

San Mateo County Tree Ordinances Steering Committee
May 25, 2017 Meeting Staff Report
Tree Replacement Requirements – Canopy Goals and Policy Options

Tree Replacement Requirements

Introduction and Purpose

San Mateo County's General Plan promotes the protection and maintenance of natural resources whenever possible. This includes preventing the destruction and neglect of vegetative resources, and recognizing that trees must be maintained for their ecological value as well as for their direct benefits to people. The County's Local Coastal Program (LCP) policies call for new development to be located and designed with special attention paid to minimizing the removal of existing trees. Efforts to conserve mature tree canopy are essential, but must be coupled with strong tree replacement requirements in order to sustain and improve urban and rural forests.

When protected trees deteriorate and present risks to the public, or when they cause damage to private property or interfere with development projects, people inevitably seek permits to have them removed. In order to prevent long-term net reduction of tree canopy in the county, it is necessary to plant replacement trees when significant or heritage trees are removed.

There are a number of shortcomings in the current ordinances with respect to tree replacement. The significant tree ordinance outlines specific requirements for the RH/DR District zone in Emerald Lake Hills, but only provides general guidance for tree replacement in the rest of County jurisdiction. The heritage tree ordinance contains no specific requirements for tree replacement. There is no off-site planting program or in-lieu fee program. The staff proposals clarify replacement planting standards, including an in-lieu fee program to promote sustainable tree canopy throughout the urban forest and rural residential lands of unincorporated San Mateo County.

We intend to establish mitigation planting requirements in the revised tree ordinances that apply when protected trees are removed from any residential, commercial, or industrial properties on unincorporated lands in the county. Many other city and county governments have already enacted effective tree replacement programs within their tree ordinances. We have studied those programs and have summarized them in this report, along with relevant current ordinance language. Proposed replanting requirements are presented as policy options for steering committee feedback.

Urban Tree Canopy Goals

Every County ordinance contains certain common elements - findings, definitions, application processing, etc., including the County's current tree regulations. One element that is missing from our current regulations and has not yet been discussed by the Steering Committee is **what should the County's Urban Tree Canopy ultimately look like going forward?**

This question involves consideration of species diversity, exotics, and total canopy coverage, as well as historical and future conditions. Total canopy coverage goals and policies can inform tree replacement policies and in-lieu fees. Establishing replacement ratios, minimum tree sizes and parcel level canopy coverage are all dependent upon this question. A related question is whether the tree ordinances will help achieve the County's tree canopy goals.

Staff requests that the Steering Committee consider the following goal-related questions as you review the replacement planting policy options:

- Should the County establish a goal of maintaining existing canopy coverage throughout the urban areas of the County; should we recognize that certain areas of the County are overstocked with trees, increasing fire hazard and therefore, in those areas, a somewhat reduced canopy coverage (from today) is acceptable?
- Are there areas of the County with insufficient trees where the goal should be to increase canopy cover?
- Should the canopy goals vary in different areas of the County based on historical ecological conditions, current area capacity to support trees, and projected future changes due to climate change?

When should on-site replacement be required?

Geographic Applicability of Replacement Tree Requirements

At our second meeting, we discussed vegetation management plans for large land holdings, typically to be prepared and implemented by government entities, such as County Parks and MidPeninsula Open Space District, State and Federal open space managers, or private property owners working in partnership with the San Mateo County Resource Conservation District. This type of tree removal is distinct from tree removal performed by a property owner when the tree in question is located adjacent to existing legal structures. County staff proposed that tree removal associated with an approved vegetation management plan be exempt from tree replacement requirements and/or payment of in-lieu fees, but tree removal within 100 feet of legal structures be subject to urban tree removal and replacement policies.

- Should replanting be required for tree removals within 100 feet of legal structures in lands zoned Resource Management or Planned Agricultural District?
- Does the Steering Committee agree that the tree replacement requirements of the tree ordinances should not apply to vegetation management plans?

Dead Tree Removal

Certain tree removals might not warrant a tree replacement requirement. The County currently does not require permits or replacement plantings when dead trees are removed. Dead trees can provide critical habitat for certain wildlife species, but that kind of habitat does not belong in the urban setting due to safety and pest concerns. Homeowners are encouraged to plant replacement trees after removing dead trees from their property, but are not required to do so.

- Should the County maintain its current practice of not requiring replacement planting for removal of dead trees?

Diseased or Hazardous Tree Removal

Currently, the County requires diseased or hazardous trees removed to be replaced at the discretion of the Community Development Director and no specific standards, except those in the RH/DR zone, are enforced. The county's urban forest would be strengthened by standard replacement requirements that promote the planting and maintenance of healthy native trees, planted in the right places.

- Should the Planning Department define specific replanting standards to guide the replacement of diseased or hazardous trees?

Defensible Space

- When significant or heritage trees are removed in accordance with defensible space standards, should the property owner be required to replace those trees?
- If no appropriate planting location exists on-site, should the property owner be required to pay an in-lieu fee?

Timing of Tree Removal and Replacement

Considerations should also be made for the timing of tree removal and replanting activities. Removal of protected trees with active bird nesting should be postponed until nesting activities have ended. Pursuant to state and federal laws protecting threatened and endangered species and migratory birds it is illegal to disturb nests, so identification of the bird species is important.

- Should the County limit the time of year in which tree removals are allowed to protect nesting birds, unless a qualified biologist confirms no nests are present?

Once the tree has been removed, a replanting timeline should be followed. Replacement trees should be planted within 60 days of removal, unless this would cause planting in mid-summer. If tree removal occurs between May 1st and September 30th, the property owner should wait until October to plant replacement trees in order to reduce the watering demand and plant stress. When replacement trees are planted, the property owner should notify the Planning Department.

- Does the Steering Committee agree that replacement trees should be codified in the ordinance as protected trees that must be maintained and replanted if they die?

What size replacement stock should be required?

15 Gallon

A common approach to tree replacement is to establish replanting standards for whenever a protected tree is removed. Most programs do not require planting of a replacement tree that is of equal size or value to the one that was removed, but may require planting of 1-3 small trees that will recoup the lost value within a reasonable period of time.

A minimum replacement size of 15 gallon stock is very common among city and county ordinances. 15 gallon size trees are typically 6-12' tall, with a trunk diameter of 0.5-1", depending on species (O'Connell, 2006). They are less expensive than box trees because they have spent much less time being maintained at the nursery. Some tree workers have found 15 gallon stock to have a higher rate of survival after planting than box trees because they have spent less time in containers and their roots more readily establish in the soil of their new planted environment (Eisenstein, 2012). The 15 gallon stock is also easier for homeowners, landscapers, and volunteer planting crews to plant because they are smaller and lighter. For these reasons, Planning is inclined to make the 15 gallon size the standard replacement requirement.

- What does the Steering Committee recommend that the staff consider when crafting policies establishing the size of required replacement trees?

Replacement Ratio

In order to advance the canopy replacement objective on sites where significant or heritage trees have been removed, the property owner could be required to plant replacement trees on a 2:1 or 3:1 basis. Again, it is necessary to carefully assess the capacity of the site to absorb new trees, including consideration of defensible space. If two 15 gallon size trees are planted on the site where a protected tree was removed, and there is sufficient space between them so as to minimize competition for resources, there is a greater chance of a replacement tree surviving and eventually replacing the lost canopy and community benefits. If the property owner prefers to plant only one replacement tree, a 24" or 36" box size could be required. In some cases, the best option for maximizing replacement tree growth and long-term derived benefits might be to only replant with one tree so it does not have to compete with other trees, especially on a property with limited space. Since the 15 gallon stock is generally more successful than box trees when planted in a new environment, it might be appropriate to only require replacement with a 15 gallon size, on a 1:1 basis.

Replacement of Large Heritage Tree

If a healthy native tree with trunk diameter >36" (or perhaps any heritage tree) is removed from a property, the Community Development Director or Planning Staff could have discretion to require the property owner to replace it with up to a 48" box tree of the same species (or other native with approval). This would impose a much higher replacement expense on the property owner, but it could also increase the rate at which the replacement tree recoups lost benefits. However, this is a very expensive proposition if the replacement tree fails and must be replaced.

The following table contains cost estimates for different size replacement trees if purchased at local nurseries. The cost of planting and maintaining a replacement tree will vary depending on size, partly due to the fact that a 15 gallon tree will weigh approximately 70 pounds while a 48” box tree can weigh over 2,000 pounds. Watering and pruning needs are varied along the size gradient as well, but these costs are difficult to estimate.

Replacement Tree Size	Estimated Cost at a Nursery	Cost of Maintenance for 2 years
15 gallon container	\$75 - \$120	Least ↓ Greatest
24” box	\$325	
36” box	\$675	
48” box	\$1,700	

iTree

There are many techniques for calculating the value of an individual tree or a community of trees. There are also a number of different kinds of value that are important to identify, including the value a tree contributes to a property and the value of ecosystem services. iTree is a suite of software tools that can be used to quantify various types of values derived from urban trees. For instance, a 34” diameter at breast height *Quercus agrifolia* in excellent condition, on a single family residential property in the 94063 Redwood City area, provides an estimated \$220 in annual benefits. Over 10 years this amounts to \$2,200 in total benefits, and half of that benefit comes from increasing property value. This sample valuation was conducted using iTree-Streets data, and if you extrapolate to the total benefit derived from the urban forest in an average San Mateo County community, it is easy to see that trees can contribute millions of dollars worth in benefits to the public and property owners every year. iTree-Canopy is a tool that can estimate the amount of canopy cover in a defined area, and could be useful for assessing site tree density.

- What considerations should guide policies intended to mitigate the removal of large and healthy significant or heritage trees?

Palo Alto Approach

Palo Alto established replacement tree requirements based on canopy replacement over a 10 year period. Whenever a protected tree is removed, the Tree Canopy – Replacement Standard table is used to determine replacement planting options. Following the table below is an example of how the standard is applied, provided in Palo Alto’s Tree Technical Manual.

Tree Canopy - Replacement Standard

COLUMN 1	COLUMN 2	COLUMN 3
Canopy of the Removed Tree (Avg. dist. across the canopy*)	Replacement Trees	Alternative Tree
4'-9'	Two 24" Box Size (minimum)	One 36" Box Size
10'-27'	Three 24" Box Size	Two 36" Box Size
28'-40'	Four 24" Box Size	Two 48" Box Size
40'-56'	Six 24" Box Size	Two 48" Box & Two 36" Box Size
56'-60'	Two 24" Box & Two 36" Box + Two 48" Box Size	**
60'+	**	**

*Add half of the difference between the two to the narrowest measurement for the average canopy.

** Replace the tree with a combination of both Tree Canopy and Tree Value Standards.

Note: Basis of this table is determined by the growth of one 24" box size tree, growing at a rate equivalent to 9 feet of canopy over the course of ten years.

Example of Tree Canopy Replacement Ratio:

The removal of a tree with a 39’ crown spread will require four 24- inch box trees to satisfy the criteria of this Section. Methodology- e.g. the average canopy of a new tree is 4’ wide + the expected canopy growth of 6” per year x 10 years = a 9’ net canopy of one replacement tree. Thus, four 9’ trees = 36’ of new canopy, and is a close approximate to the original 39’ canopy tree (Dockter, 2001).

This method has a lot of merit, and is well suited to a city like Palo Alto, but it may not be practical for San Mateo County due to the average cost to the home owner. It is still valuable to study and understand because the method could be adapted to serve the needs of the County.

- What should staff consider when crafting policies that control the amount of replanting based on the size of tree(s) removed?

Should there be specific species requirements for replacement trees?

WELO and Drought Tolerance

Our first consideration for species selection is compliance with the Water Efficient Landscape Ordinance, WELO. Replacement tree species should be limited to those that are well-adjusted to local climate conditions. We would also like to promote the idea of “right tree - right place”, in the hopes of preventing the planting of redwoods in relatively hot and dry neighborhoods, and other such plantings that often result in mature trees with poor structure and low canopy quality. The county is geologically, hydrologically, and ecologically diverse, sustaining a wide variety of species. There are several different tactics we could employ to advance appropriate species selection.

Approved Tree List

One approach could be to create a list of approved replacement tree species. This list could be made up of native species only, or it could also include several non-native/exotic species that are considered well-adapted to the county. People like to have the freedom to choose what kind of tree they plant on their own property. When a native species significant or heritage tree is removed, Planning staff believe a native species should be planted as the replacement. When an exotic tree is removed, the property owner could be encouraged to plant a species on the previously mentioned list of natives and locally-adapted exotics, while having the option to request permission to plant a species that is not on the list but still complies with WELO. These policies would help to ensure that the number of native trees will not diminish with respect to the number of exotic trees in the county. Native trees, like the *Quercus agrifolia*, provide important ecosystem services and net benefit to the community. Some exotic species can also contribute to the benefits we derive from the urban forest.

- What considerations should be made in developing a list of approved trees for replacement plantings?

Prohibited Tree List and Region-Specific Lists

Another option would be to make a list of species that are not acceptable for replacement plantings, and allow property owners to plant WELO compliant trees that are not on that list. This option could still require native-for-native replacement, but allow for freedom to choose any species that isn't on the "Don't Plant" list when replacing non-native trees. The list could be broken into region-specific lists in order to advance the "right tree – right place" concept, e.g., "no planting" lists for bay communities, east of Skyline foothill communities, Skyline communities, west of Skyline foothill communities, and coastal communities. This regional approach could also be applied to the "approved tree" list idea, having regional-specific lists of species that are allowed for replacement plantings based on climatic zones.

- Should the County establish a "Don't Plant" list of trees? Is the region-specific approach practical?

Menlo Park Approach

Menlo Park employs an interesting tool to guide the property owner's selection of replacement tree species. Selectree.calpoly.edu is a website developed by Dr. Matt Ritter and the Urban Forest Ecosystems Institute at Cal Poly San Luis Obispo, which allows the user to enter in desired characteristics of the replacement tree in maturity, and produces a list of species that will meet those criteria. When a heritage tree is removed in Menlo Park, the property owner is required to replace it with a tree that will grow to be at least 40' tall in maturity, so that is one of the criteria entered into the Selectree website. Menlo Park requires 1:1 replacement on residential lots, but 2:1 replacement on commercial lots. It makes sense to require 2:1 replacement on

commercial lots because they typically have sufficient space to accommodate 2 replacement trees. They also recommend a website called Arborday.org/trees/righttreeandplace to help tree removal permit applicants select the right replacement species for their community.

- Could the web resources promoted by Menlo Park be useful in San Mateo County?

What criteria should be used to determine if a site can accommodate replacement trees?

Right to Open Space

Some people might prefer not to replace a removed tree because of site design or layout considerations; that could be a reason to allow them to pay an in-lieu fee. Some property owners may want more sun in their yard, and removing a significant tree from the middle of the yard makes that possible.

- Should property owners desiring open yards be held to the on-site replacement requirement if replanting prevents creating a desired sunny space?
- Should the property owner be allowed to pay an in-lieu fee?

Site Utilities and Soil Type Suitability

Site utilities must be considered when making replacement planting decisions. If a protected tree is removed from a site because it is unhealthy or interfering with utility lines, and there is no other place on the property for replacement plantings, the property owner may not be required to replace the removed tree and off-site mitigation could be triggered. Soil type suitability is another consideration. If a protected tree is removed and site soil characteristics are not conducive to long-term success of the replacement tree, off-site mitigation could be triggered.

Tree Density

One of the most important criteria to determine if a site can accommodate replacement trees is the site's remaining tree density. Quantitative assessment of tree density is not widely used for this purpose but cities like Portland, Oregon have been able to successfully employ this method to minimize thinning of their urban forest. A study done 10 years ago estimated an average canopy cover of 31.7% for all of San Mateo County, with 46.6% cover in low-density residential areas, 22.6% cover in high-density residential areas, and only 13% cover on industrial and commercial properties (Simpson & McPherson, 2007). While this data is very interesting, more research will be required going into the future to understand how the urban forest canopy is changing to inform management decisions.

The City of Portland, Oregon requires one and two family residential lots to have at least 40% canopy cover when trees on the lot reach maturity. They base their on-site tree replacement requirements on that long-term goal of 40% canopy cover, and define the number of trees required per planting area based on the size class of replacement trees being planted and the amount of space they will need to grow. This system could be more technically challenging and

more demanding of County staff because of the need for on-site measurements and inspections. Having clearly defined canopy cover requirements based on land use type could eventually contribute to the stability and success of the urban forest.

- What considerations should be reflected in a policy requiring a specific canopy cover ratio?

Historic Canopy and Minimum Cover

The historic tree canopy of a community could be an important factor to consider when deciding on-site tree replacement requirements. Many areas of the county, especially bayside communities are far more forested now than they were 200 years ago. Expansive grasslands and savannah ecosystems once dominated much of our current urbanized land area.

- How should historic canopy cover be reflected in policies requiring replacement of removed trees?

Should we require greater mitigation for construction-related tree removal than for a tree removal permit?

Mitigation for Large Development Projects

Large-scale development and remodeling projects have potential to remove several significant and heritage trees. If a property owner is applying for the removal of several protected trees as part of a development project, the County could require a higher level of mitigation than would be required of a home owner applying for the removal of a single protected tree on a residential lot.

- Should we set higher mitigation requirements for development projects to provide incentive to retain significant and heritage trees? Why or why not?

Tree Replacement – In Lieu Fees

Should the County establish an In-Lieu fee?

As noted above, the County's tree removal regulations require replacement of trees removed with a permit, however the language is silent as to the number, species and location of the replacement trees, except in the Residential Hillside/Design Review (RH/DR) district, where 3:1 replacement is required. Except in the RH/DR district, replacement requirements are at the discretion of the Community Development Director. At some point after the adoption of the current regulations, a general standard of 1:1 replacement has been implemented by County staff, initially with a 5-gallon minimum replacement size. However, more recently, County staff has required a 15-gallon minimum replacement size. In some instances, a higher replacement ratio has been required depending upon the particular facts of a case. The previous sections of this

report discuss this issue – replacement ratio, species, size and location. But what if an owner can't meet the required replacement ratio (because of limited space, solar access, etc.)?

Periodically, County staff will receive a request from an applicant to waive the tree replacement requirement. Generally, the reason given is that there is insufficient space on the property to plant a replacement tree and have it be successful. At the present time, County staff has no established criteria for evaluating these requests. We generally look at air photos of the subject property and make a judgement call. The result however of approving these requests is that the County suffers a net loss to its urban tree canopy. To address this situation, Staff is considering establishing an in-lieu fee as an alternative to on-site replacement. Staff believes that on-site replacement should be the preferred alternative. However, if the County establishes an in-lieu fee alternative, we need to have criteria for its use in order to avoid confusion and disagreements, to that end, Staff would like to pose the following broad question to the Steering Committee:

1. If the Working Group believes that the County should establish an In-Lieu Fee, what criteria should we establish to determine when payment of the in-lieu fee is appropriate over on-site replacement? (From a practical perspective, such a request by the applicant should be made at the time of application, not after the tree has come down.)

While researching this question, Staff found that most local jurisdiction's tree regulations provide an in-lieu fee option but are silent as to criteria for allowing this payment. They simply leave it up to the discretion of staff. The City of Portland is however, an exception. In their regulations, the City has established a minimum area of the parcel that must be covered by tree canopy, once the replacement trees reach maturity. For example, if the type of development is the construction of a new single family dwelling, than the required mature tree canopy area shall be 40% of the parcel size. Portland's regulations then state that the required tree area shall be planted with some combination of large, medium or small canopy trees at the following rates:

Canopy size category (at maturity)	Number of trees required per size of tree area	Min. required planting area per tree (min. dimension)
Large	1 per 1,000 s.f.	150 s.f. (10' x 10')
Medium	1 per 500 s.f.	75 s.f. (5' x 5')
Small	1 per 300 s.f.	50 s.f. (3' x 3')

Using this replacement criteria, Portland's City Forester can make a determination whether there is sufficient or unsuitable area to accommodate some or all of the required replacement trees on the project parcel. If not, then the City Forester can require payment into the City's Tree Planting and Preservation Fund.

By distilling the request down to essentially a mathematical calculation it removes a level of arbitrariness from the question of whether someone can avail themselves of the in-lieu fee rather than plant a replacement tree on-site. But, such a method as this will be more labor intensive and require the applicant to provide enough information in order to make an informed decision. Perhaps this is one reason that few jurisdictions have adopted such an approach with regards to payment of an in-lieu fee versus replacement planting on-site.

County Parks and Public Works would be partners with Planning and Building in implementing any in lieu fee program. If the County were to include an in-lieu fee alternative in the ordinance revisions, then the money would be used by the County Department of Public Works for tree planting and maintenance on County owned or controlled land and/or by the County Parks Department for vegetation management activities on various County park lands.

Appendix

Current SMC ordinance requirements

SECTION 12,024. CONDITIONS OF APPROVAL. In granting any permit as provided herein, the Community Development Director, Planning Commission, or Board of Supervisors may attach reasonable conditions to ensure compliance with the intent and purpose of this ordinance including, but not limited to:

- a) Outside of the RH/DR District, replacement of trees removed shall be with plantings of trees acceptable to the Community Development Director.
- b) In the RH/DR District, replacement shall be in a manner and quantity prescribed by the Design Review Committee but shall not exceed the following specifications:
 1. For each loss of a significant indigenous tree in the RH/DR District, there shall be a replacement with three (3) or more trees, as determined by the Community Development Director, of the same species using at least five (5) gallon-size stock.
 2. For each loss of a significant exotic tree in the RH/DR District, there shall be a replacement with three (3) or more trees, as determined by the Community Development Director, from a list maintained by the Community Development Director. Substitutes for trees listed by the Community Development Director may be considered but only when good reason and data are provided which show that the substitute tree can survive and flourish in the regional climatic conditions.
 3. Replacement trees for trees removed in the RH/DR District shall require a surety deposit for both performance (installation of tree, staking, and providing an irrigation system) and maintenance. Maintenance shall be required for no less than two (2) and no more than five (5) years as determined by the Community Development Director.
 4. Loss of any particular replacement prior to the termination of the maintenance period shall require the landowner at his/her expense to replace the lost tree or trees. Under such circumstances, the maintenance period will be automatically extended for a period of two (2) additional years.
 5. Release of either the performance or maintenance surety shall only be allowed upon the satisfactory installation or maintenance and upon inspection by the County.
 6. Where a tree or trees have been removed on undeveloped lands in the RH/DR District and no existing water system is available on the parcel, the replacement tree or trees, if required to be installed, shall be of sufficient size that watering need not be done by automatic means. Under such circumstances, water can be imported by tank or some other suitable method which would ensure tree survival in accordance with subparagraphs (4) and (5), above.

7. Postponing the planting of replacement trees can be done if approved by the Design Review Administrator.
 - c) Use of measures to effect erosion control, soil and water retention and diversion or control of increased flow of surface waters.
 - d) Use of measures to ensure that the contemplated action will not have adverse environmental effects relating to shade, noise buffers, protection from wind, air pollution, and historic features.
 - e) Removal of posting following all tree cutting activity and inspection by the County.

SECTION 12,032.1.b

Size, number and species of replacement tree(s) shall be at the discretion of the Planning and Building Department and shall be commensurate with the size and species of tree removed.

SECTION 11,052. APPLICATION FOR AND GRANTING OF PERMITS.

In granting a Heritage Tree Removal/Trimming Permit, the Community Development Director or their representative may attach reasonable conditions to insure compliance with the content and purpose of this ordinance, such as, but not limited to, requiring replacement of trees removed with plantings acceptable to the Community Development Director or their representative. If a permit is denied or conditions attached, the Community Development Director or their representative shall provide the applicant with a written statement of the reasons for said denial or conditions based upon the above standards.

SECTION 11,103.2.b

Size, number and species of replacement tree(s) shall be at the discretion of the Planning and Building Department and shall be commensurate with the size and species of tree removed.

[Summary of other jurisdictional ordinance requirements](#)

[Marin County](#)

Marin County does not specify replacement tree sizes or numbers for on-site tree replacement, but instead allows for Director discretion. When on-site replacement is not appropriate, in-lieu fees are to be paid by the property owner to a Tree Replacement/Preservation Fund. The Director may require payment of money in the amount of \$100.00 per tree removed. This separate account is administered by the General Manager of the Marin County Open Space District, and the funds can only be used for "...planting and maintenance of trees or other vegetation (1) on lands owned and managed for park or open space purposes by the Marin County Open Space District or the County of Marin; and (2) for public uses as directed by the Marin County Board of Supervisors".

[City of Portland, Oregon](#)

Portland established a Tree Planting and Preservation Fund to facilitate mitigation plantings, and "...to advance the City's goals for the urban forest and equitable distribution of tree-related benefits across the City". The fund is maintained by the City Forester in a dedicated separate account. The funds are to be used:

1. To plant trees on public or private property, including streets, in the same watershed as the site from which the funds were collected. Planting trees includes the cost of materials and labor necessary to install and establish a tree for a 2 year period;
2. To purchase conservation easements for the perpetual retention of trees and tree canopy. Such conservation easements shall allow the City to replace trees that are removed when they die or become dangerous; and
3. To acquire land to permanently protect existing trees or groves

Portland charges an in-lieu fee of \$1,200 per tree removed when associated with development projects, or up to \$300 per inch of diameter for a tree removed when not associated with development. The City Forester has discretion to reduce the fee charged in certain circumstances that are not associated with development. They have recently been contemplating increasing the amount charged per tree removed for development, as a means to discourage protected tree removal.

City of Menlo Park

Menlo Park requires all residential applicants who are granted approval to remove a heritage tree to replace the lost tree(s) on a 1:1 basis. All commercial applicants who are granted approval to remove a heritage tree are required to replace the lost tree(s) on a 2:1 basis. A suitable replacement tree in #15 container is the current acceptable minimum size. However, the City staff may exercise discretion on the size and number of trees an applicant may be required to install. The tree must be a species that can reach a mature height of 40 or more feet as described on Select Tree web site, selecttree.calpoly.edu. The replacement tree is to be installed within 30 days after the heritage tree is removed, unless otherwise noted on the approved permit. The following resource is an aid to help in choosing the right tree for your planting site: arborday.org/trees/righttreeandplace.

City of Palo Alto

Palo Alto does not require replacement plantings after the removal of dead or dangerous trees. When authorizing removal of healthy protected trees, the Director or his/her designee shall determine replacement requirements based on standards detailed in the Tree Technical Manual (TTM). The number and nature of the replacement trees shall be determined with consideration to the value of the tree removed and the site design. If the City authorizes removal of a street tree in connection with a development project, it shall specify the replacement requirements in the permit authorizing removal. The following table from the TTM provides clear on-site replacement standards:

Tree Canopy - Replacement Standard

COLUMN 1	COLUMN 2	COLUMN 3
Canopy of the Removed Tree (Avg. dist. across the canopy*)	Replacement Trees	Alternative Tree
4'-9'	Two 24" Box Size (minimum)	One 36" Box Size

10'-27'	Three 24" Box Size	Two 36" Box Size
28'-40'	Four 24" Box Size	Two 48" Box Size
40'-56'	Six 24" Box Size	Two 48" Box & Two 36" Box Size
56'-60'	Two 24" Box & Two 36" Box + Two 48" Box Size	**
60'+	**	**

*Add half of the difference between the two to the narrowest measurement for the average canopy.

** Replace the tree with a combination of both Tree Canopy and Tree Value Standards.

Note: Basis of this table is determined by the growth of one 24" box size tree, growing at a rate equivalent to 9 feet of canopy over the course of ten years.

When crowding or other physical constraints make it impossible or undesirable to replace a tree with one of equal value in the same place, the value of the tree shall be computed using the most recent edition of the *Guide for Plant Appraisal* published by the Council of Tree and Landscape Appraisers. Once the value has been determined, that sum of money shall be used in the following order of preference, as approved by the Director: (1) to provide additional trees elsewhere on the site; (2) to add or replace street trees or other public landscaping in the vicinity, or (3) to add trees or other landscaping to other City property.

City of Cupertino

Cupertino allows the tree removal permit approval authority to determine the size and quantity of replacement trees to be planted on the subject site. The person requesting the tree removal permit shall pay the cost of purchasing, planting and maintaining the replacement trees. If a replacement tree for the removal of a non-heritage tree or tree with trunk size equal to or less than thirty-six inches cannot be reasonably planted on the subject property, an in-lieu tree replacement fee based upon the purchase and installation cost of the replacement tree as determined by the Director of Community Development shall be paid to the City's tree fund to:

1. Add or replace trees on public property in the vicinity of the subject property; or
2. Add trees or landscaping on other City property.

For removal of a heritage tree or tree with a trunk size greater than thirty-six inches, the in-lieu tree replacement fee shall be based upon the valuation of the removed tree by using the most recent edition of the ISA Guide for Plant Appraisal published by the Council of Tree and Landscape Appraisers.

For on-site replacement, the following table may be used to determine the size of replacement stock, based on the trunk diameters of trees to be removed:

Replacement Tree Guidelines

Trunk Size of Removed Tree (Measured 4½ feet above grade)	Replacement Trees
Up to 12 inches	One 24" box tree

Over 12 inches and up to 18 inches	Two 24" box trees
Over 18 inches and up to 36 inches	Two 24" box trees or One 36" box tree
Over 36 inches	One 36" box tree
Heritage tree	One 48" box tree

City of Napa

Napa employs a clear replacement program that includes Director and/or Commission discretion to increase or reduce the number of replacements required and the size of replacement stock. For each protected tree removed or damaged, three replacement trees of the same species as the protected tree removed and a minimum 15-gallon container or larger size shall be planted on the project site; different species can be planted with approval from the Director. If the project site is inadequate in size to accommodate the replacement trees, the trees shall be planted on public property with the recommendation of the Director and the approval of the Commission. At the discretion of the Commission, the Department may accept an in-lieu fee of \$300.00 per 15-gallon replacement tree with the moneys to be used for tree-related educational projects and/or planting programs. Each significant tree approved for removal shall be replaced within 60 days or at a reasonable time approved by the Commission. Removal of a protected native tree shall be granted with a replanting requirement of two trees per six inches of trunk diameter of the removed tree.

The Director shall ensure that security is posted in an amount sufficient to secure the maintenance and protection of any replacement tree not planted on public property for a period of three years. Said security shall be returned at the end of the three-year period if, in the Director's judgment, the replacement trees are healthy and free of any defects. Any replacement tree that is not healthy or free of defects at the end of the three-year period shall be replaced, and security shall be held for another three-year period or until, in the Director's judgment, the tree has been well established.

City of San Mateo

When a heritage tree removal permit has been issued the property owner has 12 months to remove the tree and replace it with a 24" box size tree somewhere on the same property. A \$425 deposit must be paid to the City at the time of permit approval, and will be returned by mail when the replacement tree is planted. If the replacement tree has not been planted within 12 months the deposit will be forfeited. The City uses forfeited deposits to plant trees in parks, medians, and public areas.

Where the Director determines that replanting is not feasible and/or appropriate, e.g., sufficient trees exist on site, the Director (1) may require that a payment of equal value to the cost of the purchase and installation of the replacement tree(s) be made to the City tree planting fund or (2) may place other conditions on the permit which are of equal value to the cost of the purchase and installation of the replacement tree(s).

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