

Vegetation Encroachment Site-Specific Risk Analysis

SUMMARY

This utility procedure describes how Pacific Gas and Electric Company (PG&E or Company) personnel perform detailed risk analysis to determine threat levels of vegetation near gas transmission (GT) pipeline.

In some instances, it may not be necessary to remove all tree encroachments per requirements in [Utility Standard TD-4490S, "Gas Pipeline Encroachment Management."](#)

Level of Use: Informational Use

TARGET AUDIENCE

Personnel responsible for integrity management (IM), vegetation management, and land rights management. Patrol and leak survey personnel are for procedure awareness.

SAFETY

Performing this procedure will not raise the risk of a specific hazard to personnel, public, or equipment.

BEFORE YOU START

Transmission integrity management program (TIMP) personnel complete annual TIMP training.

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PROCEDURE STEPS

1 Objectives

- 1.1 Perform all vegetation management operations in a safe and effective manner; per federal and state laws, regulations, and permit conditions; and with special attention to environmental concerns.
- 1.2 Minimize risk of pipeline damage by managing trees near gas transmission (GT) facilities.
- 1.3 Ensure appropriate maintenance is performed.
- 1.4 Maintain unobstructed access to Company natural gas pipeline facilities for emergency response and pipeline operations and maintenance (O&M) activities.

2 Integrity Management (IM) Risk Analysis Model

- 2.1 The site-specific risk analysis sets forth certain criteria that are further described in this section under which mitigating measures may be employed to reduce the risk from such trees remaining. The decision making occurs broadly using the following three steps:
 1. Data Collection.
 2. Initial risk screening.
 3. Additional risk analysis for those trees that require a deeper analysis.
- 2.2 IF emergency vehicles can reach tree location without being obstructed,
AND tree location meets one or more of the following location descriptions:
 - On a franchise location and adjacent to road,
 - On a private location within 25 feet (ft) of a drivable access point,
 - Within 25 ft of parking lot, vehicle trail, or other drivable location,THEN IM personnel complete the remaining steps in this section,
OTHERWISE GT vegetation management personnel complete the steps in [Section 3](#).

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2.3 Data Collection

1. Collect the following minimum data required for the risk analysis process:
 - Tree species
 - Tree diameter at breast height (DBH) at maturity (per [Appendix A, "Diameter at Breast Height \(DBH\) of Common Bay Area Trees at Maturity"](#))
 - Horizontal distance from the tree to the pipeline centerline
 - Pipeline depth of cover (DOC)
2. IF a tree species is not listed in [Appendix A](#),

THEN contact GT vegetation management personnel. GT vegetation management personnel will research and report on the DBH, and update [Appendix A](#).
3. IF the DBH value of a tree species in [Appendix A](#) is "TBD,"

THEN GT vegetation management personnel determine the appropriate DBH value on a case by case basis.
4. Collect the following additional data as needed for the additional analysis (per [Section 2.5](#)):
 - Pipe Coating type
 - Lightning exposure
 - Wind and flooding exposure
 - Seismic exposure
 - Soil stability
 - Pipe diameter
 - Date of construction
 - Presence and visibility of line markers
 - Ability to enter site with emergency vehicles in the event of an emergency or an IM response

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2.4 Initial Risk Screening

1. Use the minimum data required in [Section 2.3](#), to perform an initial screening per Table 1, "Tree Diameter at Breast Height at Maturity." Initial screening results may be:
 - **Monitor Threat:** The tree may remain provided preventive and mitigative (P&M) measures are undertaken. See [Section 2.5](#) if unable to monitor.
 - **Additional Analysis:** A more detailed site-specific risk analysis is necessary to determine how to manage the threat per [Section 2.5](#).
 - **Eliminate Threat:** The Company must make full efforts to negotiate with the owner to remove the tree OR take alternative action to remove the threat.

Table 1. Tree Diameter at Breast Height at Maturity

| Distance from Mature Tree to Pipe | Depth of Cover (DOC) | | | |
|---|-----------------------------|---------------------------------------|--|---|
| | Less Than OR Equal to 3 ft. | Greater Than 3 ft AND Less Than 5 ft. | Equal to OR Greater Than 5 ft AND Less Than OR Equal to 10 ft. | Greater Than 10 ft AND Clear Walking Path Above the Pipeline. |
| DBH at Maturity of 17 Inches or Less | | | | |
| Less than 2 ft | Eliminate Threat | Additional Analysis | Monitor Threat | |
| 2 ft or More | Monitor Threat | | | |
| DBH at Maturity of More than 17 Inches | | | | |
| Less than 2 ft | Eliminate Threat | | Additional Analysis | Monitor Threat |
| 2 to 5 ft | Additional Analysis | | Monitor Threat | |
| More than 5 ft | Monitor Threat | | | |

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2.5 Additional Analysis

1. IF the initial screening result is “Additional Analysis,”

THEN IM personnel assess the following risks the tree poses to the pipeline according to [additional analysis spreadsheet](#):

- External corrosion due to roots penetrating pipe coating.
- Pipeline damage due to lightning striking the tree.
- Pipeline damage due to outside forces, such as damage created by tree roots loading the pipe due to wind, floods, seismic activity, or soil instability.
- The interaction of outside forces with vintage construction threats.
- Increased damage prevention risk due to poor line of sight for pipeline markers.
- Reduced pipeline patrol effectiveness.
- Reduced ability for emergency response access.

2. Risk scores on the [additional analysis spreadsheet](#) can be classified as low, medium, or high.

3. IF the additional analysis results in a low risk score,

THEN monitor the tree through the appropriate processes for pipeline patrol and emergency response,

AND evaluate the potential use of P&M measures. The tree may remain.

- IF unable to establish the appropriate processes at a specific tree site,
THEN elevate the initial screening result to “eliminate the threat.”

4. IF the additional analysis results in a Medium risk score,

THEN mitigate the threat by considering P&M measures and/or additional monitoring, patrolling, and emergency response guidance as provided in [Table 2, “Guidelines for Additional Preventive and Mitigative Measures and/or Additional Monitoring.”](#) Additional mitigation items are included in Table 2, but are not limited to the items listed.

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2.5.3 (continued)

Table 2. Guidelines for Additional Preventive and Mitigative Measures and/or Additional Monitoring

| Mitigation Category | Additional P&M Measures to Consider |
|-----------------------------|--|
| Patrol | Trim and/or thin the tree canopy to allow for aerial patrol. |
| | Switch from aerial patrol to foot patrol. |
| | Use infrared camera for heat signature detection. |
| Emergency Response | Develop alternative emergency response plans, such as additional education of fire fighters, identification of alternative access points, etc. |
| Damage Prevention | Add additional line markers to improve line of sight and knowledge of pipeline centerline. |
| Leak Survey | Schedule more frequent leak surveys. |
| Corrosion Control | Evaluate the need for, and establish, higher cathodic protection (CP) criteria, such as 950 mV to account for potential bacterial corrosion and a higher IR (potential drop across a resistance, where I is the current and R is the resistance) component. |
| Integrity Management | Risk Analysis: <ul style="list-style-type: none"> Incorporate elevated risk from trees into risk algorithm at all sites where the trees are allowed to remain. |
| | When using in-line inspection (ILI) for assessment: <ul style="list-style-type: none"> Cross reference tree locations with ILI indications. Establish more stringent dig criteria. Establish a shorter re-assessment interval. |
| | When using direct assessment (DA) or close-interval survey (CIS): <ul style="list-style-type: none"> Establish a more stringent direct examination criterion, such as 950 mV as one of the CIS criteria. |

- a. The site-specific plan must be documented AND requires review and approval by the Director of TIMP, or designee in Electronic Document Routing System (EDRS).
 - b. IF unable to establish the appropriate processes at a specific tree site,
 THEN elevate the initial risk screening to “eliminate the threat”.
5. IF the additional analysis results in a High risk score,
 THEN eliminate the threat and make full efforts to negotiate with the owner to remove the tree OR take alternative action to remove the threat.

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3 Private Property Assessment Model

3.1 IF tree location limits access to the pipeline by emergency vehicles,

AND meets one or more of the following criteria:

- Located on private location in customer's backyard,
- Located on private location and is further than 25 ft from drivable access point,
- Location obstructs emergency access vehicles,

THEN GT vegetation management personnel complete the remaining steps in this section,

OTHERWISE IM personnel complete the steps in [Section 2](#).

3.2 Data Collection

1. The minimum data required for tree removal are the following:

- The horizontal distance of the tree from the nearest edge of the pipeline.
- The spatial location of the tree captured in a GIS point file relative to Company pipeline.

3.3 Risk Assessment of Individual Trees

1. The risk assessment of individual trees is assigned by using the GPS location of the tree and the attribute data detailing the distance of the tree from the nearest edge to the pipeline. Trees located within 5 ft of the pipeline are identified as unacceptable and trees located at distance greater than 5 ft are categorized as manageable.

a. **Pipe Zone (0-5 ft)** – The Pipe Zone includes the area 5 ft on either side of the transmission pipeline where all trees are categorized as unacceptable risks. The 5 ft minimum clearance is required to:

- Ensure emergency access to the pipeline.
- Protect the pipe from damage.
- Keep the community safe.

NOTE

Trees located in the Border Zone may be far enough away from the pipeline that they pose a risk that PG&E can manage through ongoing monitoring. Future risk increases may cause these trees to be re-assessed as an unacceptable risk.

b. **Border Zone (greater than 5 ft)** – The Border Zone is the area greater than 5 ft on either side of the transmission pipeline. Trees in the Border Zone are categorized as manageable risks (tree may remain).

END of Instructions

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DEFINITIONS

Border Zone: The area greater than 5 ft on either side of the transmission pipeline.

Cathodic protection (CP): Technique by which underground metallic pipe is protected against deterioration (rusting and pitting).

Closed-interval survey (CIS): Inspection technique including a series of above ground pipe-to-soil potential measurements, taken several feet apart at predetermined intervals along the pipeline, and used to provide information on the effectiveness of the cathodic protection system.

Depth of cover (DOC): The vertical distance measured from the ground surface to the top of the pipeline.

Diameter at breast height (DBH): A standard method of expressing the diameter of the trunk or bole of a standing tree at 4.5 ft above ground level.

Direct assessment (DA): Assessment method using a structured process to integrate physical characteristics and operational history of a pipeline system or segment with the results of inspection, examination, and evaluation, in order to determine the integrity.

Encroachment: Anything located on or near the pipeline that would either pose integrity management risk, hinder maintenance activities, OR cause a lengthy delay in accessing pipeline facilities during an emergency.

In-line inspection (ILI): Pipeline inspection technique using devices known in the industry as smart pigs. These devices run inside the pipe and provide indications of metal loss, deformation and other defects.

Pipe Zone: The area 5 feet on either side of the transmission pipeline.

Right-of-way (ROW): The area located above the pipeline in which agreements have established a right to use the property for the purpose of installing, operating and maintaining the natural gas pipelines. The ROW may arise from a specific grant of land or an "easement" agreement which provides rights and obligations of the parties for one to pass across another's land, or a franchise agreement with cities and counties.

Vegetation: All the plant life in a particular region taken as a whole.

Tree(s): Any plant life with a measureable DBH as defined in [Appendix A](#) or by vegetation management personnel.

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IMPLEMENTATION RESPONSIBILITIES

This utility procedure will be communicated via a Gas Technical Document Management (TDM) Communications Monday morning email announcement.

GT Vegetation Management will provide a WebEx session communicating the publication of this procedure and to reinforce the current practice.

GOVERNING DOCUMENT

[Utility Standard TD-4490S, "Gas Pipeline Encroachment Management"](#)

COMPLIANCE REQUIREMENT / REGULATORY COMMITMENT

[Code of Federal Regulations \(CFR\), Title 49, Transportation, Part 192—Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Subpart L, "Operations"](#)

[49 CFR Part 192, Subpart M, "Maintenance"](#)

[49 CFR Part 192, Subpart O, "Gas Transmission Pipeline Integrity Management"](#)

REFERENCE DOCUMENTS

Developmental References:

"Biomechanical Study on the Interactions of Roots with Gas and Water Pipelines for the Evaluation of Tree Sites," *Arboricultural Journal* 2000, Vol. 23, pp. 343-377

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Friends of the Urban Forest, *Urban Tree Species Dictionary*, www.fuf.net/resources-reference/urban-tree-species-directory/

Frizzell, Randall. *Tree Root Interactions with Natural Gas Transmission Pipelines*, Prepared for PG&E by Randall Frizzell and Associates, Nevada City, CA. April, 2012

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REFERENCE DOCUMENTS (continued)

Developmental References (continued):

Frizzell and Associates. *Assessment, Documentation, and Reporting of Roots Near Gas Transmission Pipelines*. December 31, 2013

Hatch, Charles R. *Trees of the California Landscape: A Photographic Manual of Native and Ornamental Trees*. University of California Press, 2007

Municipal Tree Resource Analysis iTree Study 2009, contact Ralph Mize, City of San Jose

National Wildlife Federation, *Field Guide to Trees of North America*

Simpson, P. 2000. *Dancing Leaves: The story of New Zealand's cabbage tree, ti kouka*. Christchurch: Canterbury University Press

"Tree Root Interference Threat Analysis," April 29, 2013, Dynamic Risk Assessment Systems, Inc.

"Tree Roots in the Built Environment", Research for Amenity Trees No.8, pp. 45-48

United States Department of Agriculture (USDA) Forest Service (FS) Northern Research Station, *Assessing Urban Forest Effects and Values: San Francisco's Urban Forest*

University of Arizona Cooperative Extension. 2012. *Arid Plant Manual*.
https://ag.arizona.edu/pima/gardening/aridplants/aridplant_index.html

USDA FS, Center for Urban Forest Research, City of Berkeley California.

USDA FS, Silvics in North America,

USDA FS, Unpublished urban FIA data on file with John Mills

Supplemental References:

[Additional Analysis Spreadsheet](#)

APPENDICES

[Appendix A, "Diameter at Breast Height \(DBH\) of Common Bay Area Trees at Maturity"](#)

ATTACHMENTS

NA

Vegetation Encroachment Site-Specific Risk Analysis

DOCUMENT REVISION

Utility Procedure TD-4490P-03, "Integrity Management Site-Specific Risk Analysis," Rev. 0, issued 11/2014.

DOCUMENT APPROVER

Mike Barnum, Manager, TIMP Risk Management

DOCUMENT OWNER

Patrick Espiritu, Associate Gas Engineer, Gas Standards and Procedures

DOCUMENT CONTACT

Bronson Ingemansson, Senior Gas IM Engineer, TIMP Risk Management

Ryan Willis, Supervisor, Vegetation Management Support

REVISION NOTES

| Where? | What Changed? |
|------------------------|--|
| Revision 1a | |
| Step 3.1 | Changed "AND meets all of the following criteria" to "AND meets one or more of the following criteria." |
| Revision 1 | Publication Date: 06/21/2017; Effective Date: 07/05/2017 |
| Summary | Clarified usage of procedure for areas with vehicle access. |
| Before you Start | Added Transmission Integrity Management training |
| Section 1 | Modified, moved requirements to TD-4490S Standard. |
| Section 2.3 | Added depth of cover acceptance criteria. |
| Section 2.5 | Added that EDRS is used to document approvals for site specific plans. |
| Section 3 | Added private property assessment model into procedure. |
| Compliance Requirement | Added regulatory requirements for Title 49, Part 192 Subpart L and M |
| Reference Documents | Added literature reference: "Tree Roots in the Built Environment", Research for Amenity Trees No.8, pp. 45-48. |
| Appendix A | Moved DBH of Common Bay Area Trees at Maturity Table to Appendix A. |

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Appendix A, Diameter at Breast Height (DBH) of Common Bay Area Trees at Maturity Page 1 of 4

| Botanical (Species) Name | Common Name | DBH (in inches) |
|------------------------------------|---------------------------|------------------|
| <i>Abies concolor</i> | Fir, white | 48 |
| <i>Acacia baileyana</i> | Acacia, Bailey | 36 |
| <i>Acacia melanoxylon</i> | Acacia, green | 36 |
| <i>Acer buergeranum</i> | Maple, Trident | 25 |
| <i>Acer macrophyllum</i> | Maple, Bigleaf | 36 |
| <i>Acer negundo</i> | Boxelder | 30 |
| <i>Acer palmatum</i> | Maple, Japanese | 12 |
| <i>Acer platanoides</i> | Maple, Norway | 30 |
| <i>Acer rubrum</i> | Maple, Red | 30 |
| <i>Acer saccharinum</i> | Maple, Silver | 36 |
| <i>Aesculus californica</i> | Buckeye | 10 |
| <i>Ailanthus altissima</i> | Ailanthus, Tree of Heaven | 36 |
| <i>Albizia julibrissin</i> | Mimosa | 20 |
| <i>Alnus rhombifolia</i> | Alder, white | 30 |
| <i>Araucaria araucana</i> | Monkey-Puzzle Tree | TBD ¹ |
| <i>Araucaria bidwillii</i> | Bunya-Bunya Tree | TBD ¹ |
| <i>Araucaria heterophylla</i> | Pine, Norfolk Island | 48 |
| <i>Arbutus menziesii</i> | Madrone | 36 |
| <i>Arbutus unedo</i> | Strawberry Tree | TBD ¹ |
| <i>Arbutus x marina</i> | Strawberry Marina Tree | TBD ¹ |
| <i>Betula jacquemontii</i> | Birch, Jacquemont | TBD ¹ |
| <i>Betula nigra</i> | Birch, River | 30 |
| <i>Betula pendula</i> | Birch | 24 |
| <i>Callistemon viminalis</i> | Bottlebrush, weeping | TBD ¹ |
| <i>Calocedrus decurrens</i> | Cedar, Incense | 60 |
| <i>Carpinus betulus 'Compacta'</i> | Hornbeam, compact | TBD ¹ |
| <i>Carya illinoensis</i> | Pecan | 48 |
| <i>Casuarina equisetifolia</i> | Casuarina, Horsetail Tree | 18 |
| <i>Catalpa speciosa</i> | Catalpa | 36 |
| <i>Ceanothus thyrsiflorus</i> | Blueblossom | 12 |
| <i>Cedrus atlantica glauca</i> | Cedar, Blue Atlas | TBD ¹ |
| <i>Cedrus deodara</i> | Cedar, Deodar | TBD ¹ |
| <i>Celtis occidentalis</i> | Hackberry, common | TBD ¹ |
| <i>Ceratonia siliqua</i> | Carob | 18 |
| <i>Cercis canadensis</i> | Redbud, Eastern | 12 |
| <i>Cercis occidentalis</i> | Redbud, Western | TBD ¹ |
| <i>Chamaerops humilis</i> | Palm, Mediterranean Fan | TBD ¹ |
| <i>Chitalpa tashkentensis</i> | Chitalpa | TBD ¹ |
| <i>Cinnamomum camphora</i> | Camphor Tree | 25 |
| <i>Citrus hybrids</i> | Citrus, cultivated | 8 |
| <i>Cordyline australis</i> | Dracaena/ cabbage tree | TBD ¹ |

Notes:

1. Vegetation management personnel determine the appropriate DBH value on a case by case basis.

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Appendix A, Diameter at Breast Height (DBH) of Common Bay Area Trees at Maturity Page 2 of 4

| Botanical (Species) Name | Common Name | DBH (in inches) |
|--|--------------------------------|------------------|
| Cornus nuttallii | Dogwood, Pacific | 15 |
| Crataegus douglasii | Hawthorn, black | 12 |
| Cupressus macrocarpa | Cypress, Monterey | 24 |
| Cupressus sempervirens | Cypress, Italian | 49 |
| Diospyros kaki | Persimmon, Japanese | TBD ¹ |
| Dodonaea viscosa | Hopseed Bush | TBD ¹ |
| Eriobotrya japonica | Loquat | 8 |
| Eucalyptus camaldulensis | Eucalyptus, Red Gum | 85 |
| Eucalyptus cinerea | Eucalyptus, Silver Dollar Tree | TBD ¹ |
| Eucalyptus ficifolia | Eucalyptus, Red-Flowering Gum | 57 |
| Eucalyptus globulus | Eucalyptus, Blue Gum | 48 |
| Eucalyptus nicholii | Eucalyptus, Peppermint Gum | TBD ¹ |
| Eucalyptus polyanthemos | Eucalyptus, Silver-Dollar Gum | TBD ¹ |
| Eucalyptus sideroxylon | Eucalyptus, Red Ironbark | TBD ¹ |
| Eugenia uniflora | Eugenia | TBD ¹ |
| Fagus sylvatica | Beech, European | 48 |
| Ficus carica | Fig, Edible | 7 |
| Fraxinus holotricha 'Moraine' | Ash, Moraine | TBD ¹ |
| Fraxinus oxycarpa | Ash, Raywood | TBD ¹ |
| Fraxinus uhdei | Ash, Shamel (Evergreen) | TBD ¹ |
| Fraxinus velutina 'Modesto' | Ash, Modesto | TBD ¹ |
| Geijera parviflora | Willow, Australian | TBD ¹ |
| Ginkgo biloba | Ginkgo | 36 |
| Gleditsia triacanthos | Locust, honey | 36 |
| Grevillea robusta | Oak, Silk | TBD ¹ |
| Heteromeles arbutifolia | Toyon | TBD ¹ |
| Ilex opaca | Holly, American | TBD ¹ |
| Jacaranda mimosifolia | Jacaranda | TBD ¹ |
| Juglans hindsii | Walnut, California | 24 |
| Juglans nigra | Walnut, Black | 48 |
| Juglans regia | Walnut, English | 36 |
| Juniperus chinensis 'Torulosa' | Juniper, Hollywood | TBD ¹ |
| Koelreuteria bipinnata | Flame Tree | TBD ¹ |
| Koelreuteria paniculata | Goldenrain Tree | TBD ¹ |
| Lagerstroemia indica | Crape Myrtle | 20 |
| Laurus nobilis | Bay, European | TBD ¹ |
| Ligustrum lucidum | Privet, Glossy | TBD ¹ |
| Liquidambar styraciflua | Liquidambar, Sweetgum | 60 |
| Liriodendron tulipifera | Tulip tree | 48 |
| Lithocarpus densiflora | Oak, Tan | 36 |
| Lyonothamnus floribundus asplenifolius | Catalina Ironwood | 12 |

Notes:

1. Vegetation management personnel determine the appropriate DBH value on a case by case basis.

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Appendix A, Diameter at Breast Height (DBH) of Common Bay Area Trees at Maturity Page 3 of 4

| Botanical (Species) Name | Common Name | DBH (in inches) |
|---------------------------|-------------------------------------|------------------|
| Magnolia grandiflora | Magnolia, Southern | 36 |
| Magnolia stellata | Magnolia, Star | TBD ¹ |
| Magnolia X soulangiana | Magnolia, Saucer | 6 |
| Malus sylvestris | Apple, Edible | 18 |
| Malus x floribunda | Crabapple, Japanese Flowering | TBD ¹ |
| Maytenus boaria | Mayten Tree | TBD ¹ |
| Melaleuca quinquenervia | Melaleuca/Cajeput | TBD ¹ |
| Melia azedarach | Chinaberry | 24 |
| Metasequoia glyptostroboi | Redwood, Dawn | 48 |
| Morus alba | Mulberry, white | 24 |
| Musa x paradisiaca | Banana | TBD ¹ |
| Myoporum laetum | Myoporum | TBD ¹ |
| Nerium oleander | Oleander | TBD ¹ |
| Nyssa sylvatica | Tupelo / Sour Gum | 36 |
| Olea europaea | Olive | 36 |
| Parkinsonia aculeata | Palo Verde, Mexican/Jerusalem thorn | TBD ¹ |
| Persea americana | Avocado | TBD ¹ |
| Phoenix canariensis | Palm, Canary Island | 24 |
| Phoenix dactylifera | Palm, Date | 24 |
| Photinia X fraseri | Photinia | TBD ¹ |
| Picea sitchensis | Spruce, sitka | 120 |
| Pinus canariensis | Pine, Canary Island | 51 |
| Pinus halepensis | Pine, Aleppo | TBD ¹ |
| Pinus pinea | Pine, Italian Stone | TBD ¹ |
| Pinus ponderosa | Pine, Ponderosa | 72 |
| Pinus radiata | Pine, Monterey | 36 |
| Pinus thunbergiana | Pine, Japanese Black | TBD ¹ |
| Pinus torreyana | Pine, Torrey | 24 |
| Pistacia chinensis | Pistache, Chinese | 25 |
| Pittosporum undulatum | Victorian box | TBD ¹ |
| Platanus racemosa | Sycamore, Western | 48 |
| Platanus X acerifolia | London Plane Tree | 48 |
| Podocarpus gracilior | Fern pine | TBD ¹ |
| Populus fremontii | Cottonwood | 48 |
| Populus nigra 'Italica' | Poplar, Lombardy | 36 |
| Prosopis glandulosa | Mesquite | 12 |
| Prunus cerasifera spp. | Plum, Purple-Leaf | TBD ¹ |
| Prunus dulcis | Almond | TBD ¹ |
| Prunus serrulata | Cherry, Japanese Flowering | TBD ¹ |
| Prunus X blireiana | Plum, Flowering | TBD ¹ |
| Pseudotsuga menziesii | Fir, Douglas | 60 |

Notes:

1. Vegetation management personnel determine the appropriate DBH value on a case by case basis.

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Appendix A, Diameter at Breast Height (DBH) of Common Bay Area Trees at Maturity Page 4 of 4

| Botanical (Species) Name | Common Name | DBH (in inches) |
|--|-----------------------------------|------------------|
| <i>Punica granatum</i> | Pomegranate | TBD ¹ |
| <i>Pyrus calleryana</i> | Pear, Ornamental | 14 |
| <i>Pyrus communis</i> | Pear, Edible | 12 |
| <i>Pyrus kawakamii</i> | Pear, Evergreen | TBD ¹ |
| <i>Quercus agrifolia</i> | Oak, Coast Live | 48 |
| <i>Quercus chrysolepis</i> | Oak, Canyon Live | 60 |
| <i>Quercus douglasii</i> | Oak, Blue | 36 |
| <i>Quercus ilex</i> | Oak, Holly | 42 |
| <i>Quercus kelloggii</i> | Oak, California Black | 48 |
| <i>Quercus lobata</i> | Oak, Valley | 48 |
| <i>Quercus palustris</i> | Oak, Pin | 30 |
| <i>Quercus rubra</i> | Oak, Red | 36 |
| <i>Quercus suber</i> | Oak, Cork | TBD ¹ |
| <i>Quercus wislizeni</i> | Oak, Interior Live | 36 |
| <i>Rhaphiolepis x 'Montic'</i> | Indian Hawthorne, majestic beauty | TBD ¹ |
| <i>Rhus lancea</i> | Sumac, African | TBD ¹ |
| <i>Robinia pseudoacacia</i> | Locust, black | 36 |
| <i>Salix babylonica</i> | Willow, Weeping | TBD ¹ |
| <i>Sambucus mexicana</i> | Elderberry, blue | TBD ¹ |
| <i>Sapium sebiferum</i> | Chinese Tallow Tree | TBD ¹ |
| <i>Schinus molle</i> | Pepper, California | 20 |
| <i>Schinus terebinthifolius</i> | Pepper, Brazilian | TBD ¹ |
| <i>Sequoia sempervirens</i> | Redwood | 180 |
| <i>Sequoiadendron giganteum</i> | Sequoia | 20 |
| <i>Syagrus romanzoffiana</i> | Palm, Queen | 12 |
| <i>Taxodium distichum</i> | Cypress, Bald | 60 |
| <i>Thuja plicata</i> | Cedar, Western-Red | 96 |
| <i>Tilia tomentosa</i> | Linden, silver | TBD ¹ |
| <i>Trachycarpus fortunei</i> | Palm, Chinese Windmill | TBD ¹ |
| <i>Tristania conferta</i> | Brisbane Box | TBD ¹ |
| <i>Tristania laurina/Tristaniopsis laurina</i> | Gum, Water | TBD ¹ |
| <i>Ulmus parvifolia</i> | Elm, Chinese | 18 |
| <i>Umbellularia californica</i> | Bay, California | 36 |
| <i>Washingtonia filifera</i> | Palm, California Fan | 36 |
| <i>Washingtonia robusta</i> | Palm, Mexican Fan | 18 |
| <i>Xylosma congestum</i> | Xylosma, shiny | TBD ¹ |
| <i>Yucca gloriosa</i> | Spanish dagger | TBD ¹ |
| <i>Zelkova serrata</i> | Zelkova | 30 |

Notes:

1. Vegetation management personnel determine the appropriate DBH value on a case by case basis.