmental Design
8. Contractor licensing requirements

2. LANDSCAPING REQUIREMENTS IN RESIDENTIAL DISTRICTS

A. Low-density Residential Districts:

1. Required Landscaping:
   a. All front yards, boulevards, and side yards to the rear of the structure shall have sod, hydroseeding, or landscaping with mulch cover properly installed within sixty (60) days, weather permitting, after the home is constructed upon the lot, but no later than one hundred eighty (180) days after issuance of a building permit. During winter conditions, when plants cannot be installed due to weather, the city will issue a

temporary certificate of occupancy and specify a date for landscaping to be installed during the growing season.

b. Silt fences shall be installed and maintained.

c. Each lot shall have not less than one overstory tree for each 500 square feet of lot area or fraction thereof not occupied by buildings. At minimum, two (2) trees per lot shall be installed, in the front yard and side yard if facing a street, concurrently with sodding requirements.

d. The lot shall have, at minimum, one overstory tree and either one ornamental tree or evergreen tree. The lot may have two (2) overstory trees as long as they are not identical species. This provision may be waived if existing trees meet the requirements of this subsection and are shown on the certificate of survey.

e. All trees shall be planted on private property at least five feet (5') from the property line unless the city manager approves an alternative spacing.

B. Medium Density and High Density Residential:

1. At least fifty percent (50%) of the total site area shall be landscaped. For the purpose of this subsection, landscaping may also include prairies, wetlands, woodlands, ponds, pervious outdoor play areas, outdoor recreational courts, and outdoor swimming and wading pools.
2. All maintained landscaped areas shall have in-ground irrigation systems consistent with the specifications in the *Anycity Landscape Policy Guide* unless the city manager approves an alternative method.

3. LANDSCAPING REQUIREMENTS IN MULTIPLE-FAMILY RESIDENTIAL, BUSINESS, MIXED USE, AND INDUSTRIAL DISTRICTS

A. General Requirements: General requirements that shall apply in all multiple-family residential, business, mixed use, and industrial districts include the following:

1. Minimum Tree and Shrub Requirements: The landscape plan shall, at a minimum, provide at least the following required numbers of trees and shrubs. The shrub requirement shall be in addition to any shrubs required for screening in subsections A.4 and B of this section:
   a. Two overstory trees per three thousand (3,000) square feet of the site not occupied by buildings.
   b. One ornamental tree per one thousand five hundred (1,500) square feet of the site not occupied by buildings.
   c. Two evergreen trees per three thousand (3,000) square feet of the site not occupied by buildings.
   d. One deciduous or evergreen shrub per one hundred (100) square feet of the site not occupied by buildings.
   e. A minimum of two (2) cubic feet of uncompacted, biologically healthy soil that allows healthy tree root growth shall be provided per one square foot of mature tree canopy.
   f. Since construction activities can make soil unable to support trees, the above tree root volume requirement must be satisfied with undisturbed soils.
2. Building Perimeter Landscaping: At least fifty percent (50%) of the total building perimeter shall be sodded or landscaped with approved ground cover, shrubbery, and trees in an area of no less than six feet (6') in width.

3. Heat-Island Reduction: To minimize impact on microclimate and on human and wildlife habitat, shading of parking lots is required. At least two overstory trees shall be planted for every five (5) parking stalls on site. To satisfy this requirement trees must be located at least four feet (4') and within ten feet (10') of a curb adjacent to any internal parking or drive area. Said trees shall count toward meeting the overall site green space and landscaping requirements identified by this chapter for the underlying zoning district.
4. Buffer Yards:
   a. Buffer Yard Location: Where any business, institutional, or industrial use (i.e., structure, parking, or storage) abuts a residential zone or use, such business or industry shall provide a buffer yard and screening along the boundary of the residential property. The buffer area and screening shall also be provided where a business, institution, or industry is across the street from a residential zone or use, but not on that side of a business, institution, or industry considered to be the front as defined by the city.
   b. Buffer Yard Design: Except in areas of steep slopes or where natural vegetation is acceptable, as approved by the city manager, buffer yards shall contain a combination of earth berms, plantings, or privacy fencing of a sufficient density to provide a minimum visual screen and a reasonable buffer to the following heights:
      (1) Plantings: All designated buffer yards must be seeded or sodded except in areas of steep slopes where natural vegetation is acceptable as approved by the city manager. All plantings within designated buffer yards shall adhere to the following:
         (a) Planting screens shall be fully irrigated, consist of healthy, hardy plants, at least six feet (6') in height and designed to provide a minimum year round opaqueness of eighty percent (80%) at the time of installation whenever screening or buffering is required.
         (b) Plant material centers shall not be located closer than five feet (5') from the fence line and property line, and shall not conflict with public plantings, sidewalks, trails, etc.
         (c) Landscape screen plant material shall be in two (2) or more rows. Plantings shall be staggered in rows unless otherwise approved by the city.
         (d) Shrubs shall be arranged to lessen the visual gaps between trees. Along arterial streets, all plantings of deciduous trees shall be supplemented with shrubs such that the buffer yard contains a continuous band of plants.
         (e) Deciduous shrubs shall not be planted more than four feet (4') on center, and/or evergreen shrubs shall not be planted more than three feet (3') on center.
         (f) Where parking or loading areas front on a public street or path, there shall be at least one canopy tree per 25 linear feet or fraction thereof of frontage. Deciduous trees intended for screening shall be planted not more than forty feet (40') apart. Evergreen trees intended for screening shall be planted not more than fifteen feet (15') apart.
      (2) Walls And Fences: All walls and fences erected within designated buffer yards shall meet the following conditions:
         (a) A screening fence or wall shall be constructed of attractive, permanent finished materials compatible with those used in construction of the permanent structure. Such screens shall be at least six feet (6') in height and provide a minimum opaqueness of eighty percent (80%).

(b) Fences may be exposed no more than a maximum length of twenty feet (20’) between landscaping areas or clusters.

(c) For interior lots, a gate constructed of the same material as the fence shall be provided in the wall or fence to allow for maintenance of the street side boulevard.

(d) Fences and landscaping shall not be located within the traffic sight visibility (as defined by the National Association of City Transportation Officials or an approved equivalent).

(3) Earth Berms: Earth berms shall adhere to the following:

(a) Except in areas of steep slopes or where other topographic features or physical characteristics will not permit, as determined by the city engineer, an earth berm shall be installed in all designated buffer yards in accordance with the following requirements:

i. Berms shall be a minimum of four feet (4’) in height.

ii. The slope of the earth berm shall not exceed a three to one (3:1) slope unless approved by the city engineer.

iii. The earth berm shall contain no less than four inches (4”) of topsoil.

B. Parking Lot Landscaping Requirements: The following shall apply to all new development and redevelopment of parking lots for expansions creating five thousand (5,000) square feet or more of impervious surface or disturbance of one-half ($^1/_2$) acre or more of land.

1. Parking Lot Screening: Parking lot screening shall be designed to reduce the visual impact of surface parking lots; mitigate glare from headlights; improve the aesthetic quality of the area for users of the site, adjacent sites, roadways, and sidewalks; and define the perimeter of the parking lot as follows:

a. Off Street Parking Containing Six Or More Parking Spaces: Parking lot screening must be provided between those portions of an off street parking area containing six (6) or more parking spaces and a different zoning district or a public street.

c. Parking Lot Screening Standards:

(1) Parking lot screening must be provided within ten feet (10’) of the perimeter of the parking lot to be screened, except for parking lots adjacent to rain gardens/bio-retention systems, other landscape features, or where screening may impact the traffic sight visibility triangle (as defined by the National Association of City Transportation Officials or an approved equivalent).

(2) Parking lot screening shall be not less than eighty percent (80%) opaque and be a minimum of three feet (3’) and a maximum of four feet (4’) in height as measured from the adjacent finished surface of the parking area. When shrubs are used to provide the screen, such shrubs must be at least two feet (2’) tall at planting and anticipated to grow to at least three feet (3’) tall at maturity.

(3) No landscaping or screening shall interfere with driver or pedestrian visibility for vehicles entering or exiting the premises.

(4) Screening for a parking lot may be comprised of one hundred percent (100%) evergreen planting materials.

d. Content: Parking lot screening must consist of at least two (2) of the following:

(1) A compact hedge of evergreen or densely twigged deciduous shrubs spaced to ensure closure into a solid hedge at maturity.
(2) A berm with plantings as described above.
(3) Transit shelters, benches, bicycle racks, and similar features may be integrated as a part of the screen.
(4) Fencing may be integrated as part of the screen. All wood fencing shall be stained and sealed with a weatherproof product.

2. Parking Island Design: Off street parking areas with at least twenty-five (25) parking stalls shall contain interior landscaped islands. Such islands shall be bounded by a raised concrete curb, pervious curbing, or an approved equivalent, and shall contain mulch (as prescribed by the *Anycity Landscape Policy Guide*) to retain soil moisture. This provision shall not apply to parking structures. The standards for landscape islands are as follows:
   a. Landscape parking lot islands shall be required at the beginning and end of each parking row and shall contain a minimum of one hundred eighty (180) square feet and a minimum width of nine feet (9').
   b. A minimum of one overstory tree shall be provided for each island with soil volumes as prescribed in sections 3.a.1.e. and f. The design shall inhibit damage to the tree root protection zone as defined by the *Anycity Landscape Policy Guide*.
   c. Shrubs, perennials or ornamental grass shall be incorporated in each landscaped island that does not contain a tree.
   d. Islands shall be prepared with healthy topsoil to a depth of two feet (2') and improved to ensure adequate drainage, nutrient, and moisture retention levels for the establishment of plantings.
   e. All perimeter and interior landscaped areas in parking lots shall be equipped with a permanent irrigation system, unless drought tolerant plant materials are used exclusively. Where drought tolerant plant materials are used, irrigation shall be required only for the two (2) year period following plant installation and may be accomplished using hoses, water trucks, or other nonpermanent means.
3. Orientation: Where practical, tree plantings shall be grouped and oriented in response to the sun and wind consistent with the requirements in the *Anycity Landscape Policy Guide*.

Anycity Landscape Policy Guide

Introduction

Ordinances versus guidelines: Ordinances are, by design, difficult to change. Their clarity, relative permanence, and stability can generate investment confidence for developers and preserve existing property values. On the other hand, best management practices for landscaping must respond to unique site conditions and creative landscape designs and they must change as arboriculture science evolves and circumstances vary, especially in response to the changing climate. Rather than burden the Landscape Regulations in the Zoning Code with myriad detailed technicalities that may require periodic updating through the cumbersome code revision process, this *Anycity Landscape Policy Guide* includes a comprehensive compilation of best practices and technical requirements. It is intended to serve as a one-stop portal of important information for all of the actors in the development review process.

The City Code authorizes the city manager to develop the *Anycity Landscape Policy Guide*, keep it up-to-date, and use it to make permit decisions. It will serve in a quasi-judicial role and have a similar (but not identical) degree of authority as a regulation contained in the City Code. The city manager, Planning Commission, City Council, and other city officials will use the provisions in this guide as the legal bases for making decisions affecting a variety of permits and approvals.

Grey and green infrastructure: Everybody loves trees. We love how they beautify our yards, define our streets, shade our parks and trails, and provide aesthetic relief to our bleak parking lots. However, few people fully appreciate what it takes to develop and maintain an urban forest and the full spectrum of benefits such forests provide. Many urban disciplines also undervalue the urban forest; fostering the notion that grey public infrastructure (e.g. streets, sewers, sidewalks, and conduit) is significantly more important than green infrastructure (e.g. soils, plants, air, and water).

Cities should treat its green infrastructure on a par with its grey. While cities have legal and financial institutions, policies, plans, and best practices in place to ensure that public grey infrastructure performs as intended over the expected life of a particular system, similar safeguards are lacking when it comes to green infrastructure. If a city hired a private company to build a road designed to last twenty years and it started to fall apart after ten, the city could hold the company responsible for necessary repairs. Similarly, cities should ensure that development does not adversely affect green infrastructure. For example, zoning codes include specific landscape requirements for developments, but cities may not have prioritized their resources to inspect the sites years later to make certain that plants and trees are still alive and stormwater systems function as designed.

Tree inventories offer an excellent example of how this *green=grey* principle should also apply to city operations. Inventories that document public tree location, species, condition, and maintenance history are as essential to managing the urban forest as similar inventories of public grey infrastructure. Also, public tree inventories need to be continually updated in order to retain their value and effectiveness.

The value of mature trees: While it is easy to appreciate the aesthetic value of trees and other landscape elements, the scientifically quantifiable environmental, economic, and health benefits are not usually as easy to grasp. However, when these quantifiable benefits of trees are weighed against their purchase, planting, pruning, protection, and removal costs, the benefits outweigh the costs by a margin of about 3 to 1. For example, studies show that:

- An average mature tree will provide about $170 in benefits annually.[5]
- The net cooling effect of an average, healthy tree is equivalent to 10 room-size air conditioners that operate 20 hours a day.[6]
- One acre of urban forest absorbs 6 tons of carbon dioxide and emits 4 tons of oxygen annually.[7]
- Street trees even help extend the life of expensive asphalt by 40-60% by reducing daily heating and cooling of roads.[8]
- Storm water interception by trees reduces the peak-flow and flooding during intense storms, thereby reducing the amounts of pollutants that are washed into our rivers and lakes. An average mature tree will intercept over 1,800 gallons of stormwater annually.
- Tree roots have a profound effect on the soil environment. They will direct 40-73% of assimilated carbon below ground.[9]

As experts have underscored, healthy urban trees mean healthier city residents. A recent analysis by the World Health Organization confirmed that air pollution is now the world's single largest environmental health risk.[10] A recent analysis prepared by U.S. Forest Service scientists and collaborators provides the first broad-scale estimate of how trees reduce air pollution, protect our health, and reduce health care costs. The article describing the analysis quoted Michael T. Rains, Director of the Forest Service's Northern Research Station and the Forest Products Laboratory: "With more than 80 percent of Americans living in urban area, this research underscores how truly essential urban forests are to people across the nation."[11] The Forest Service study estimated that in 2010, trees in the urban areas of Minnesota removed 4,600 tons of pollutants from the air and that this resulted in $26.7 million in reduced health care costs.[12]

The following diagram is from a study published in 2013 in the *Journal of Environmental Science and Technology,* which measured the impact of boulevard trees on indoor air quality. Researches found a greater than 50% drop in traffic-derived indoor particulate matter when trees separated streets and homes.[13]

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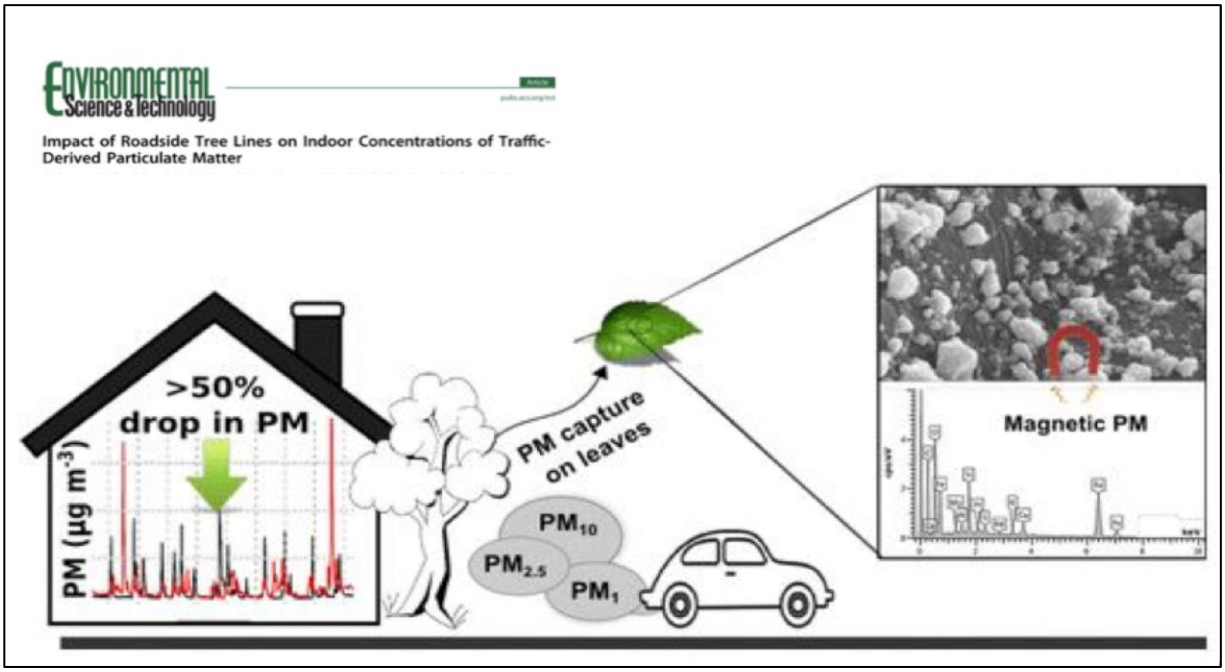
[5] Based on a 17-inch ash tree. Source: National Tree Benefits Calculator, http://www.treebenefits.com/calculator/
[6] http://www.arborday.org/trees/benefits.cfm
[7] Ibid.
[8] Source: "City to Consider Special Funding for Trees," City of Madison Wisconsin, 7/31/14, http://www.cityofmadison.com/news/city-to-consider-special-funding-for-trees
[9] Source: http://www.dailycamera.com/guest-opinions/ci_26131781/silent-environmental-devastation
[10] "7 million premature deaths annually linked to air pollution," World Health Organization press release, 3/25/14, www.who.int/mediacentre/news/releases/2014/air-pollution/en
[11] "Tree and forest effects on air quality and human health in the United States," Nowak, David, et al., *Environmental Pollution*, 7/25/14, http://www.nrs.fs.fed.us/pubs/46102
[12] The health impacts and their monetary values are based on the changes in NO_2, O_3, $PM_{2.5}$ and SO_2 concentrations using information from the U.S. EPA Environmental Benefits Mapping and Analysis Program model; http://www.epa.gov/air/benmap/.
[13] "Independently, the two approaches identify >50% reductions in measured [particulate matter] (PM) levels inside those houses screened by the temporary tree line. Electron microscopy analyses show that leaf-captured PM is



While the above studies quantify how trees benefit human health, another study demonstrates how tree deaths from the Emerald Ash Borer (EAB) infestation are associated with human deaths. An analysis by U.S. Forest Service scientists concluded that, "Poor air quality and stress are risk factors for [lower respiratory disease and cardiovascular disease], and trees can improve air quality and reduce stress. Their results showed that the spread of EAB across 15 states was associated with an additional 15,000 deaths from cardiovascular disease and an additional 6,000 deaths from lower respiratory disease."[14]

A key word in the above subheading refers to *mature* trees. Contrary to past assumptions, a recent study showed that the older the tree, the more quickly it grows. "Trees with trunks three feet in diameter generated three times as much biomass as trees that were only half as wide. … If we want to use forests as a weapon against climate change, then we must allow them to grow old…."[15]

The value of soils: There is a similar argument for preserving soils. Our soils are alive. They play key roles in the cycle of life and they are absolutely crucial to climate change and the hydrologic and carbon cycles. The structures of healthy soil rely on carbon, which is a key element of all living things. These soil structures are interspersed with small air pockets that absorb precipitation and snow melt. This is especially important in times of drought and

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concentrated in agglomerations around leaf hairs and within the leaf microtopography. … The efficacy of roadside trees for mitigation of PM health hazard might be seriously underestimated in some current atmospheric models." Source: http://pubs.acs.org/doi/abs/10.1021/es404363m

[14] "Exploring Connections Between Trees and Human Health," *Science Findings*, Pacific Northwest Research Station, U.S. Forest Service, Jan./Feb. 2014, http://www.fs.fed.us/pnw/sciencef/scifi158.pdf

[15] Wohlleben, Peter, *The Hidden Life of Trees: What The Feel, How They Communicate*; Greystone Books, 2015, pp. 97-98.

flooding.[16] Compaction destroys this stormwater management benefit and the ability to absorb carbon.

To stay fertile, soil needs a steady diet of carbon from organic matter and it needs protection from temperature extremes and erosion by keeping it covered.[17] Climate change reflects a human-caused disruption in the natural processes where carbon cycles through the environment as a liquid, solid, or gas. "Another way of looking at the problem is that too much of the carbon that was once in a solid phase in the soil is now a gas."[18] The Earth's soils store 2,500 billion tons of carbon—more carbon than the atmosphere (780 billion tons) and plants (560 billion tons) combined.[19]

Plant photosynthesis evolved to utilize atmospheric carbon dioxide and convert it into sugars. The waste product, oxygen, is, of course, essential for higher forms of life. Plant sugars produce the above ground growth we see such as leaves and stems, but plants release up to 40% of the captured carbon dioxide through its roots to feed soil microbes, which in turn assist the plant in acquiring nutrients.[20] As scientist, Peter Wohlleben writes, "There are more life forms in a handful of soil than people on the planet. A mere teaspoon contains many miles of fungal filaments. All of these work the soil, transform it, and make it so valuable for the trees."[21]

Do it right the first time: There are common misperceptions that there is little difference between soil and dirt, and between a mature tree and a new tree (even though it takes up to 3 decades for a new tree to provide benefits comparable to a mature tree). It is crucial during the development process to preserve as much as possible all healthy soils and mature trees. As for new trees, the National Arbor Day Foundation urges putting the "right tree in the right place."[22] Furthermore, it's much more efficient to do it right the first time. A fuller appreciation of the importance of our green infrastructure can lead to urban forests that deliver the substantial benefits that were the long-range hope of those who planted the saplings.

Best Practices and Technical Requirements

1. **Protection of trees and soils:** Mother Nature ignores property lines. The city's developmental controls (zoning, subdivision, and stormwater ordinances) must account for both on and off-site impacts. For example, construction activities like heavy

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[16] "Soil and Carbon: Soil Solutions to Climate Problems," Diana Donlon, Center for Food Safety, 2015. Downloaded from: http://www.centerforfoodsafety.org/reports/3846/soil-and-carbon-soil-solutions-to-climate-problems#

[17] Grubinger, Vern. "Soil Microbiology: A Primer." University of Vermont Extension. University of Vermont, Nov. 2004. Web. 9 Apr. 2015.

[18] Jones, Christine. "SOS: Save Our Soils." Interview by Tracy Frisch. Acres USA Mar. 2015. Web. 9 Apr. 2015.

[19] Lal, Rattan. "Managing Soils and Ecosystems for Mitigating Anthropogenic Carbon Emissions and Advancing Global Food Security." *BioScience* 60.9 (2010): 708-21. Oxford Journals. Web. 9 Apr. 2015. 708.

[20] Dilkes, Nigel B., David L. Jones, and John Farrar. "Temporal Dynamics of Carbon Partitioning and Rhizodeposition in Wheat." Plant Physiology 134.2 (2004): 706–715. PMC. Web. 9 Apr. 2015.

[21] Wohlleben, Peter, *The Hidden Life of Trees*, p. 86.

[22] Source: https://www.arborday.org/trees/righttreeandplace/

equipment movements, materials storage, excavations, and changes to drainage can damage on and off-site trees and destroy living soils.

The Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Minnesota Tree Trust, and the University of Minnesota have developed comprehensive guides of best management practices for the protection of trees and soils in developments (MnDNR BMPs for developments, Minnesota Stormwater Manual, *City Trees: Sustainability Guidelines & Best Practices*, and "SULIS: Sustainable Urban Landscape Information Series" (http://www.extension.umn.edu/garden/landscaping/). Rather than replicate these best practices in this report, the city manager should apply the standards described in these websites and reports in the evaluation of developments as if they were incorporated in total in the zoning code. The alternative compliance provisions in the Model Landscape Ordinance provide sufficient flexibility to vary these more specific criteria where appropriate.

1.1. Tree Root Protection Zone: A tree's Root Protection Zone is defined as a circle on the ground defined by either a) the drip line of the tree or b) a radius that equals one foot for every inch of diameter at breast height (DBH). Damage to a tree's roots can be caused by any disturbance inside this zone including nearby trenching, paving, vehicular movements, materials storage, soil replacement, or altering drainage patterns.[23]

1.2. Process for designating the tree root protection zones of on-site and off-site trees: The following describes a two-stage process whereby city staff can determine if a development under review by the city is likely to have an effect on existing trees on the site and on adjacent properties, and on new trees proposed for the development.

1.2.1. Stage 1 screening procedure by city staff: The city will develop a simple and clear Tree Screening Procedure that can be used by the city's permit review staff to determine if a development under review is likely to have an effect on existing trees on the site and on adjacent properties, and on new trees proposed for the development. This Tree Screening Procedure will help the staff person estimate tree size and location relative to land disturbing activities and to define the preliminary tree root protection zone. The Tree Screening Procedure will incorporate relatively low thresholds to identify a project's potential threats to on and off-site trees, and it will guide the staff decision whether to require the developer to prepare a Tree Plan, which is part of the second stage of the landscape review process.

[23] The following article provides helpful information: https://www.cnu.org/publicsquare/2017/03/10/root-zone-tips-healthy-street-trees?utm_source=Public+Square&utm_campaign=676289d244-EMAIL_CAMPAIGN_2017_03_23&utm_medium=email&utm_term=0_a565e9d234-676289d244-36264433

1.2.2. Stage 2 Tree Plan review completed by arborist: If city staff determine a project has land disturbing activities within the staff-defined, preliminary root protection zone, staff should require the developer to submit a Tree Plan and to notify the property owners of adjacent sites with trees that may be adversely affected by the project. Similar to the landscape plan that is an integral part of the Site Plan Review process, the Tree Plan will identify the information critical to determining a project's potential risk to on and off-site trees including the species, measured trunk diameter, canopy size, and the tree's classification as young, mature, or over-mature. The city should employ the services of a certified arborist who will review the developer's Tree Plan, make on-site inspections, categorize specific trees as "Significant," "Desirable," or "Undesirable," delineate tree root protection zones, and identify potential hazards. The city's arborist may recommend possible alternative solutions such as the redesign of paved areas and excavations, alternative locations accessible for construction equipment and materials storage, the use of tunnel trenching and air spades, and modifications to the site contours and drainage plan.

1.2.3. Tree fund: In the event site constraints prohibit the reasonable protection of on-site or off-site Significant and Desirable trees, the city could establish a Tree Fund and require developers to pay the equivalent costs for the city to buy, plant, and maintain trees on public or private property in the same watershed as the site.

1.3. Mulch: Mulch must be placed around plants (or covering the ground in lieu of plants) to prevent the growth of weeds, reduce erosion and water loss, regulate soil temperature, and, upon decomposition, serve as a soil amendment. Rocks are not acceptable mulch and the use of weed mats are prohibited because they limit the ability of the mulch to amend the soil.

1.4. Perc Test: Developments that call for extensive grading or new planting areas may require per tests to determine if soil amendments will be needed.[24] Tests should be conducted prior to the start of development and post construction. The development permit could define a limit to the allowable percent change in the soil absorption rate. The percentage change could be based on the grey infrastructure capacity surrounding the site, or the requirement to keep all stormwater (including from more severe storms) on site.

2. Stormwater management and erosion control: Until the turn of the century, design and engineering professionals focused on moving every drop of water that fell or melted as quickly and efficiently to the Mississippi River as soon as possible. We now know the huge environmental damage that practice has caused, e.g. periodic flooding along much of the river's trip to the Gulf of Mexico and the creation of a "dead zone" there the size of

[24] A perc test evaluates how well soil absorbs liquid. They are typically required to get a permit to install a new septic system or a drainage system (like French drains) that is dependent on the soil absorption rate. Simple perc tests may also be used to determine what will grow well on a specific site.

New Jersey every year in the Mississippi River delta.[25] Over the last decade, civil engineers, architects, and city planners now face the opposite challenge, trying to treat 100% of the stormwater on site.

2.1. Best practices for stormwater management and erosion control: The Minnesota Pollution Control Agency (MPCA) has developed a report that describes best practices for stormwater management, "Protecting Water Quality in Urban Areas: Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota," (https://www.pca.state.mn.us/water/stormwater-best-management-practices-manual). The report includes policy guides, not mandates, that can guide the city manager's review of the landscape plan for a development. The following are selected policies of the MPCA report that address parking lots, which are often the most critical part of a development's landscape plan:

6. The required parking ratio governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking space construction. . . .

7. Parking codes should be revised to lower parking requirements where mass transit is available or enforceable shared parking arrangements are made.

8. Reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes and using pervious materials in spillover parking areas. . . .

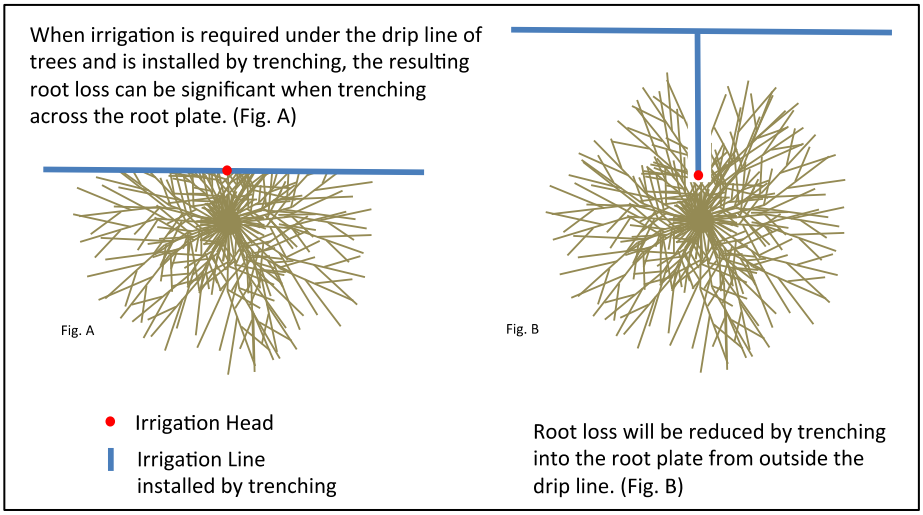
10. Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips or other practices that can be integrated into required landscaping areas and traffic islands.

2.2. Tree islands and stormwater management: For trees in commercial areas, conventional tree islands (or "tree coffins" as they are often called) are designed for failure. Trees rarely last beyond 5 years and rarely grow of sufficient size to serve their primary purposes of providing environmental, economic, and health benefits, as well as shade and aesthetic relief from the view of vehicles. However, alternative methods exist. Structural soil (e.g. Cornell University structural soil) and Silva Cells allow trees to be planted almost anywhere because they allow tree roots to grow under paved areas without disrupting the pavement as they grow. Adequately sized and placed islands designed as rain gardens with structural soils can eliminate the need for stormwater ponds and allow long-lived, large canopy trees to thrive for 50+ years. Construction documents and specifications for a wide

[25] "Each year a swath of the Gulf of Mexico becomes so devoid of shrimp, fish, and other marine life that it is known as the dead zone." "Gulf of Mexico 'Dead Zone' Is Size of New Jersey," John Roach, National Geographic News, May 25, 2005.

range of soil cell applications can be found on the manufacturers' websites (Deeproot Green Infrastructure and Citygreen Systems).

2.3. **Tree root irrigation:** Installation design for the irrigation of established trees should allow for root protection as shown in the plan-view drawings in Fig. A and B below:



3. **Summer sun and wind orientation:** During the summer months when shade and cooling breezes are most important, the sun will cast lengthening shadows to the east during the late afternoon when parking demand will be the highest (peak retail time is after 5:30 pm). Since the predominant wind directions in Minnesota are generally from the south in July and August, a north-south orientation of tree islands and rain gardens offers the best shade for cars on the eastern sides while not blocking southern breezes.

4. **Submission Requirements for Land Use Permits:** The following outlines the primary components of an adequate landscape plan:

4.1. **Who must submit a landscape plan:** Landscape plans are required for applicants for development permits that involve land disturbing activities that may have an adverse impact on trees that might be classified as "Significant" or "Desirable." This means that those staff members who review permit requests must be aware of the two-stage Tree Screening Procedure described in Section 1 and that even the most basic site plans must include an inventory of on-site mature trees. City staff can also use the readily available satellite imagery to help them determine if a complete landscape plan is also warranted (refer to the resources listed in Section 9).

4.2. **Components of a landscape plan submission:** Landscape plan submissions must include at least the following information:

- Site survey showing current conditions including natural features and topography.

- Post-development natural features and topography.
- On-site shrubs and trees that are proposed or will be preserved: Type, size (diameter at breast height for trees), and overall amounts.
- Existing trees adjacent to the site with at least an 8-inch diameter at breast height located within 12 feet of on-site, land-disturbing activities: Type, size, and number.
- Areas of land disturbing activities during construction including excavations and trenching, grading and filling areas, material storage areas, and areas where vehicles and equipment will operate.
- Mitigating measures to minimize soil removal and compaction.
- Snow storage areas or propose a snow removal plan.
- Walls, screens, and fences (show location, type, opacity, and height).
- Fire hydrants, transit stops, public plazas, trash enclosures, trees in the public right-of-way (type and size).
- Directions of water drainage from the site and buildings (downspouts, roof drains, etc.).

5. **Acceptable and unacceptable plants:** In order to determine the acceptability of new plantings, the city shall utilize the information available on the website: "SULIS: Sustainable Urban Landscape Information Series (http://www.extension.umn.edu/garden/landscaping/). Cultivars may be used if they do not appear on the Minnesota Native Plant Society or University of Minnesota Extension Service "Invasive" or "Species of Concern" lists.

6. **Plant diversity definitions and goals:** The city shall utilize the 5-10-15 rule to increase species diversity in development projects. The rule suggests an urban tree population should include no more than 5% of any one species, 10% of any one genus, or 15% of any family. [26] The city manager shall determine how to apply the rule on a development site under consideration.

7. **Crime Prevention Through Environmental Design:** Landscape designs should take into account the principles of Crime Prevention Through Environmental Design (CPTED).[27] The principles include natural surveillance through "eyes on the street," natural access control (e.g. thorny bushes beneath first floor windows and no hidden access to upper story windows and balconies), and natural territorial reinforcement through the public/private access stages: Public (e.g. sidewalk), semi-public (e.g. alley, driveway, private sidewalk to front door), semi-private (e.g. front porch), and private (e.g. inside).

8. **Contractor licensing requirements:** (To be developed by each city)

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[26] The general rule used to be 10-20-30 but it implies the acceptability of suffering the loss of 20% of our urban canopy since both of the commonly planted ash species are highly susceptible to the Emerald Ash Borer infestation.
[27] Useful summary of CPTED principles:
http://en.wikipedia.org/wiki/Crime_prevention_through_environmental_design

9. Additional resources:

- *Design Guidelines for 'Greening' Surface Parking Lots* (City of Toronto: 2013)
- *Green Parking Lot Resource Guide* (U.S. EPA: 2008)
- Free i-Tree canopy calculation using Google Maps at: https://landscape.itreetools.org
- Statewide LiDAR coverage at 3.3-foot horizontal resolution available from the MN Geospatial Information Office (MnGeo) at http://www.mngeo.state.mn.us
- The University of Minnesota's Remote Sensing and Geospatial Analysis Laboratory at http://land.umn.edu provides satellite imagery for land cover and impervious surface datasets for several time periods for the state of Minnesota, and for more time periods for the Twin Cities Metropolitan Area.
- The Global Land Cover Facility of the University of Maryland at http://www.landcover.org develops and distributes remotely sensed satellite data that includes forest inventories.