

# Proposed Amendments to Title 11, Trees: Trees in Development Situations



Source: Portland Parks & Recreation Urban  
Forestry Division

Bureau of Development  
Services, with Portland Parks  
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Planning and Sustainability

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# 2020 Tree Code Amendments Staff Proposal

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## EXECUTIVE SUMMARY

On January 8, 2020, through Resolution 37473, the Portland City Council directed the Bureau of Development Services, the Bureau of Planning and Sustainability, and Portland Parks & Recreation to conduct an analysis, legal review and stakeholder engagement process of the proposals recommended by the PSC and UFC. This Staff Proposal is the result of that resolution, specifically the project evaluates:

- Removing the exemptions from tree preservation and tree density in IH (Heavy Industrial), IG1 (General Industrial 1), EX (Central Employment), and CX (Central Commercial) zones on private and City-owned/managed property.
- Reducing the threshold for required preservation of trees on private property from 36 inches to 20 inches in diameter at breast height (dbh), wherever tree preservation is required.
- Reducing the threshold for inch-per-inch fee in lieu of preservation for trees on private property from 36 inches dbh to 20 inches dbh.

Staff from the three named bureaus conducted community engagement strategies through interviews with key stakeholders to obtain input on the initial scope of work, a community survey to gauge community values and priorities, and an online community forum to present a draft proposal and gather input on the draft proposal.

Staff also engaged a consultant and conducted research to estimate the tree size composition of the existing tree canopy in affected areas of the city to inform an economic analysis to determine impacts of changing the regulations on industrial land supply to verify compliance with Statewide Planning Goal 9, Economic Development. The analysis also quantified additional impacts to housing production and housing costs. Staff also estimated potential outcomes on the rate of tree preservation and fees-in-lieu of preservation assessed if the proposed amendments are adopted.

Finally, staff considered the environmental and economic benefits of trees and economic considerations associated with impacts on industrial land supply available for job growth. Based on the outcomes of the economic analysis, community engagement, equity considerations and economic considerations, project staff propose the following amendments to Portland City Code Chapter 11.50, Trees in Development Situations:

- **Remove** the exemption from tree preservation and tree density in IG1 (General Industrial 1), EX (Central Employment), and CX (Central Commercial) zones on private and City-owned/managed property.
- **Retain** the exemption from tree preservation and tree density in IH (Heavy Industrial) zone on private and City-owned or managed property.
- **Reduce** the threshold for required preservation of trees on private property from 36 inches to 20 inches in diameter at breast height (dbh), wherever tree preservation is required.
- **Reduce** the threshold for inch-per-inch fee in lieu of preservation for trees on private property from 36 inches dbh to 20 inches dbh.

The staff proposal does not:

- Change any of the other existing exemptions from tree preservation or tree density.
- Change anything else about the rules for tree preservation or tree density in development situations.

Staff also proposes to re-examine the exemptions from tree preservation and tree density in the IH zone through the 5-year update to the Economic Opportunities Analysis (EOA) required by the State of Oregon to demonstrate compliance with Statewide Planning Goal 9, undertaken by the Bureau of Planning and Sustainability as part of its regular work program. The last EOA was adopted in 2016. Public engagement for the 5-year update is anticipated to begin in early 2021. In that forum, mitigating strategies may be established to offset the development constraints presented by adding tree preservation and tree density regulations in the IH zone.

## I. Introduction

### A. Project Background

In 2011, Portland adopted its first unified Tree Code to regulate the preservation, removal, planting and pruning of trees. The Tree Code took effect January 1, 2015. Several amendments have been made to the Tree Code over time and are described below.

#### 1. Large Tree Stop Gap Amendment, 2016

Shortly after the Tree Code went into effect, public concern emerged about the removal of especially large diameter trees during development. As a result, Ordinance 187685 was adopted to strengthen the regulations for tree preservation of especially large diameter trees. This was commonly known as the “Large Tree Amendment” or the “Stop-Gap” amendment. Acknowledging that the amendment was an emergency ordinance that was a “fast track” project with limited opportunity for public comment and staff analysis, a sunset date of December 31, 2019, was added to the amended regulations. The amendments were effective in May 2016. Those amendments are summarized as follows:

- The pre-existing standard for tree preservation was not changed. This standard requires that at least one-third of all healthy, non-nuisance trees on private property be preserved during development situations, or a fee must be paid in lieu of preservation into the Tree Planting and Preservation Fund.
- A new requirement was added that all healthy, non-nuisance trees on private property 36 inches diameter at breast height (dbh) and larger must be preserved or a fee paid in lieu of preservation is required. These trees may be used to meet the one-third preservation standard. In addition, for trees over 36 inches dbh, fees are calculated on an inch-by-inch basis when those trees are removed.
- A new requirement was added that requires an on-site posted notice and mailed notice to some parties when a tree 36 inches dbh or larger is to be removed, and that this notice be given at least 45 days prior to issuance of the related building permit. Certain affordable housing projects are exempt from the fee in lieu of preservation for trees 36 inches dbh or larger.

#### 2. Sunset Date Extension of Large-Tree Stop Gap Amendment, 2019

In 2019, staff initiated a project to extend the sunset date of the 2016 amendments to provide for additional time to review those amendments and the regulations for tree preservation in development more generally. As part of the legislative adoption process of that extension, the Planning and Sustainability Commission (PSC) and the Urban Forestry Commission (UFC) recommended that the City further strengthen tree preservation by removing the existing industrial and commercial zone exemptions for private trees and trees on city-owned sites. The UFC also recommended decreasing the key inch-for-inch mitigation fee threshold for tree removal on private property from 36 inches dbh to 20 inches dbh. Portland City Council adopted an extension of the sunset date to December 31, 2024, but did not act on the additional recommendations made by the PSC and the UFC. Instead, City Council passed a resolution that directed staff from the Bureau of Development Services (BDS), together with Portland Parks & Recreation (PP&R) and the Bureau of Planning and Sustainability (BPS), to initiate a project addressing the additional recommendations of the PSC and UFC.

### 3. City Council Resolution, 2020

Through Resolution 37473, the Portland City Council directed the Bureau of Development Services, the Bureau of Planning and Sustainability, and Portland Parks & Recreation to conduct an analysis, legal review and stakeholder engagement process of the proposals recommended by the PSC and UFC. This Staff Proposal is the result of that resolution, specifically:

“BE IT FURTHER RESOLVED that BDS, BPS, and PP&R shall immediately prepare a proposal to address the exemption from regulations for certain zones. BDS, BPS, and PP&R, shall conduct technical analysis and coordinate legal review to develop an analysis that addresses the exemption from preservation and density regulations in IH, IG1, EX, and CX zones. Based on this initial analysis, stakeholder feedback, and legal review, BDS, in coordination with BPS and PP&R, shall develop a proposal to remove the exemption and submit it to City Council no later than July 7, 2020, if the analysis and legal review allow for removal of the exemption.

BE IT FURTHER RESOLVED, concurrently with the first proposal, BDS and PP&R, in coordination with BPS, shall prepare a proposal to amend the regulations for tree preservation adopted by Ordinance 187675, including evaluating reduction of critical tree size threshold for inch-for-inch mitigation from 36-inches to 20-inches. BDS and PP&R shall return to Council with this second proposal no later than July 7, 2020.”

### **B. Effects of COVID-19 on Project Schedule**

The uncertainties presented by the COVID-19 crisis beginning in mid-March 2020, including federal, state and local “state of emergency” declarations, caused disruption to the project schedule. The public engagement plan for the project was underway but needed to be re-worked to accommodate remote participation and uncertainties related to the ability of the community to effectively participate at the time. Among other things, staff revised the public engagement windows to a time when experts had projected the COVID-19 peak to have passed and people might be more inclined to participate.

In addition, in the early stages of the crisis, there was a high level of uncertainty of when the City Council, the Urban Forestry Commission, and the Planning and Sustainability Commission would be able to effectively run meetings virtually, how much of the City Council's time would need to be devoted to public health and economic priorities, and consequently how backed up their dockets would become.

Finally, the crisis presented impacts to project staff and consultant time, including required furlough and altered work schedules to accommodate dependents or other COVID-19 related impacts.

With support of City Council offices, the project timeline was extended to bring a proposal to the City Council the end of October 2020.



## II. Project Process

### A. Policy Direction and Project Goals

The goals of this project were developed by staff and originate from the existing purpose of the Tree Code, direction from the PSC and UFC provided in their recommendations in 2019, and direction from the City Council provided in Resolution 37473.

#### 1. Purpose of the Regulations in Title 11, Trees

Title 11, Trees, has an adopted overall purpose statement that considers the entirety of the Tree Code. This purpose considers the balance of the regulations that apply to development situations and non-development situations. It also considers the balance of the regulations that applies to trees on private property, trees on City-owned or managed sites, and street trees. Title 11 also has a purpose statement that considers the subject of this proposal, trees in development situations. Both the overall purpose statement and the purpose for the regulations of trees in development situations are discussed here.

#### *Purpose of Title 11, Trees*

The purpose of Title 11, Trees, is to enhance the quality of the urban forest and optimize the benefits that trees provide. Section 11.05.010, Purpose states:

“A. The Tree Code is one of the implementation measures of the Urban Forest Plan. Together with education and other initiatives, these regulations protect the health, safety, and general welfare of the citizens of Portland and are consistent with other plans and policies of the City. In so doing, the appearance of the City is enhanced and important ecological, cultural, and economic resources are protected for the benefit of the City’s residents and visitors.

B. The chapters within this Title address trees in both development and non-development situations and seek to enhance the quality of the urban forest and optimize the benefits that trees provide. Desired tree benefits include:

1. Providing oxygen and capturing air pollutants and carbon dioxide;
2. Maintaining slope stability and preventing erosion;
3. Filtering stormwater and reducing stormwater runoff;
4. Reducing energy demand and urban heat island through shading of buildings and impervious areas;
5. Providing visual screening and buffering from wind, storms and noise;
6. Sustaining habitat for birds and other wildlife;
7. Providing a source of food for wildlife and people;
8. Maintaining property values and the beauty, character and natural heritage of the City; and
9. Meeting the multi-purposed objectives of the Urban Forest Plan, including reaching and sustaining canopy targets for various urban land environments.”

### *Purpose of Chapter 11.50, Trees in Development Situations*

The purpose of Chapter 11.50, Trees in Development Situations, takes into account the overall purpose of Title 11 while balancing the desire to accommodate planned development and ensuring mitigation when tree preservation standards are not met. Section 11.50.010, Purpose states:

“The regulations of this Chapter support and complement other City development requirements, with a focus on achieving baseline tree preservation and total tree capacity on a site, considering the anticipated use and level of development. This Chapter regulates the removal, protection and planting of trees through the development process to encourage development, where practicable, to incorporate existing trees, particularly high quality or larger trees and groves, into the site design, to retain sufficient space to plant new trees, and to ensure suitable tree replacement when trees are removed. It is the intent of these provisions to lessen the impact of tree removal and to ensure mitigation when tree preservation standards are not met.”

### 2. Tree Canopy Equity

In its recommendation to the City Council during the 2019 sunset date extension project, the PSC noted potential equity implications related to disparities in tree canopy and its corresponding environmental and public health services to low income residents and communities of color.

From the PSC recommendation dated October 10, 2019:

“In addition to the initial proposal, the Commission deliberated specifically on removing the exemption for tree preservation in development situations for certain industrially and commercially zoned sites (those in IH, IG1, CX and EX). Though staff has not done a thorough analysis to confirm, members of the commission noted that commercial and industrial lands often abut neighborhoods with lower income residents and communities of color – such that loss of tree canopy in these zones would have disproportionate impacts.”

The UFC’s recommendation to the City Council during the same project offered a similar perspective related to the potential equity implications of disparities in tree canopy and its corresponding environmental and public health services to low income residents and communities of color. From the UFC recommendation dated October 21, 2019:

“The Commission was in full agreement that trees provide multiple ecosystem services, including climate comfort, clean air, wildlife habitat, genetic resources, cultural and social values. In addition, the additional time will allow the Commission to evaluate potential implications of the code and develop an equitable solution before the next sunset date.

The public also expects that all zone classes follow the same regulations regarding Title 11 to maintain the distribution of ecosystem services along the city. Additional testimony by the PSC underscored the importance of social equity in removing current exemptions for sites zoned IH, IG1, EX and CX because many abut lower income households who face the harshest effects of increasing temperatures and persistent urban flooding-both climate induced events that are expected to rise in frequency and intensity over the coming years.”

### **3. Job Growth**

Job growth in industrial districts has an inclusive-prosperity role in the regional labor market as higher-paying alternatives to low-wage jobs are accessible to workers without college degrees. These job opportunities on average can be expected to moderate the region’s increasing income inequality, poverty (lack of income self-sufficiency), and income-related health impacts. Harbor-dependent sectors of the regional economy can also provide higher median incomes as compared to other sectors, particularly for people of color.

### **4. Statewide Planning Goal 9-Economic Development**

Statewide Planning Goal 9 requires local governments to demonstrate that there is an adequate inventory of developable industrial and employment land to accommodate forecasted economic growth. The Goal 9 rule (660-09-015 and 660-09-025) requires that comprehensive plans identify adequate 20-year and short-term land supply to fully meet forecast demand of industrial and other employment use types as analyzed in an Economic Opportunities Analysis (EOA; BPS 2016b).

The City of Portland’s EOA was most recently updated as a part of the 2035 Comprehensive Plan, originally adopted in 2016. The EOA estimates the 20-year supply and demand for employment land in the city by geography and land use types and includes a Buildable Land Inventory (BLI) that identifies specific properties that are most likely to redevelop over the 20-year period. To estimate the supply of employment land available, development constraints, including physical barriers (such as brownfields, steep slopes and other hazards, etc.) and regulations and their associated costs, are incorporated into the analysis.

Once the 20-year land supply is identified, local governments must monitor the availability of that land to ensure that the projected demand can still be met. If the land supply is reduced to a level below the 20-year demand projected in the EOA, the local government then becomes out of compliance with Goal 9.

## 5. Project Goals

Given the various contributions described above, project staff developed the following project goals:

**a. To support and implement the forest infrastructure goals of the Urban Forest Management Plan for various urban land environments.** In development situations, this means encouraging development, where practicable, to incorporate existing trees, particularly high quality or larger trees and groves, into the site design, to retain sufficient space to plant new trees, and to ensure suitable tree replacement when trees are removed.

**b. To improve equitable outcomes of regulation,** by preserving and protecting tree canopy and affiliated public health services, in and near places where low income residents and communities of color work and live. Members of the Planning and Sustainability Commission noted that commercial and industrial lands often abut neighborhoods with lower-income residents and communities of color such that loss of tree canopy in these zones has disproportionate impacts. Lowering the size threshold expands tree preservation requirements to include a greater percentage of trees distributed across more neighborhoods, as compared to only requiring preservation of trees 36 inches dbh.

**c. To evaluate the benefits and costs of the proposals** using the best available science.

**d. To engage community members** to inform the analyses that will support the final proposal, inform goals for future work on Title 11, and identify other opportunities and constraints related to the proposals. In addition to stakeholders, there should be a focus on engagement with communities of color, low income communities, and other communities that disproportionately bear the impacts of reduced tree canopy.

**e. To put forth a legally defensible staff proposal** to ensure that the outcome of the project meets Statewide Planning Goal 9, which requires local governments to demonstrate that there is an adequate inventory of developable industrial and employment land to accommodate forecasted economic growth.

## B. Community Engagement

In addition to written comments submitted throughout the project, staff worked with Barney & Worth, Inc., to engage community members in a three-pronged approach. The approach included interviews with stakeholders, an online survey publicly available for broad community input during the development of this proposal, and an Online Community Forum, open continuously for almost three weeks, for community members to provide input and ask questions related to the draft staff proposal. Finally, there will be opportunities to provide input to the recommending bodies, the PSC and UFC, and the City Council. Staff from other City bureaus - Environmental Services, Housing,

Management and Finance, Transportation, and Water --were also engaged and provided early review and comment on the potential amendments.

## 1. Stakeholder interviews

A series of interviews with 27 individuals representing 23 affiliations were conducted in March and April 2020. Stakeholders were identified by interest in the process leading up to the adoption of Resolution 37473 in January 2020. Individuals represented a spectrum of interest advocacy groups, community groups, geographic-based or neighborhood groups, City staff who implement the Tree Code, and private design professionals that frequently work with the Tree Code. A discussion guide, list of interviewees, and explanation of major themes that emerged from these interviews are shown in Appendix C. Major themes that emerged from these interviews were:

- a. Trees are valued by Portlanders for their contributions to livability, beauty and “sense of place.”
- b. It is broadly recognized that trees are not evenly or equitably distributed throughout the City.
- c. There is widespread agreement the current Tree Code is not working well.
- d. Portland’s Tree Code conflicts with other City codes and policies.
- e. The Tree Code fails to clarify “what we want to protect.”
- f. Stakeholders are left guessing about how mitigation funds are used.
- g. Participants have sharply contrasting views on the proposed removal of some industrial and commercial lands from tree preservation and planting requirements.
- h. Perspectives differ significantly on the proposed reduction of the threshold for the inch-per-inch mitigation fee from 36” to 20” diameter.
- i. Most stakeholders acknowledge increased urban density, affordable housing and tree preservation are competing goals and that more work/creative thinking is needed to address this problem.
- j. There is strong support for a comprehensive update of the Portland Tree Code, and participants suggest a rich treasure of topics to be addressed.

## 2. Community Survey

An online survey was conducted from April 16 to May 15, 2020. The intent of the survey was to gauge priorities of a broad range of community members. The topics were presented in a way that allowed them to be rated independently of one another so that they were not mutually exclusive. The survey also provided an opportunity to provide comments on issues to examine in a potential future comprehensive Tree Code project. Surveys were distributed to those interviewed in March and April, to other community partner organizations identified by project staff and equity staff from the Bureau of Development Services and Portland Parks & Recreation, to general distribution lists of Bureau of Development Services, Portland Parks & Recreation, and the Bureau of Planning and Sustainability, and through social media platforms such as Twitter, Facebook, and Next Door.

A total of 2,064 surveys were completed and 1,277 written comments submitted through this process. More detail on the outcomes of the survey are shown in Appendix D, though a brief summary is provided as follows:

**a. Interests represented**

Survey respondents reported a variety of interest identities. Respondents could choose more than one interest. General community interest was indicated by the most respondents, while representatives who work for a construction or development firm comprise the fewest respondents. Respondents were from every Portland zip code, ranging from 1 responded to 165 respondents. Other demographic information was collected and is shown in Appendix D.

- 90%** - Interested community member
- 53%** - Own or manage property in Portland
- 16%** - Work for or member of an environmental/climate advocacy group
- 14%** - Work for or member of community-based organization
- 11%** - Another affiliation
- 11%** - Work for or member of tree/wildlife advocacy group
- 6%** - Work for a government agency
- 4%** - Local tree care provider or arborist
- 4%** - Work for or member of business or industry group
- 3%** - Work for a development or construction firm

**b. Highest priorities for code amendments (% very important/important)**

There is near-consensus among survey respondents on priorities for Tree Code amendments.

- 95%** – Preserving and planting more trees in industrial areas in close proximity to the Willamette River, Columbia Slough, the Columbia River, or other environmentally sensitive natural areas.
- 92%** – Preserving trees in certain industrial and commercial sites, when possible.
- 92%** – Preserving and planting trees in industrial areas in close proximity to low-income communities and communities of color.
- 86%** – Collecting fees paid into the tree planting and preservation fund when trees must be removed.
- 82%** – Ensuring all industrial, commercial, and residential areas are subject to the same tree preservation requirements.

**c. Lower priorities for code amendments (% very important/important)**

- 29%** – Minimizing the cost of developing industrial sites.
- 29%** – Maximizing the amount of land available for industrial uses to accommodate middle-income job growth.

**d. Highest priorities for mitigation fee (% very important/important)**

Likewise, there is strong agreement on objectives for the mitigation fee.

**91%** – Improving environmental and health outcomes.

**87%** – Preserving more trees when construction occurs on private property.

**78%** – Increasing mitigation fees enabling more trees to be planted and preserved elsewhere.

**77%** – Minimizing the cost of housing, including affordable housing.

**e. Lower priorities for mitigation fee (% very important/important)**

**32%** – Minimizing the cost of development.

**3. Online Community Forum**

The Online Community Forum was open continuously for nearly three weeks, from July 14 to August 3, 2020. Prior to COVID-19, this forum was to be held via in-person open house sessions. As this was not possible without risking human health, the Online Community Forum was developed as way to present information about the project, the processes for analysis, draft staff proposal and proposed amendments, to the public.

Content was presented in a narrated PowerPoint Presentation and also through text accompanied by photos. Frequently Asked Questions provided supplemental information, a short survey collected feedback from the public regarding the specific proposed amendments (inclusive of open-ended questions), and a separate comment field offered an opportunity for the public to provide further feedback with a request for response. A representative from the Mayor’s Office, BDS, PP&R and BPS researched and responded to most public comments within a few days. More information can be found in the summary highlights for the Online Community Forum in Appendix E.

**Survey Results:** A total of 591 surveys were completed. Survey respondents indicated a high level of support for all of the proposed amendments, and only 14% supported retaining the exemptions from tree preservation and tree density in IH zones. However, there is no analysis of the demographics or interests of the survey respondents.

***Q#1 – Do you support the proposal to remove the exemption from tree preservation in CX and EX and IG1 zones?***

83% – Yes

16% – No

***Q#2 – Do you support the proposal to remove the exemption from tree density in the CX and EX and IG1 zones?***

83% – Yes

17% – No

**Q#3 – Do you support the proposal to retain the exemption from tree preservation in the IH zone?**

14% – Yes

85% – No

**Q#4 – Do you support the proposal to retain the exemption from tree density in the IH zone?**

14% – Yes

86% – No

**Q#5 – Do you support the proposal to reduce the tree diameter threshold from 36” to 20” for private trees wherever tree preservation is required?**

81% – Yes

18% – No

#### **4. City Bureau Comments**

The Bureau of Environmental Services, Portland Housing Bureau, Portland Office of Management and Finance, Bureau of Transportation, and Portland Water Bureau were engaged prior to development of the draft staff proposal based on the initial scope of work, and following the draft staff proposal. With the exception of the Bureau of Environmental Services, the bureaus or offices responded with no concerns regarding the initial scope of work or the draft staff proposal.

The Bureau of Environmental Services (BES) responded to the initial scope of work with some concerns related to an ongoing question of how trees on private property within public easements are regulated; if they are regulated as private trees or city trees. BES acknowledges that this issue is out of the scope of this project, but both the Bureau of Development Services and Portland Parks & Recreation –Urban Forestry will continue to work through this question; and possibly refer it to clarification through a future broader Title 11 amendment project. BES expressed support for the initial scope of work and acknowledgement of the rationale for the staff proposal; indicating the proposal to remove exemptions from tree preservation and tree density compliments their stormwater management goals. From their letter dated June 12, 2020:

BES supports the proposed deletions of current exemptions from development-related tree preservation and tree density requirements for sites in IH, IG1, EX, and CX zones, which are low-tree-canopy zones. BES anticipates that the proposed elimination of the zoning-based exemptions will have only a modest impact on a small subset of BES CIP projects, and it could have important equity and stormwater management benefits for the City. The proposed deletion of zoning-based exemptions is an important step in supporting equitable tree canopy and associated health, stormwater management, and other benefits for Portlanders, by applying the same tree preservation and tree density regulatory structures to development projects regardless of zone. BES notes that the benefits associated with tree canopy are greatest for mature trees, which provide a level of service that, once lost, may take decades for mitigation trees to match.



## 5. Remaining Opportunities for Engagement

There are several additional opportunities to provide input to project staff, the PSC and UFC, and City Council.

- **Provide live Testimony at a PSC and UFC joint hearing** on the final staff proposal currently scheduled for September 8, 2020. A link to sign up to testify at the hearing is posted online at [www.portland.gov/80501](http://www.portland.gov/80501).
- **Submit written comments on the PSC and UFC recommendations** to City Council prior to the City Council hearing. A link to submit written comments is posted online at [www.portland.gov/bds/80501](http://www.portland.gov/bds/80501).
- **Provide live testimony at the City Council hearing** currently scheduled for October 29, 2020.

## III. About Title 11, Trees

### A. Title 11, Trees and Chapter 11.50, Trees in Development Situations

#### 1. Framework of Title 11, Trees

The City's Tree Code is broadly divided between non-development and development activities, and additionally between trees on private property, trees on City property, and street trees.

Title 11 places the responsibility for implementing to Title 11 to either PP&R Urban Forestry or BDS based on the type of tree and situation (Table 1). Each bureau is responsible for leading amendments of the sections of code they implement. However, any amendment to Title 11 is conducted in consultation with Bureaus of Planning and Sustainability, Parks and Recreation, Development Services, Environmental Services, Transportation and Water.

*Table 1. Title 11 implementation matrix.*

Situation	City & Street Trees	Private Trees
Non-Development	PP&R Urban Forestry	PP&R Urban Forestry
Development	PP&R Urban Forestry	BDS

The scope of this project is limited to development situations and does not include regulations for street trees which are required to be planted with development projects.

#### 2. Chapter 11.50, Trees in Development Situations

Chapter 11.50 of the Tree Code is generally divided into regulations for Tree Preservation, Tree Density, and Street Trees. The scope of this project is limited to Tree Preservation and Tree Density. For each Tree Preservation and Tree Density, the code first states when the regulations apply; and then when sites or trees are exempt from the regulations. Within the regulations for Tree Preservation, there are separate requirements for trees on private property, and trees on City-owned or managed

property and street trees. Tree Density regulations are not distinguished between trees on private property and trees on City-owned or managed property.

### *Tree Preservation Requirements*

**Tree preservation requirements are triggered** when there are any trees over 12 inches dbh that are not dead, dying, dangerous, or a nuisance species, and where there is ground disturbance into the root protection zone of any of those trees. However, some sites are exempt from tree preservation requirements, including those locations within some of the higher intensity Commercial, Industrial and Employment Zones (CX, IH, IG1, and EX), on sites less than 5,000 square feet in area, or on sites with 85 percent current or proposed building coverage or more. Within those parameters tree preservation requirements are triggered for all project types and sizes; not only new development projects. This could include a new commercial development, a new apartment complex, re-development of a site with a single dwelling unit, a new accessory dwelling unit (ADU), a detached garage on a lot with an existing single dwelling unit, or a small kitchen or family room addition to an existing dwelling.

**For private trees in development situations,** the basic tree preservation standard is that one-third of subject trees must be preserved or a fee paid in lieu of preservation. Prior to the large tree stop-gap amendment in 2016, all trees were treated the same in terms of both preservation priority and mitigation fees. All non-exempt trees were uniformly subject to the one-third preservation requirement, regardless of size. An applicant could choose to remove the largest sized trees over the smallest sized trees with no differentiation in fees paid-in-lieu. The mitigation requirement adopted in 2016 is more responsive to the size of the tree not designated to be preserved and protected, and provides an incentive to preserve especially large diameter trees; those 36 inches dbh or greater (Table 2). The current code provides for tiers of tree sizes and corresponding mitigation, expressed in the number of two-inch diameter replacement trees required. For especially large diameter trees (36 inches dbh or greater), the mitigation fee is based on the cost per inch (based on dbh) of the tree removed, as stated in the annually adopted Urban Forestry fee schedule. The rate is currently \$450.00 per inch.

*Table 2. Current fee structure for fee in lieu of preservation.*

Size of Tree Removed (inches in diameter)	Required Mitigation per tree removed	Associated Cost per tree removed
At least 12 and less than 20	The cost of (2) two-inch diameter replacement trees	\$1,800
At least 20 and less than 36	The cost of (4) two-inch diameter replacement trees	\$3,600
At least 36 or more	The cost per inch of tree removed	\$16,200 and up

There is an additional incentive for preserving trees 36 inches dbh or greater in that these trees can be used to meet the basic one-third preservation standard. Therefore, if a permit applicant is choosing what trees to preserve on their site, they are incentivized to choose the larger diameter tree over the smaller diameter tree.

**For city trees, those on City-owned or managed property,** the tree preservation requirements are different and require consultation with Urban Forestry. City-owned or managed properties are subject to the same exemptions as private properties; though if trees are removed, the replacement of those trees is regulated by an administrative rule PRK 2.04, Replanting Requirements for Tree Removal.

(1) Approved Street Tree removal in conjunction with improvements to partially or fully unimproved streets. Each tree at least 12 inches in diameter that is allowed to be removed shall be replaced with at least one tree. Trees planted to meet Street Tree Planting Standards will be credited toward meeting this requirement.

(2) Any other Street or City Tree allowed to be removed that is 6 or more inches in diameter shall be replaced with at least one tree in addition to trees required to meet required tree density or Street Tree Planting Standards.

### *Tree Density Requirements*

**Tree density requirements for private trees and trees on City-owned or managed sites** ensure that a baseline amount of tree canopy is either planted or retained on the site or development impact area. The number of required trees is determined by the type of development and the site area. Sites that are zoned IH, IG1, EX, and CX projects reviewed under Demolition, Site Development, Septic, Plumbing or Zoning permits, and sites subject to Airport Landscape standards are exempt from meeting tree density standards. Unless exempt, all new development projects and exterior alterations with valuations greater than the Portland Zoning Code Non-conforming Upgrade threshold of Chapter 33.258 are required to meet tree density standards.

Applicants may preserve, plant, pay a fee-in-lieu, or a combination thereof to meet these standards. Trees planted to meet other landscaping standards, such as those required by Title 33, Planning and Zoning, may be used to meet the tree density requirements. As such, trees in parking areas or other landscaped areas may be used to meet the requirement.

The number and canopy size of trees required to be planted or preserved is a function of the site or development impact area, and whether one is choosing to plant or preserve small, medium, or large canopy sized trees (defined by tree species). This percentage represents the required “tree area,” with different percentages required of different development types, as shown in Title 11 Subsection 11.50.050.D. The actual “planting area” required is much less than the required “tree area.”

A simple example for a **100,000 square foot industrial site using medium canopy trees** follows:

- The required tree area is 10% of the site area, or 10,000 square feet.
- 1 medium tree is required per 500 square feet of the 10,000 square feet of required tree area
- $10,000 \text{ square feet} / 500 \text{ square feet} = 20$  medium canopy trees
- Each of the 20 medium trees requires a minimum planting area of 75 square feet
- $20 \text{ trees} \times 75 \text{ square feet} = \mathbf{1,500 \text{ square feet planting area}}$

There are several exemptions to tree preservation and tree density requirements. This project only affects the exemptions in CX, EX, IG1 and IH zones; other exemptions still apply and have not been examined in this project. Tree Planting and Preservation Fund

Fees in lieu of preservation or planting used to meet the tree preservation requirements or tree density requirements go to the Tree Planting and Preservation Fund. The Tree Planting and Preservation Fund is used to support the [Citywide Tree Planting Strategy: Growing a More Equitable Forest \(PP&R 2018a\)](#). The strategy was completed and accepted by City Council in 2018 following nearly two years of planning, [data analysis](#), and outreach. The strategy identifies high-priority neighborhoods where tree planting is needed most, rather than watershed or zone. PP&R Urban Forestry also produces a [planting performance report](#) which is publicly available. As required by Title 11, PP&R Urban Forestry submits an annual report to City Council on the revenue, expenses, and use of the fund.

## IV. Analysis

### A. Introduction

There are two primary components of this analysis; an overview of the importance of urban trees in providing public health and environmental services and how the inequitable distribution of urban canopy disproportionately affects communities of color and low income communities; and, an economic analysis to determine how the potential tree code changes might affect cost of development of private property, job growth and middle wage economic opportunities. A tree canopy analysis provided data inputs into the economic analysis.

### B. Services and Benefits of Urban Trees

City of Portland Ordinance 184522, which established Title 11, recognizes “trees as a fundamental component of the City's green infrastructure and a basic site development requirement similar to stormwater management and erosion control.”

With approximately 5-6 million trees on private property (UFIA, unpublished), 1-2 million trees in parks (UFIA, unpublished) and approximately 218, 000 street trees (PP&R 2017b), the estimated replacement value\* (<https://www.itreetools.org/about>), of our urban forest is \$5 billion (Ordinance 184522). Our urban forest is not only valuable, monetarily, but in providing important environmental and public health services. Indeed, ensuring that all communities benefit from the services provided by trees is one of the main goals of the Urban Forest Management Plan (PP&R 2004).

*\*Replacement value is an estimate of the full cost of replacing a tree at its current size and condition, should it be removed for some reason. Replacement value is calculated using the tree's current size, along with information on regional species ratings, trunk diameter, and replacement costs.*

## 1. Tree Canopy Goals and Existing Tree Canopy

The adopted Portland Plan 2012 set a citywide canopy target of 33.3 percent, and a 15 percent canopy cover in commercial and industrial zones (PP&R Urban Forest Management Plan 2004).

As of 2015, Portland's urban canopy covered 30.7 percent of the City. However, the distribution of tree canopy is not equitable. West of the Willamette River, canopy coverage is 56 percent (44 percent, excluding Forest Park), while just 21 percent on the east side, where 80 percent of Portlanders reside. For comparison, the Los Angeles has overall canopy coverage of 25 percent.

Additionally, Portland's Tree Canopy Varies by land use type:

- Industrial: 9.7 percent canopy coverage
- Commercial: 13.3 percent canopy coverage
- Open Space: 54.4 percent canopy coverage
- Residential: 34 percent canopy coverage

## 2. Tree Services

As essential infrastructure, urban trees provide a multitude of well researched and established environmental and public health services:

- mitigating the effects of climate change by absorbing greenhouse gases, improving air quality, reducing urban heat island effect, and sequestering carbon (Nowak et al 2002);
- reducing heat related illnesses (Nowak 2014; Voelkel et al 2018);
- reducing rates of asthma and other respiratory illnesses (Lovasi et al. 2008);
- improving cardiovascular health and reducing blood pressure (Sullivan 2014);
- improving mental health (Kuo and Taylor 2004; Maas et al 2009);
- improving people's coping mechanisms to stress (Thompson et al 2012);
- reducing hospital stays for patients (Ulrich 1984);
- improving healthy birth outcomes for pregnant women (Dzhambov, Dimitrova and Dimitrakov 2014);
- calming traffic for safer streets (Mok et al 2006);

- reducing crime (Donovan and Prestemon 2016);
- improving academic performance of students (Tennessen and Cimprich 1995);
- reducing stormwater runoff and sewage overflow (Kuehler et al 2017);
- increasing commercial business profits (Wolf 2005);
- reducing building heating and cooling costs (Nowak et al 2017);
- shading streets and decreasing maintenance costs for asphalt (Mcpheerson 2005);
- and providing wildlife habitat for birds and pollinators.

### 3. Inequities in Tree Canopy

As previously described, tree canopy and the important public health and environmental services provided by trees are not equitably distributed in Portland (Figure 1). In a recent Portland State University study, households with the top 20% highest incomes, had an average of 20% more canopy than those in the lowest 20% of incomes (Voelkel 2017). PP&R’s Growing a More Equitable Urban Forest: Portland’s Citywide Tree Planting Strategy (PP&R 2018a) also found a high correlation between low canopy neighborhoods and communities of color and immigrant or refugee communities.

Exacerbating the effects of low canopy, communities of color and immigrant and refugee communities are often located adjacent to transportation corridors and industrial or commercial properties (Figures 2 and 3). Less tree canopy coupled with lower elevations, greater proportions of impermeable surfaces, and greater vehicular traffic, result in urban heat islands (Figure 4) and disproportionate heat exposure for people living and working in these areas (Voelkel et al 2018). This results in numerous adverse effects, including: increased rates of respiratory illness, increased susceptibility to heat related injuries, and decreased physical and mental health outcomes (Sullivan 2014).

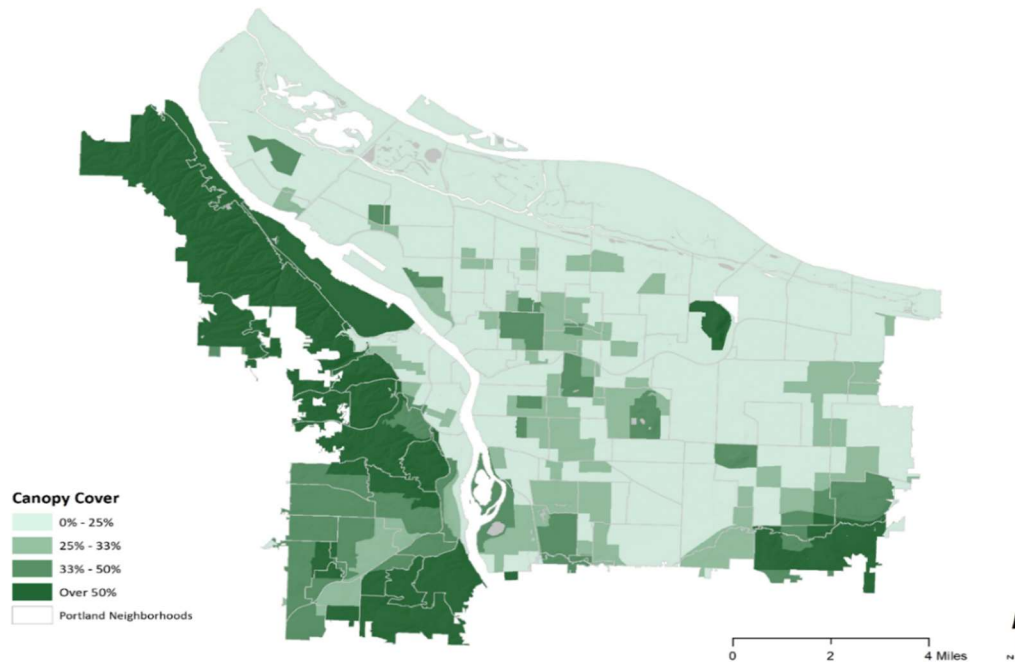
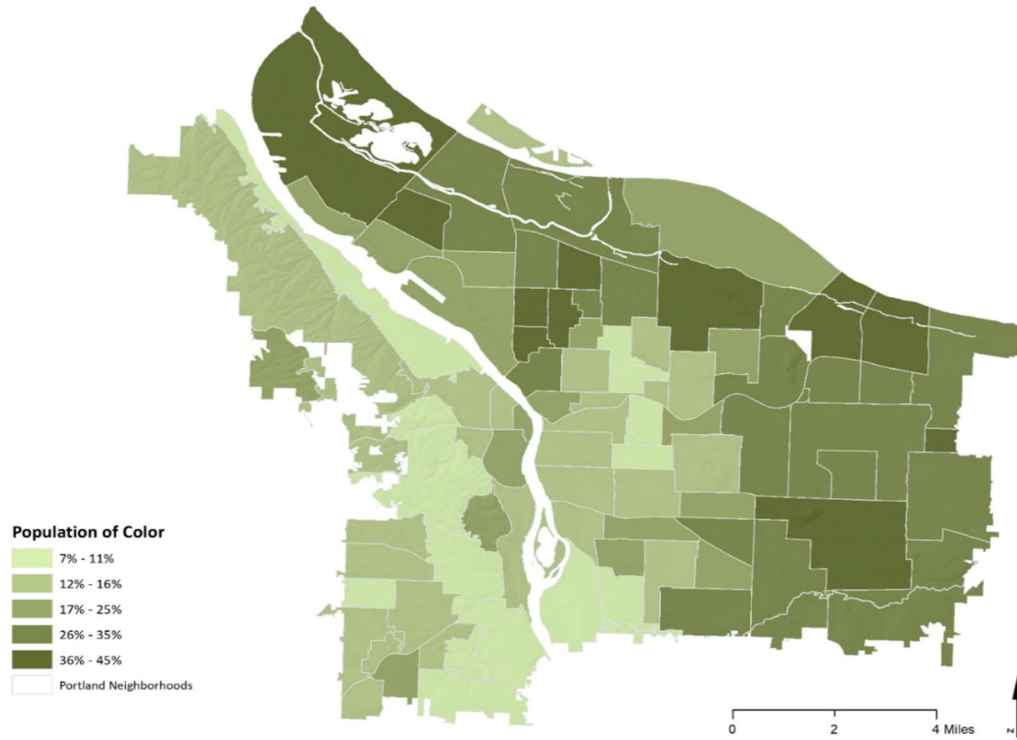
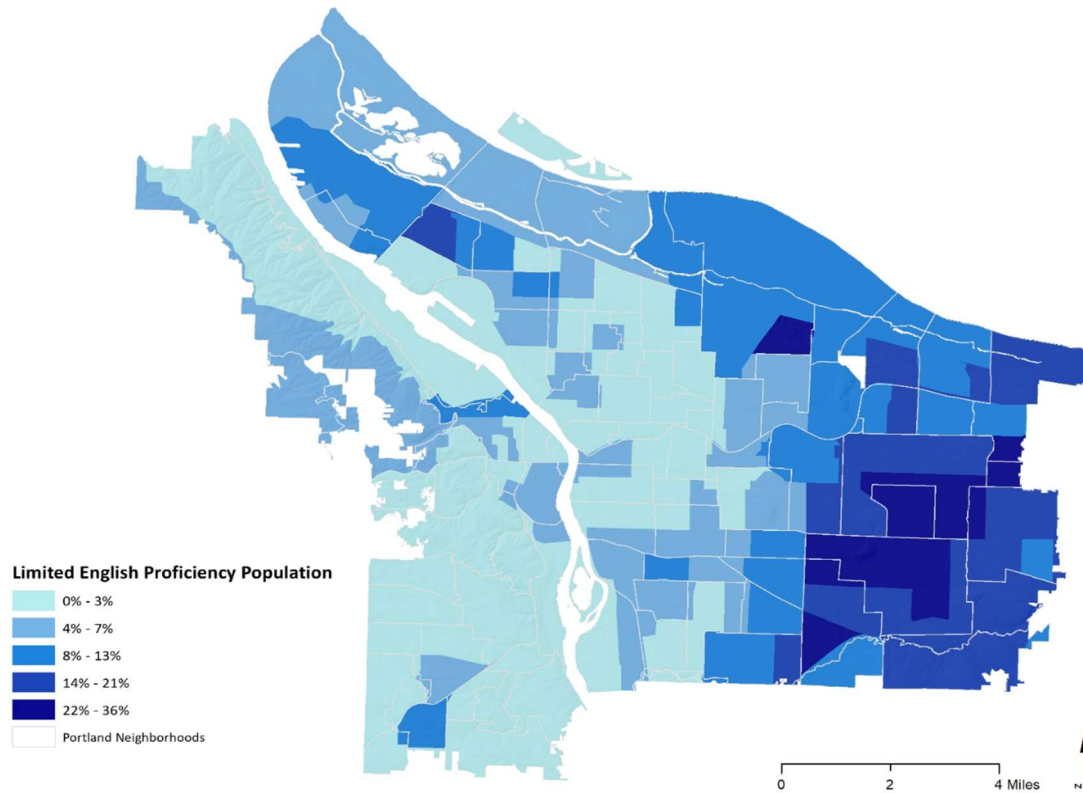


Figure 1. Tree canopy in Portland (Metro 2016)



*Figure 2. Populations of color in Portland (Office of Community and Civic Life 2010). Note that census tract data is represented on the neighborhood level. Portland’s industrial zones do not allow housing; however, housing may be adjacent to industrial zones.*



*Figure 3. Limited English Proficiency (LEP) population in Portland (BPS 2016). Individuals with limited English proficiency are described as those whose primary language is not English and have a limited ability to read, write, speak, or understand the English language. This serves as a proxy for immigrant and refugee communities. Note that census tract data is represented on the neighborhood level. Portland’s industrial zones do not allow housing; however, housing may be adjacent to industrial zones.*



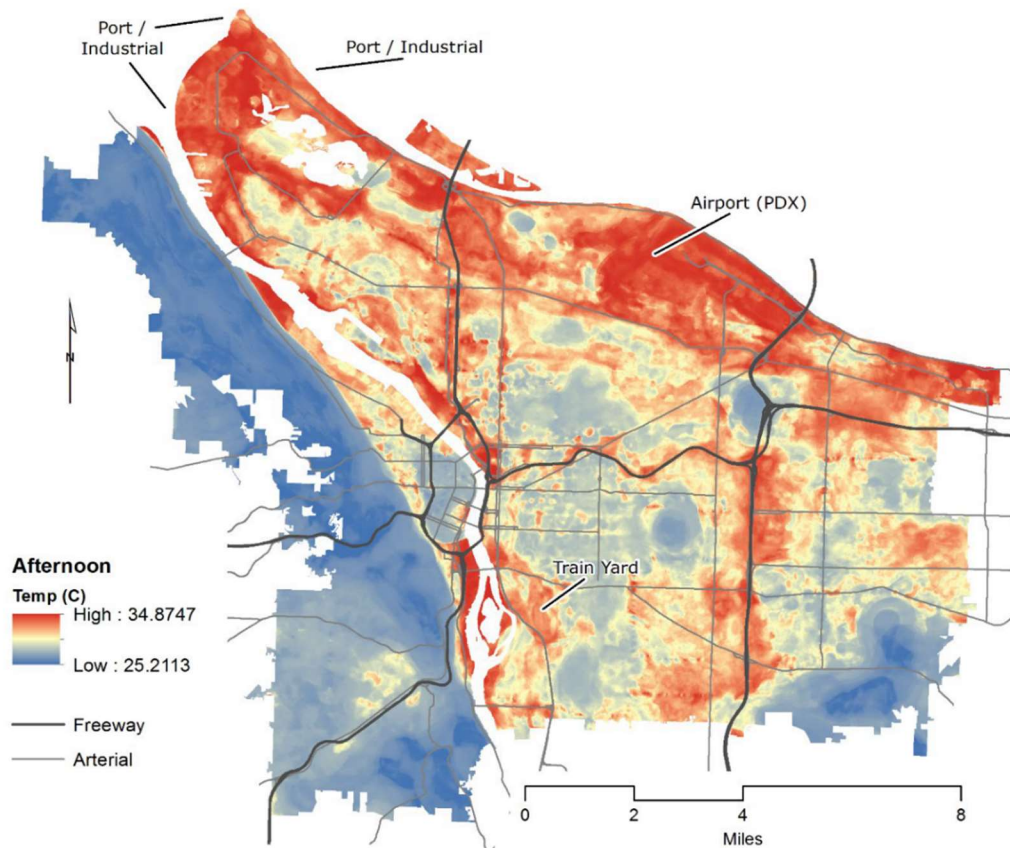


Figure 4. Afternoon temperatures in Portland, measured in August 2014 (Voelkel et al 2018)

Recognizing these disparities, PP&R and the City of Portland are committed to reducing these inequities through several actionable items. The Urban Forest Management Plan (PP&R 2004) sets a goal to “provide equitable urban forest benefits for all residents of the city” and the PP&R Five-Year Racial Equity Plan (2017a) identifies “improving urban forest services to low-income, low canopy neighborhoods” as an action item and performance measure. Recognizing that the effects of climate change disproportionately impact low-income communities and communities of color, the city of Portland and Multnomah County jointly adopted a Climate Action Plan in 2015 (BPS 2015), which identifies increasing green infrastructure, inclusive of tree planting and preservation, as a primary tool for mitigating against and preparing for climate change.

Underscoring the importance of the urban forest, canopy cover is cited as an important environmental indicator in Portland’s Urban Forest Management Plan (PP&R 2004), the Urban Forest Action Plan (PP&R 2007), the Climate Action

Plan (BPS 2015), the Portland Plan (BPS 2012), and the 2035 Comprehensive Plan (BPS 2016).

As future planning occurs in the context of Covid-19 and the anticipated economic recession, it is imperative that we prioritize long term investments towards protecting vulnerable communities from the disproportionate effects of climate change, while balancing investments in economic growth.

#### 4. Value of Proposed Amendments

Large, mature trees provide a functional level of service that will take decades to replace if these trees are removed and replaced with smaller trees. With current exemptions to tree preservation, further canopy loss in industrial and commercial zones would have serious and long-lasting public health and environmental consequences. By requiring tree preservation and tree planting in these zones, we maintain the services provided by existing trees and develop opportunities for canopy growth as these lands are developed.

Assigning a functional value to a tree's services is dependent on the tree species, tree size and site conditions and provides only a partial estimate of a tree's value. Estimates may be generated for carbon sequestration (removal of carbon dioxide from the atmosphere), carbon storage (carbon bound in belowground and aboveground biomass), stormwater mitigation (gallons of water diverted from stormwater facilities), energy savings (savings in heating and cooling buildings), reduced emissions as a result of reduced energy usage, air quality improvements (absorption of pollutants and release of oxygen), shading of other infrastructure, and lowering urban air temperatures. Human physical, mental and community health services are more difficult to quantify, as are the combined value of future environmental and public health functions.

Calculating the structural value (Nowak et al. 2008) of a tree provides an estimate of replacement cost, while using site location as a proxy for accounting an aspect of function. Four tree/site characteristics are considered: trunk area (cross-sectional area at dbh), species, condition, and location to estimate the cost of removing and replacing the tree and the services provided. The rating for industrial/commercial locations is slightly higher than that of residential, partially because there are fewer trees (so each individual tree is that much more valuable). and also because the topography is different as compared to residential (i.e., impermeable vs. permeable surfaces).

Table 3 illustrates the annual structural value of a mature broadleaf deciduous tree in three different size categories, comparing the difference in value of infrastructure provided when these trees are located in residential and industrial zones. The value of larger trees and their importance in industrial zoning is demonstrated by noting that in **residential zones, a 40" dbh tree is estimated to have over twice the structural value\* of a 24" dbh tree; whereas in industrial zones, a 40" dbh tree has almost three times the structural value of a 24" dbh tree.**

Table 3. Comparison of structural value of trees in different zoning categories and size classes.

Zoning	dbh	Annual Structural Value (\$)	One-time Fee in Lieu of Preservation with Amendment Reducing Size Threshold(\$)
Residential	24.0	9,368.77	10,800
Residential	32.0	16,155.95	14,400
Residential	40.0	23,475.11	18,000
Industrial	24.0	11,710.96	10,800
Industrial	32.0	20,194.94	14,400
Industrial	40.0	29,343.89	18,000

In instances where tree preservation is not possible, the fee in lieu collected would contribute to the tree planting and preservation fund which prioritizes tree planting and preservation where needed most- in low income and low canopy areas of the city.

However, it is important to note even while reducing the size threshold for increased mitigation, for all size/zone categories except 24 inch dbh/residential, the one-time fee in lieu of preservation would still be less than the annual structural value of the tree. Reducing the size threshold for inch per inch mitigation from 36 inches dbh to 20 inches dbh brings the cost of mitigation **closer** to the structural value of the tree but does not match the monetary investment retained with large tree preservation.

Analysis of permit data (Sub-section IV.C) demonstrates that current requirements for preservation of trees 36 inches dbh and greater are working. A greater proportion of these trees are preserved than in other size classes. If the goal is to further increase tree preservation, reducing the size threshold would increase the number of trees preserved, with the added benefit of ensuring that those species of trees that have the capacity to grow to be 36 inches in diameter, have the opportunity to do so. Reducing the size threshold, saves space for larger trees and the important environmental and public health services that they provide.

With current requirements at 36 inches dbh, we are losing a substantial number of trees in lower size classes. By lowering the threshold, we assign a more accurate value for the loss of these trees, while allowing a 20-inch tree to grow into a 36-inch tree (if appropriate for the species), and investing in our future.

### C. Existing Tree Canopy Analysis

To evaluate the potential effects of the proposed tree code amendments, the first step was to characterize the tree canopy on tax lots where the amendments would apply. The proposed changes fall into two categories: (1) the removal of exemptions for properties in four industrial, employment and commercial zones (IH, IG1, ECX and CX) from tree

preservation (Title 11.50.040) and on-site tree density standards (Title 11.50.050); and (2) the reduction of the size of trees triggering an inch-for-inch mitigation fee from 36 inches to 20 inches dbh. This reduction in tree size would affect properties in all zoning designations throughout the city.

As a result of the variation in the properties affected, their locations and the implications on developable land (specifically, industrial land) of the different proposals, the methodology used to characterize tree canopy on properties subject to the proposed amendments varied based on the proposal and zoning type. Additionally, the methodology took into account the challenges associated with accurately characterizing tree composition, defined as size class (dbh), using geographic information systems (GIS) technology. Characterization of tree species composition was not possible with this technology.

The methodologies used and results of the tree canopy analyses completed are described below.

### **1. Tree Canopy Analysis in Industrial Zones (IH, IG1, IG2 and EG2)**

The first step in the tree canopy analysis focused on developing an estimate of tree composition within industrial zones: General Industrial 2 (IG2), Heavy Industrial (IH), General Industrial 1 (IG1), and General Employment 2 (EG2). Figure 5 shows the location of these zones.

Given the recognition that estimates of currently-available industrial land were close to the minimum needed to meet the City's estimated Statewide Planning Goal 9 needs and the limited tree data included in past permits for these land uses, GIS modeling was used to estimate the composition of tree canopy in these zones. The focused scope of this analysis allowed for an adequate number of site visits to be completed to calibrate the GIS model for increased accuracy.

A summary of the industrial lands methodology and results is provided below. The full report, including the complete methodology and results, of this analysis can be found in Appendix F.

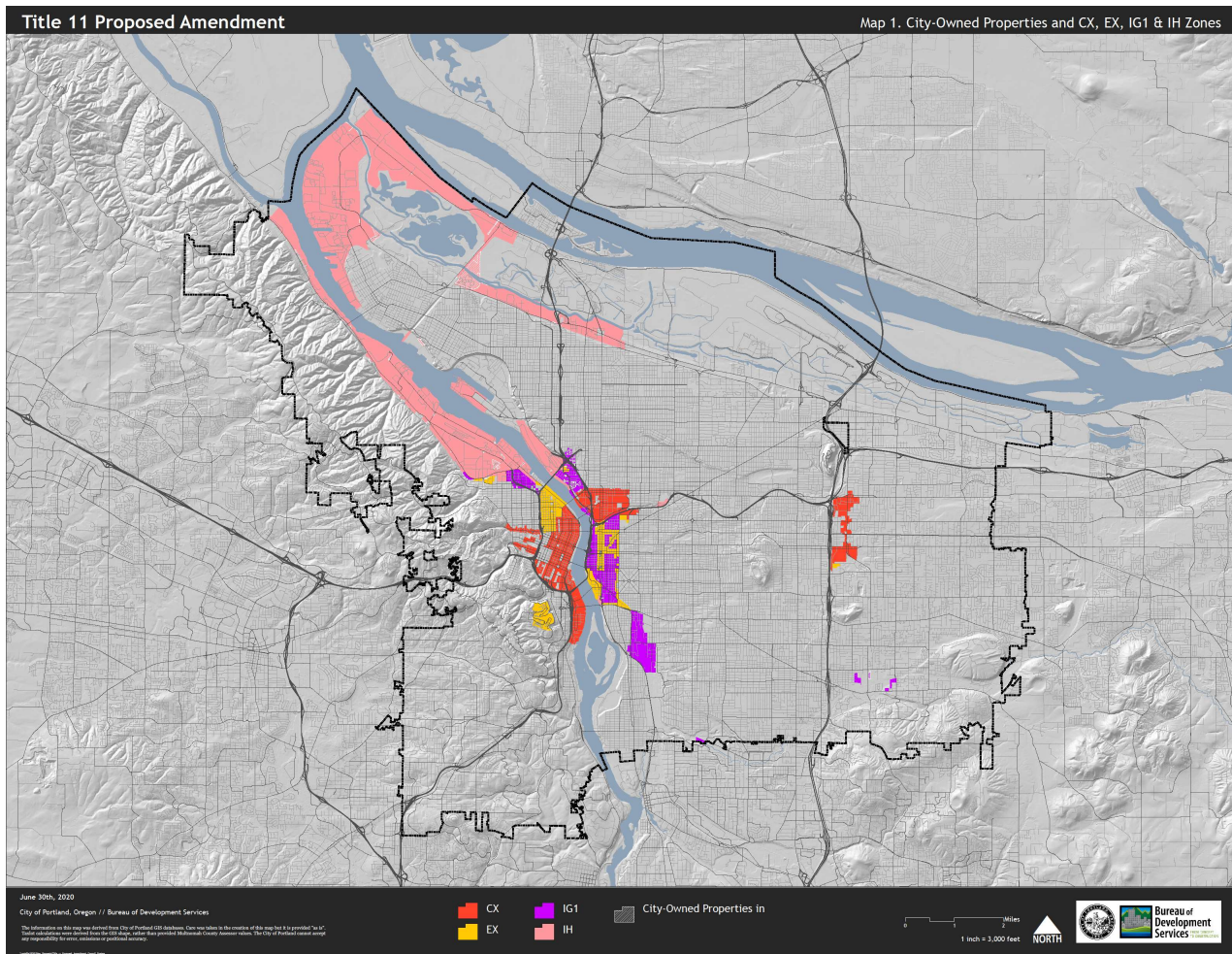


Figure 5. Proposed amendments address tree preservation and tree planting exemptions in four land use zones: commercial (CX; red), employment (EX; yellow), general industrial (IG1; purple), and heavy industrial (IH, pink).

## 2. Methodology Summary for Tree Canopy Analysis in Industrial Zones

The goal of this analysis was to develop an estimate of tree canopy characteristics for land in industrial zones by analyzing GIS data using object-based image analysis (OBIA) techniques and regression analysis to develop equations for estimating, to the extent possible, dbh from individual tree crowns. The dbh estimates were then grouped into four categories: less than 20 inches; 20 to 27.9 inches; 28 to 35.9 inches; and 36 inches or greater.

Two publicly-available datasets served as baseline data for the analysis: 1) a 3-foot resolution canopy height surface model (CHM) using 2014 LiDAR and normalized difference vegetation index (NDVI) data derived from four-band imagery and 2) a 3-foot resolution, classification model, delineating the CHM into coniferous and broadleaf (or, deciduous) trees. Both datasets were obtained from the Regional Land Information System (RLIS) developed by Metro.

To derive tree sizes from estimated crown widths, City of Portland Park Tree Inventory data were used in a regression analysis to develop equations of best fit by general structure, one set for coniferous trees and another for broadleaf trees. These equations were applied to individual tree crowns and the predicted dbh values were plotted versus the measured dbh values in an independent dataset – the City of Portland Street Tree Inventory (PP&R 2017b). The Park Tree Inventory data provides data on tree species, mapped location, dbh, tree height, canopy dimensions and tree condition rating. Data in the Street Tree Inventory is similar but without canopy dimensions or tree height.

Based on the number of modeled individual tree crowns within the study area, site visits were conducted on six public and two Port of Portland properties, wherein all trees within a 150-foot-diameter plot were catalogued and geolocated. For each tree greater than 12 inches dbh, the height, crown width, dbh, species, and general condition (living, dead, or stressed) were assessed and recorded. These tree measurements were used to further evaluate the performance of the modelled results by capturing locations with growing conditions different from the sort encountered in the park and street tree inventories, i.e., dense copses or stands and/or trees in natural or semi-natural conditions (in contrast to the groomed and regulated planting conditions of the trees within the tree inventories).

The second phase of the analysis involved using the modelled object-based image analysis outputs to estimate the dbh value for each individual tree crown. To generate the equations needed to derive these estimates, the preponderance of forestry research has determined that the strongest allometric relationship for dbh is with a tree's crown width, most specifically when the species is known. However, classifying trees by species was not possible, given the scope and lack of available high-resolution hyperspectral or multispectral imagery for this project. Therefore, it was necessary to develop other means of estimating dbh from available data. City of Portland Park Tree Inventory data were separated and grouped into coniferous and broadleaf data subsets. Regression analyses were applied to these subsets to generate equations of best fit (a linear function and a power function).

The last phase of the analysis assessed the performance of the model's predicted number of individual tree crowns and dbh values. Each model result was compared with independent datasets not used in the development of the model, the Portland Street Tree Inventory data, and tree measurement data collected during site visits. These point-based data layers were then intersected with the tree segments to evaluate the accuracy of the count of actual versus modelled trees. The measured dbh values were plotted versus predicted dbh values in a regression analysis to assess the amount of variance in the model.

A linear trendline and a power trendline were applied in an effort to achieve the highest correlation ( $R^2$ ) possible. Both of these regressions apply a line fitted to the plot of data to minimize the amount of variance at any point between crown width (x-axis) and dbh (y-axis). The difference between the two equations is that the linear trendline uses a

linear equation to produce a simple straight line of best fit while the power trendline uses an exponential function that produces a slightly curved line of best fit.

The results of this analysis are provided in the Results section below.

### **3. Model Limitations and Assessment of Error for Tree Canopy Analysis for Industrial Zones**

There are a variety of potential sources of error and discrepancy inherent to remotely sensed data. These limitations include, but are not limited to, seasonal and/or yearly variability for acquisition times of the various data products, resolution limitations in the CHM, possible classification errors in the coniferous-deciduous data layer, temporal variability of park and street tree inventory data and the limitations of image segmentation, which creates hard breaks between objects—in this case, trees—which may not accurately model the landscape, particularly in areas with dense stands of trees with heavily overlapped tree crowns. These potential sources of error (and others) were evaluated and minimized, to the extent possible, throughout the analysis.

One area where it was identified that the model did not perform well was in dense stands of tightly-clustered trees. Comparison of the results of fieldwork with the model output revealed that the segmentation protocol did a poorer job of delineating individual tree crowns for stands dominated by black cottonwood due to their unique structure – i.e., densely packed stands with intermingled crowns and generally very tall crown heights compared to relatively narrow, asymmetrical crown widths. In these cases, the model underestimated the number of individual trees within the stand. Because of this recognized issue with the model, a separate analysis was completed with the nine tax lots characterized by dense stands of black cottonwood removed. These tax lots comprised 224.9 acres, or 1.8 percent of the total area (12,182.8 acres) analyzed.

A more detailed of model limitations and potential sources of error can be found in the full report in Appendix F.

### **4. Results of Tree Canopy Analysis for Industrial Zones**

The results of the industrial lands analysis (including both the linear and power trendlines) are provided in Tables 4 and 5. These data, which were used in the economic analysis, present the tree canopy estimates with the nine poor performing tax lots discussed above removed. Similar tables showing the results when all of the tax lots were assessed (including the nine poor performing tax lots) can be found in the full report (see Appendix F).

Table 4. Diameter at breast height categories by power function\*

Tax Lots by Zone <sup>1</sup>	<20"		≥20" to <28"		≥28" to <36"		≥36"		Total Trees	Tree Canopy Acres	Avg Trees/Canopy-Acre
	# of Trees (% of total)	Trees/canopy-acre	# of Trees (% of total)	Trees/canopy-acre	# of Trees (% of total)	Trees/canopy acre	# of Trees (% of total)	Trees/canopy acre			
EG2	9,491 (90.2%)	70.15	663 (6.3%)	4.90	244 (2.3%)	1.80	122 (1.2%)	0.90	10,520	135.3	77.8
IG1	2,029 (90.9%)	72.46	115 (5.2%)	4.11	42 (1.9%)	1.50	46 (2.1%)	1.64	2,232	28.0	79.7
IG2	25,078 (89.7)	67.04	1,890 (6.8%)	5.05	628 (2.2%)	1.68	359 (1.3%)	0.96	27,955	374.1	74.7
IH	13,814 (89.0%)	61.45	1,060 (6.8%)	4.72	365 (2.4%)	1.62	274 (1.8%)	1.22	15,513	224.8	69.0
All Tax Lots	50,412 (89.6%)	66.14	3,728 (6.6%)	4.89	1,279 (2.3%)	1.68	801 (1.4%)	1.05	56,220	762.2	73.8

**Needleleaf:**  $DBH = 0.3286 * CD^{1.2225}$ , **Broadleaf:**  $DBH=0.1802 * CD^{1.2397}$

**Model Accuracy Statistics:** measured DBH – Predicted DBH, where total industrial and EG2 model outputs intersect park and street tree inventory data); **Residuals:** mean 1.9 inches, median 1.6 inches, std deviation 8.2 inches, SE=0.1113 inches; **Model Correlation:**  $R^2 = 0.4022$

<sup>1</sup> Omitted lots: 7 IH lots: Property IDs: R239681, R256362, R325506, R323385, R256223, R323445, and R256242 (207.7 acres); 2 IG2 lots: Property IDs: R171715, and R237851 (17.2 acres).

Table 5. Diameter at breast height categories by linear function\*

Tax Lots by Zone <sup>1</sup>	<20"		≥20" to <28"		≥28" to <36"		≥36"		Total Trees	Tree Canopy Acres	Avg Trees/Canopy-Acre
	# of Trees (% of total)	Trees/canopy-acre	# of Trees (% of total)	Trees/canopy-acre	# of Trees (% of total)	Trees/canopy acre	# of Trees (% of total)	Trees/canopy acre			
EG2	9,184 (87.3%)	67.9	938 (8.9%)	6.9	295 (2.8%)	2.2	103 (1.2%)	0.8	10,520	135.3	77.8
IG1	1,971 (88.3%)	70.4	169 (7.6%)	6.0	49 (2.2%)	1.8	43 (1.9%)	1.5	2,232	28.0	79.7
IG2	24,262 (89.8%)	64.9	2,640 (9.4%)	7.1	762 (2.7%)	2.0	291 (1.0%)	0.8	27,955	374.1	74.7
IH	13,359 (86.1%)	59.4	1,469 (9.5%)	6.5	457 (2.9%)	2.0	228 (1.5%)	1.0	15,513	224.8	69.0
All Tax Lots	48,776 (86.7%)	64.0	5,216 (9.3%)	6.8	1,563 (2.8%)	2.0	665 (1.2%)	0.9	56,220	762.2	73.8

<sup>1</sup> Omitted lots: 7 IH lots: Property IDs: R239681, R256362, R325506, R323385, R256223, R323445, and R256242 (207.7 acres); 2 IG2 lots: Property IDs: R171715, and R237851 (17.2 acres).

**\*Needleleaf:**  $DBH = 0.7595 * CD$ , **Broadleaf:**  $DBH=0.4816 * CD$

**Model Accuracy Statistics:** measured DBH – Predicted DBH, where total industrial and EG2 model outputs intersect park and street tree inventory data); **Residuals:** mean 0.2 inches, median 0.4 inches, std deviation 7.9 inches, standard error 0.1073 inches; **Model Correlation:**  $R^2 = 0.4036$



The linear trendline was determined to be the more accurate of the two analysis and was characterized by lower mean and median error estimates, standard deviation and standard error. Therefore, the tree estimates provided by the linear trendline (Table 5) were used in the subsequent economic analysis.

#### 5. Tree Canopy Analysis in All Other Zones

The use of GIS analysis to determine estimates of tree composition in all other zones in the city was not feasible, given the time that would be needed to complete enough site visits to achieve the necessary model accuracy. Therefore, staff utilized a different approach to characterize the tree composition in commercial and employment, multi-dwelling residential and single-dwelling residential zones. In contrast to industrial zones (especially those currently exempted from the tree preservation and tree density requirement), property owners in these zones are generally required to submit a tree plan as a part of any development proposal. In these tree plans, all trees on site must be shown and any trees to be removed must be identified. Staff used these tree plans to estimate the average number of trees per tax lot acre that could be expected.

A summary of the methodology used is provided below.

#### 6. Methodology Summary for Tree Canopy Analysis in All Other Zones

As stated above, because non-industrial sites are frequently already required to provide tree plans showing all trees on site, the City's permit database provides an excellent record of the number and type of trees on sites in the various zoning designations. As a first step, the Bureau of Development Services compiled permit information for private tax lots of 5,000 square feet or more (tax lots less than 5,000 square feet are exempt from Title 11.50.040) from the last two years (2018-2019) in each of the following land use categories: commercial and employment, multi-dwelling residential and single-dwelling residential zones. Table 6 lists the zoning designations grouped in each of the three land use categories and provides the total number of permits compiled for each category. The group of permits in each land use category were split into residential "market areas" to coincide with the boundaries used by the Bureau of Planning and Sustainability to assess housing affordability throughout the city (Table 6). Grouping permits into these market areas allowed the economic consultant to more specifically assess impacts in each of the areas, rather than simply at the citywide level.

Table 6. Summary of staff permit review components.

Land Use Category	Zoning Designations	Market Area	Total Permits	Tree Plans Reviewed
<b>Multi-dwelling Residential</b> <sup>1</sup>	Commercial/Mixed Use 1 (CM1)	Inner	204	100
	Commercial/Mixed Use 2 (CM2)			
	Commercial/Mixed Use 3 (CM3)			
	Commercial Employment (CE)	Middle	273	99
	Commercial Residential (CR)			
	Residential 1,000 (R1)	Outer	149	48
	Residential 2,000 (R2)			
	Residential 3,000 (R3)			
	High-Density Residential (RH)			
Central Residential (RX)				
<b>Single-dwelling Residential</b>	Residential Farm/Forest (RF)	Inner	533	200
	Residential 20,000 (R20)	Middle	1,008	206
	Residential 10,000 (R10)	Outer	544	199
	Residential 7,000 (R7)			
	Residential 5,000 (R5)			
<b>Commercial and Employment (Central City)</b>	Central Commercial (CX)	Inner	61	41
	Central Employment (EX)			

<sup>1</sup> Note: Identified zones are those in effect prior to the changes implemented by the Better Housing by Design (adopted Jan 2020)

In the market areas within each of the land use categories a sample of permits were reviewed by staff. The size of these samples varied depending on the total number of permits submitted over the previous two years and availability of a tree plan. To ensure a random sample was reviewed, each permit in the individual market areas was assigned a random number that was then sorted from smallest to largest. In reviewing the permits, staff started with the permit assigned the lowest number and then continued through each subsequent permit until at least an established minimum of permits had been reviewed (or there were no more permits). During staff review, permits were removed if no tree plan was provided or if they were permits associated with a previously reviewed permit (e.g., updates to previous plans, permits for different trades, etc.). Table 6 includes the number permits reviewed in each market area for the three land use categories.

During tree plan review, a variety of key information was recorded. The actual size of all trees was entered into a spreadsheet. For trees 20 inches dbh or greater, whether the tree was preserved or removed as a part of the project was also recorded. Trees below 20 inches dbh were documented but whether an individual tree was removed or preserved was not recorded since the proposed amendments would apply only to trees 20 inches or greater in diameter. Additionally, if the site was vacant it was indicated in the spreadsheet. This allowed for the differences in tree composition between vacant and redeveloped sites to be captured. (Note: the large majority of tax lots were redevelopment sites.)

With all of the data above compiled, the average number of trees per tax lot-acre was calculated. Similar to the industrial land analysis, averages were calculated for four tree size categories: less than 20 inches; 20 to 27.9 inches; 28 to 35.9 inches; and 36 inches or greater.

**7. Permit Review Limitations for Tree Canopy Analysis in All Other Zones**

Currently exempted zones, including Heavy Industrial (IH), General Industrial 1 (IG1), Central Commercial (CX) and Central Employment (EX), are not required to provide tree plans. However, due to landscape and other requirements in the CX and EX zones, a site plan showing existing vegetation, including trees, is frequently provided. Staff reviewed CX and EX permits but determined that, in most cases, landscape plans showing existing trees were not submitted or, when they were, specific tree size information was not provided. Therefore, the data from the review of CX and EX permits was not used in the economic analysis. Instead, the general extent of tree canopy was used to estimate the potential impacts of the proposed amendments in these zones.

**8. Results of Tree Canopy Analysis in All Other Zones**

Tables 7 and 8 summarize the data obtained through permit research as described above.

*Table 7. Summary of multi-dwelling residential permit review tree size estimates.*

Market Area	Lot Acres, Total	% Vacant	<20"		≥20" - <28"		≥28" - <36"		≥36"	
			Trees	Trees/ lot-acre	Total (% Preserved)	Trees/ lot acre	Total (% Preserved)	Trees/ lot acre	Total (% Preserved)	Trees/ lot acre
Inner	27.6	8.0	92	3.3	41 (34.1%)	1.5	8 (50%)	0.3	10 (60%)	0.4
Middle	29.7	3.0	195	6.6	36 (27.7%)	1.2	12 (25%)	0.4	10 (40%)	0.3
Outer	41.7	2.1	523	12.6	130 (83.8%)	3.1	81 (88.9%)	1.9	34 (94.1%)	0.8
<b>Total</b>	<b>247.0</b>	<b>4.9</b>	<b>810</b>	<b>8.2</b>	<b>207 (64.3%)</b>	<b>2.1</b>	<b>101 (78.2%)</b>	<b>1.0</b>	<b>54 (77.8%)</b>	<b>0.5</b>

Table 8. Summary of single-dwelling residential permit review tree size estimates.

Market Area	Lot Acres, Total	% Vacant	<20"		≥20" - <28"		≥28" - <36"		≥36"	
			Trees	Trees/ lot-acre	Total (% Preserved)	Trees/ lot-acre	Total (% Preserved)	Trees/ lot-acre	Total (% Preserved)	Trees
Inner	28.5	0.5%	326	11.4	49 (71.4%)	1.7	25 (84.0%)	0.9	23 (87.0%)	0.8
Middle	43.6	3.9%	412	9.5	97 (77.3%)	2.2	66 (75.7%)	1.5	45 (91.1%)	1.0
Outer	77.8	7.0%	834	10.7	203 (88.2%)	2.6	120 (81.6%)	1.5	88 (95.5%)	1.1
<b>Total</b>	149.9		1,572	10.5	349 (82.8%)	2.3	211 (80.1%)	1.4	156 (92.9%)	1.0

## B. Economic Analysis-Costs and Development Impacts

Tree Code requirements are an example of regulations that may impact the developability of employment lands. The proposed Tree Code amendments evaluated in this report are expected to reduce the city’s available employment land capacity.

Specifically, the removal of the current exemptions of four industrial, commercial and employment zones (IH, IG1, CX and EX) from the tree preservation and tree density requirements are expected to reduce land capacity. A primary goal of this project is to evaluate the potential land capacity reduction and determine whether that reduction would result in a deficit in the adopted 20-year land capacity within established EOA geographies.

Though Title 11, Trees, is not considered a land use regulation, Title 11 requirements are considered development constraints in that they reduce the buildable land inventory and must be factored into the EOA. A number of other development constraints not considered land use regulations are included in the assessment of lands in the EOA, such as land constrained by steep slopes or other hazards, the cost of brownfield remediation, which can preclude conversion of these lands to more productive use, and the cost to extend adequate infrastructure, such as streets and sewers to facilitate a site’s development. Development constraints may be physical constraints that reduce the physical land available for development. They may also be financial constraints that may affect the market in a way that reduces the probability that the land will be developed.

## 1. Overview

With the number of trees in the different size categories determined through the Tree Canopy Analysis, an analysis of the potential impacts of the proposed Tree Code amendments on development costs and land capacity was completed. As previously stated, local jurisdictions in Oregon must demonstrate continued compliance with Statewide Planning Goal 9, Economic Development, whenever changes are proposed that may affect the availability of 20-year and short-term growth capacity to fully meet forecasted demand for industrial and other employment use types, as determined in an adopted EOA.

### ***Effects on Industrial Land Supply and Statewide Planning Goal 9, Economic Development***

The City of Portland's EOA was most recently updated as a part of the 2035 Comprehensive Plan. The EOA estimates the 20-year supply and demand for employment land in the city by geography and land use types and includes a Buildable Land Inventory (BLI) that identifies specific properties that are most likely to redevelop over the 20-year period.

To characterize the locations, sites and types of spaces needed for various employment lands, the EOA identified ten categories of employment areas (locations, sites and types of space), referred to in the report as "employment geographies". The EOA employment geographies included Central City Commercial, Central City Industrial, Harbor and Airport Districts, Harbor Access Lands, Columbia East, and Dispersed Employment areas, along with town and neighborhood centers and corridors and other commercially-focused geographies. Institutions and residential employment were also identified. Figure 6 shows the location of the ten employment geographies.

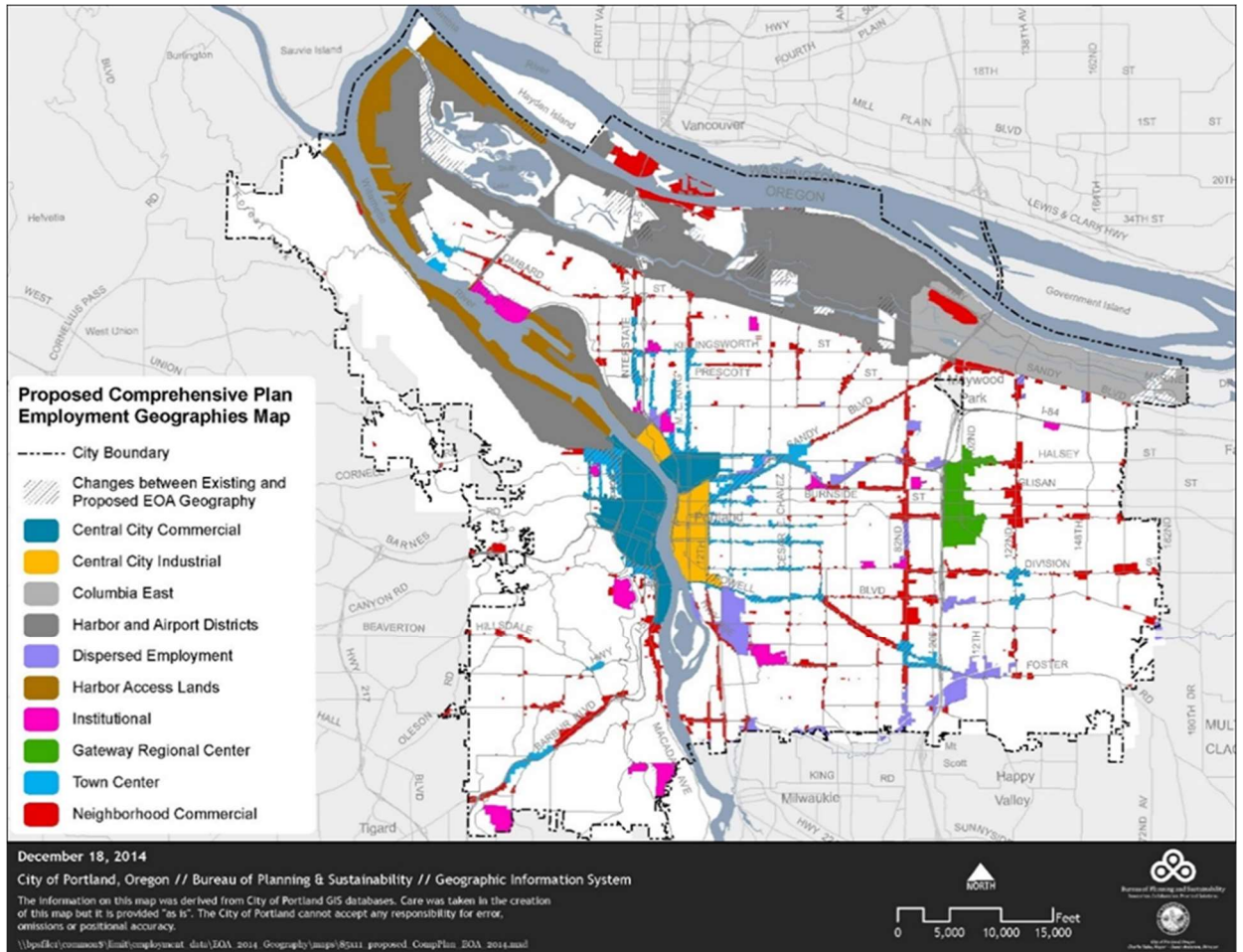


Figure 6. Comprehensive Plan employment geography boundaries

The two employment geographies where the proposed tree code changes pose significant issues for adequate growth capacity are Harbor Access Lands (HAL) and Harbor and Airport Districts (HAD). These ‘freight hub’ industrial districts are where Oregon’s largest marine port, largest airport, two Class 1 railroads, and two interstate highways converge. The 2035 Comprehensive Plan designated ample growth capacity in residential and commercial areas, typically meeting over 200% of forecast land needs, but the currently planned growth capacity in these two industrial geographies meet only 101% of forecast land needs. The Harbor Access Lands geography is particularly specialized, consisting of river-frontage sites along the deepwater shipping channel where the River Industrial overlay zone reserves land for development of river-dependent and river-related use where feasible.

The EOA estimated a 54-acre surplus of 20-year development capacity in the HAD geography (meeting 105 percent of forecast land needs to 2035) and a 25-acre shortfall in the HAL geography (meeting 87 percent of forecast land needs). The EOA explained that the HAL shortfall could be met in the nearby HAD geography and showed examples of where that has occurred. Thus, the growth capacity of these two geographies are evaluated together in the EOA, where HAL has no effective surplus capacity and HAD is

estimated to have a capacity of 29 acres. Collectively, these districts were estimated to provide development capacity to meet just 102 percent of forecast demand.

Since the adoption of the 2035 Comprehensive Plan, two manufactured dwelling parks in the HAD geography were rezoned to RMP, Residential Manufactured Dwelling Park, a zone designed to protect them as affordable housing in response to Portland's identified housing emergency. These zone changes were a part of the Manufactured Dwelling Parks Zoning project (Ordinance 189137, 8/22/2018) and Fox Run Manufactured Dwelling Park Map Changes (Ordinance 189301, 12/12/2018). These combined zone changes reduced the effective buildable land inventory (after deduction for constraints) in HAD by 18.5 acres, reducing the current surplus capacity in the combined HAD/HAL geographies to 10 acres.

### *Effects on Residential Development Costs*

Housing supply does not present the same narrow development capacity considerations that industrial supply does, according to the adopted 2016 EOA. However, to inform a policy decision, it is important to estimate the potential impacts of the proposed amendments on cost and development yield to better understand the potential impact on housing affordability in the city.

## 2. Methodology Summary

Johnson Economics was contracted to analyze the potential development impacts of the proposed Tree Code changes. This section summarizes the methodology used to analyze these potential impacts and the next section summarizes the results. Additional detail on the analysis can be found in the full Johnson Economics report in Appendix G.

To assess the anticipated magnitude and character of impacts on development outcomes associated with the proposed code changes, a predictive development model was used to forecast development outcomes with and without the proposed changes. The model is designed to predict the magnitude and form of likely development or redevelopment activity over an assumed time frame, in this case 20 years. Three proposed code changes were evaluated:

- Remove the exemption from the Tree Preservation Standards for private trees in development situations for zoning designations – IH, IG1, CX, and EX; and
- Remove the exemption from tree density standards from zoning designations IH, IG1, CX and EX
- Reduce the Tree Preservation size threshold that triggers an inch-for-inch mitigation fee for private trees in development in all zones from 36 inches diameter-at-breast height (dbh) to 20 inches dbh for all zones.

Impacts were assessed in into six geographic subareas:

- Harbor Access Lands
- Harbor & Airport
- Columbia East
- Inner Residential
- Middle Residential
- Outer Residential

The primary metric used to predict likely development patterns is the relationship between the supportable residual land value for prospective uses and the current value of the property (including land and improvements, if any). Residual land value is essentially the supportable purchase price of the property for new development. The underlying assumption is that when the value of a property for new development is high relative to the current value of the property, it will be more likely to see development or redevelopment over a defined time period.

The model is designed to generate an estimated ratio between the current value of a parcel and the underlying value of the parcel under potential development scenarios. This ratio is used as the primary indicator of the likelihood of development or redevelopment. Within the model, Real Market Value (RMV) from the assessors' office is used as a proxy for the value of the site. The residual land value is determined using a series of simplified pro formas that represent potential development forms. The resulting ratio between current and residual value has proven to be a strong predictor of the likelihood of development or redevelopment at the parcel level. The model solves for a development solution that represents the highest and best use at the parcel level under the assumptions used. The model also generates an associated residual property value.

For this analysis, the model evaluated a total of 30 prototypical development programs which cover the range of residential and employment development forms allowed under the current and proposed code in the study area. Each development prototype has a predicted employment density, or development square feet per job. Then, the allowed uses and development prototypes are narrowed to reflect what is allowed under existing and proposed zoning.

The probability of development/redevelopment activity is predicted by the model at the parcel level based on the ratio generated by dividing the current value (RMV) by the indicated residual land value. A shift in assumptions that increases the value of the property under a new development scenario, such as a higher achievable price or less restrictive entitlements, will increase the likelihood of development or redevelopment. Sites with relatively high current values resulting from significant physical improvements (e.g., buildings) are expected to be significantly less likely to redevelop.

The model evaluates the likelihood of development at the parcel level, although the results are expressed in aggregated geographies. The model estimates the probability of redevelopment, as well as anticipated development forms, and the results reflect the expected value of development/redevelopment. The model will not indicate that a specific parcel will or will not redevelop, but rather estimates the probability of development/redevelopment based on market factors.



The analysis focused on the marginal impact of the ordinance, and as a result, the analysis of tree preservation impacts only included BLI parcels identified as having existing tree canopy on site. The incremental cost of tree removal was calculated using an assumed distribution of trees by size and a mapping of impacted tree canopy. This was based on work completed by SWCA and the Portland Bureau of Planning and Sustainability. The impact of the removal of the tree density exemption was estimated all BLI parcels, regardless of whether they had existing tree canopy or not. Any new development, either on vacant or already-developed sites, would be required to meet the tree density standards. To estimate the cost and development impacts of the tree density requirement, it was assumed that the fee-in-lieu option would be utilized instead of planting. The model excluded sites that currently are within an environmental overlay, as the existing overlay requirements would continue to supersede Title 11 requirements and therefore the new ordinance would not substantively change development requirements.

Key variables were the estimated cost to mitigate the tree impacts on site development, as well as the underlying value of the property in a development scenario. As a general rule, land uses that support relatively high underlying land values can more easily accommodate an incremental increase in development cost, while the marginal impact will be larger in land uses that have a lower supportable land value (such as industrial in employment lands and residential sites in lower priced markets).

It should be noted that this analysis evaluated impacts on predicted development outcomes under a range of assumptions and did not assess canopy related environmental and public health services associated with the proposed changes. The analysis only looks at the impacts of regulatory changes on predicted development outcomes and does not represent a full cost/benefit analysis. The regulatory proposals are likely to have significant public benefit that would offset potential costs. While we recognize the existence of public benefits, this analysis does not attempt to quantify these.

### **3.Results**

The analysis indicates that the most significant impact on predicted development would be for employment lands in the Harbor & Airport and Harbor Access study areas. Much of this property is currently exempted from tree preservation standards and the incremental impact would be substantive. In addition, industrial uses support relatively low residual land values and as a result they are less able to absorb cost increases. The impact on residential yields is less significant as these uses support higher land values and the marginal change in requirements is lower than for exempted zoning classifications (Table 9).

Table 9. Summary of predicted development yields by study area on 20-year horizon.

	Predicted Development Yield				Marginal Cost on Impacted Properties		
	Construction Investment	Residential Units	Employment Acreage	Employment Capacity	Loss of Exemption	Change in Coverage	Tree Density
<b>OVERALL SUMMARY</b>							
<b>BASELINE</b>							
COLUMBIA EAST	\$123,938,026	0	31.2	981	\$0	\$0	\$0
HARBOR - AIRPORT	\$312,742,428	0	110.6	3,629	\$0	\$0	\$0
HARBOR ACCESS LANDS	\$102,402,713	0	46.9	1,500	\$0	\$0	\$0
INNER RESIDENTIAL	\$23,408,389,350	62,931	21.0	1,094	\$0	\$0	\$0
MID-RESIDENTIAL	\$7,872,409,812	4,294	2.4	123	\$0	\$0	\$0
OUTER RESIDENTIAL	\$7,967,427,127	11,772	11.2	588	\$0	\$0	\$0
<b>VARIANCE FROM BASELINE</b>							
COLUMBIA EAST	(\$784,741)	0	(0.5)	(15)	\$0	\$153,598	\$0
HARBOR - AIRPORT	(\$19,035,928)	0	(11.7)	(616)	\$535,448	\$459,901	\$199,363
HARBOR ACCESS LANDS	(\$26,929,491)	0	(15.9)	(506)	\$379,823	\$133,648	\$852,175
INNER RESIDENTIAL	(\$5,444,872)	(24)	0.00	0	\$79,381	\$508,748	\$582,272
MID-RESIDENTIAL	(\$1,888,332)	(8)	0.0	0	\$30	\$477,459	\$66
OUTER RESIDENTIAL	(\$5,013,667)	(22)	(0.0)	(0)	\$12,943	\$2,166,422	\$43,526
TOTAL	(\$59,097,031)	(54)	(28.1)	(1,137)	\$1,007,625	\$3,899,775	\$1,677,401

In the Harbor Access Lands subarea, realized employment capacity is predicted to decline by 506 jobs over a twenty-year period, reflecting a 34 percent decrease. In the Harbor and Airport Districts, realized employment capacity is predicted to decline by 616 jobs, reflecting a 17 percent decrease. In contrast, the realized employment and housing capacity on in the commercial zones and residential subareas is predicted to decline by less than 1 percent.

Goal 9 implications - The impact of the proposed Tree Code changes on Portland’s Goal 9 compliance is analyzed by comparing 1) the development impacts modeling of each code change by Johnson Economics and 2) the available surplus capacity (after meeting forecast 20-year needs) identified in the EOA. The results of the analysis are summarized below:

**Removal of tree preservation and tree density exemptions in EX and CX zones**

Development impacts modeling estimated no impact from this code change on employment capacity in Portland’s Central City or any of the residential/mixed use market areas. The CX and EX zones are concentrated in the Central City and Gateway geographies, where the EOA found ample surplus capacity, meeting 260 percent and 328 percent of their forecast land needs, respectively. Some EX zones are also located in the Town Center, Neighborhood Commercial and Institutional EOA geographies, where the EOA found adequate 20-year capacity. This code change would be consistent with Goal 9.

**Removal of tree preservation and tree density requirements in IG1 zone**

Development impacts modeling estimated no impact from this code change on employment capacity in the Central City, Harbor and Airport Districts, or other areas citywide. The IG1 zone is located in the EOA’s Central City Industrial, Harbor & Airport Districts and Dispersed Employment geographies, where the EOA found adequate 20-year capacity. This code change would be consistent with Goal 9.

### ***Removal of tree preservation and tree density requirements in IH zone***

Development impacts modeling estimated a reduction of 11.8 acres to result from the removal of the IH tree preservation exemption and an additional 11.9 acres due to the removal of the IH tree density exemption, for a combined reduction of 23.7 acres of employment lands in this zone. The IH zone is located in the EOA's Harbor Access Lands and Harbor & Airport Districts geographies, where, as stated previously, the current 20-year surplus capacity is 10 acres and estimated land supply meets 102 percent of forecasted land needs to 2035. Additional development costs associated with the code changes have unusually high impacts on development yields in the IH zone because the low, freight-oriented density of these districts reduces developable land values.

Overall, development capacity is predicted to decline by 34 percent on sites with tree canopy in Harbor Access Lands and 17 percent in the Harbor & Airport Districts as a result of the proposed code changes, primarily due to removal of the IH exemptions, compared to reductions of less than 1 percent in Portland's commercial and residential subareas. The proposed removal of the tree preservation and tree density exemptions in the IH zone would be inconsistent with Goal 9, resulting in a reduction of Portland's existing surplus capacity of 10 acres to a deficit of 13 acres.

Johnson Economics also assessed employment impacts of reduced development in key industrial subareas from the proposed tree code changes. The impacts from the tree code changes there would result from three interrelated factors: 1) development in this freight-infrastructure hub location are difficult to replace elsewhere in the region; 2) the Harbor Access Lands and Harbor & Airport Districts have tight 20-year development capacity and short-term vacancy; and 3) development costs of the proposed code changes are estimated to have comparatively high impacts on development because of the low, freight-oriented density of these districts. If the exemptions for tree preservation and tree density were removed in the IH zone, the resulting impacts on 20-year employment growth in these districts is estimated at 837 jobs.

### ***Expansion of tree preservation requirements to 20" trees (dbh)***

Development impacts modeling estimated a development capacity reduction due to the reduced tree preservation threshold in the Harbor Access Lands (-1.55 acres), Harbor & Airport Districts (-4.52 acres), and Columbia East (-0.48 acres) geographies of the EOA. If the IH tree preservation exemption is retained, the reduction in land capacity associated with this change is estimated to be 3.9-acres in the IG2 and EG2 zones of the combined Harbor Access Lands and Harbor & Airport Districts geographies, where the current surplus land capacity is 10 acres. Surplus 20-year capacity in the Columbia East geography is ample (66 acres) to accommodate the 0.48-acre reduction estimated as a result of the change. Applying this code change to all zones except IH would be consistent with Goal 9, retaining surplus capacity of 6 acres in the combined Harbor Access Lands and Harbor & Airport Districts geographies.

For residential development, the modeling estimated a reduction of 54 housing units from what would be expected under the current tree preservation threshold. These units span all development types from single-dwelling to multi-dwelling or mixed use.

While the model does not predict substantive changes in residential carrying capacity associated, the proposed changes are expected to increase residential construction costs by over \$20 million over the next twenty years.

This increase represents 0.11 percent of the total predicted residential new construction investment in the City over the next 20 years. As a result, the proposed changes are not expected to substantively impact affordability, on average.

#### **4. Job Growth and Income Inequality**

Job growth in industrial districts has an inclusive-prosperity role in the regional labor market as higher-paying alternatives to low-wage jobs accessible to workers without college degrees. These job opportunities on average can be expected to moderate the region’s increasing income inequality, poverty (lack of income self-sufficiency), and income related health impacts. Harbor dependent sectors of the regional economy can also provide higher median incomes, as compared to other sectors, particularly for people of color. Industrial job growth is consistent with City policy which calls for expanding opportunities for and limiting negative impacts on plans and investments that support middle wage jobs.

As stated previously, Johnson Economics estimated employment impacts (Table 10) of the proposed code changes on development yields in Portland’s harbor and airport industrial districts, with outcomes described above.

*Table 10. Estimated employment impacts on 20 year employment in harbor and airport industrial districts with removal of IH and IG1 exemptions and reduction of tree preservation size threshold in all zones.*

	<b>Estimate over 20 years (# of jobs)</b>	<b>Estimate per average year (# of jobs)</b>
<b>Removal of exemption from tree preservation and tree density exemptions in IH zone</b>	830	41.5
<b>Expansion of tree preservation to 20” trees</b>	300	15
<b>Total employment impacts in harbor and airport districts</b>	1130	56.5

#### ***Inclusive-prosperity benefits of middle-wage jobs and industrial districts***

Middle-wage occupations (Abel and Dietz, 2012; Lehner 2019) in the Portland region (shown in the blue-shaded area in the Figure 7) had median annual wages between \$35,000 and \$60,000 in 2018. Industrial occupations (21% of regional jobs in 2018) and office support occupations (14% of regional jobs in 2018) are the largest sources of middle-wage jobs that don’t require bachelor’s degrees. The industrial occupations include production, transportation, installation and repair, and construction.

Earnings potential is higher for occupations that require advanced education than those that don't as shown in Figure 7, but only 26% of jobs nationally are in occupations that require bachelor's degrees or higher (BLS 2018).

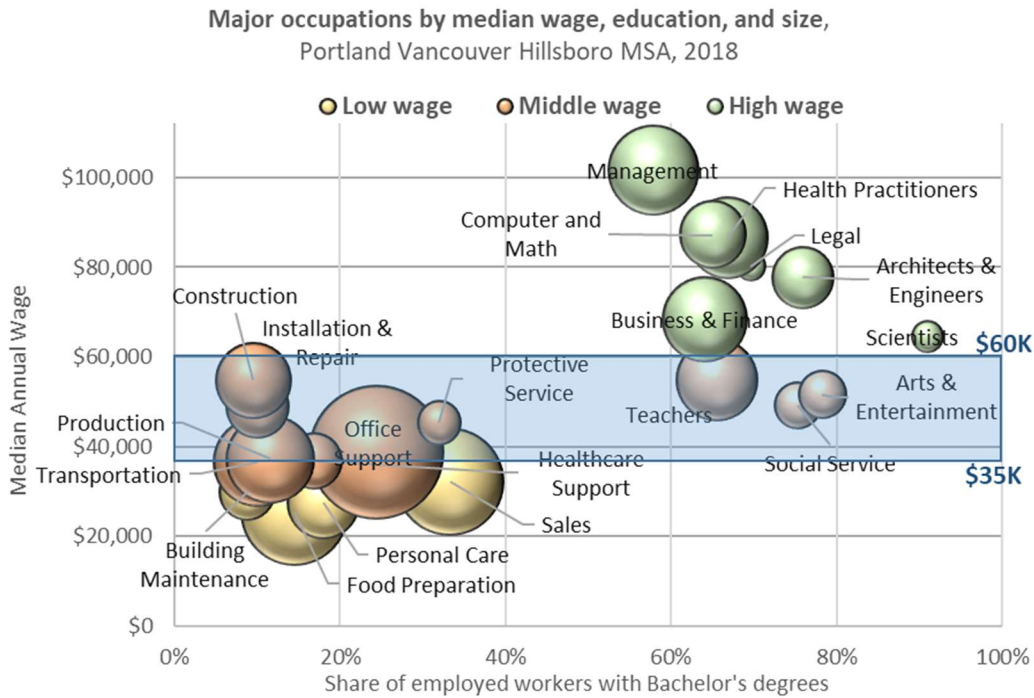
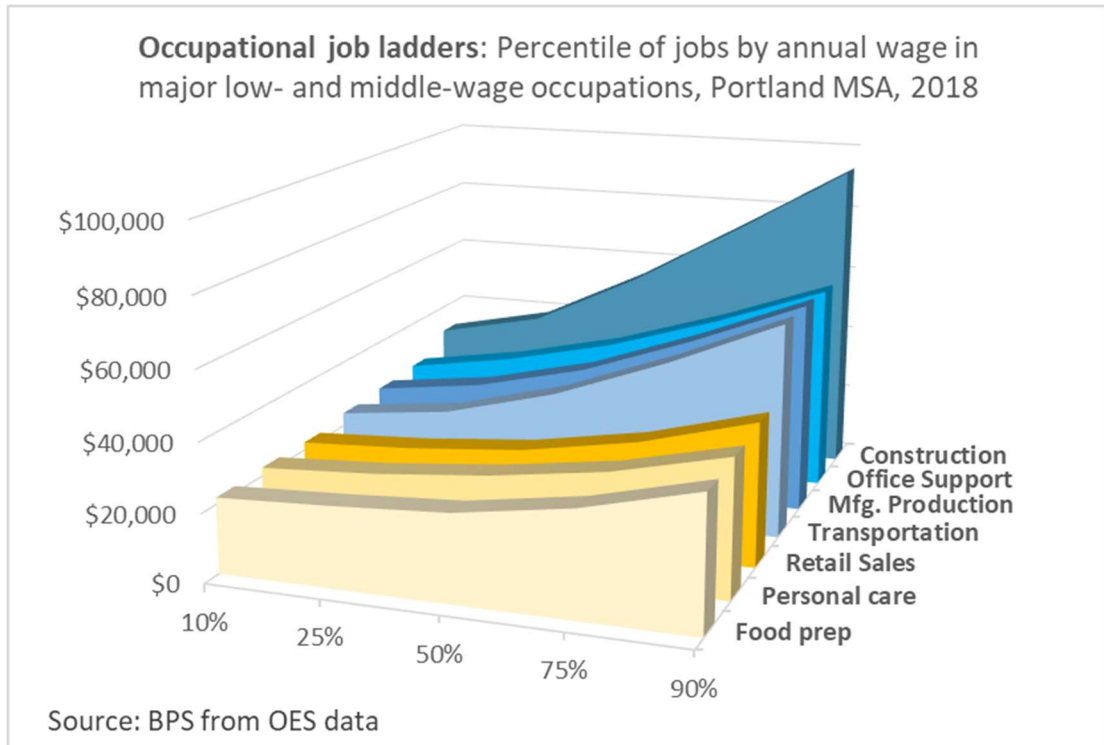


Figure 7. Major Occupations by median wage, education, and size in Portland Vancouver Hillsboro Metropolitan Statistical Area (MSA), 2018.

For the 61 percent of regional employees (ACS 2011-2015) that don't have a bachelor's degrees, middle-wage occupations can transform households by offering higher wages, more benefits, and job-ladder careers relative to low-wage occupations (Figure 8).



*Figure 8. Occupational job ladders in Portland MSA, 2018*

The unequal wage distribution of occupations in the labor market is also reflected in the varying business district types of Portland’s comprehensive plan map (Figures 9 and Figure 10). Portland’s Central City (an office district with 53 percent office-sector jobs in 2016) and campus institutions have a primarily high-wage distribution of jobs, corresponding to college-credential occupations. Neighborhood commercial corridors have a primarily low-wage distribution of consumer service and retail jobs. And industrial and mixed employment districts have primarily middle-wage jobs, at 58% compared to 13% low-wage jobs. Combined upper-middle and high-wage quartiles is comparable in Central City (66%), Institutional 68%, and Industrial and Employment districts (68%). These three business district types also all have comparable percentages of low quartile. The key distinction is that Industrial and Employment districts have the highest rate of occupations in the middle-upper wage quartile of all employment geographies, at 40%.

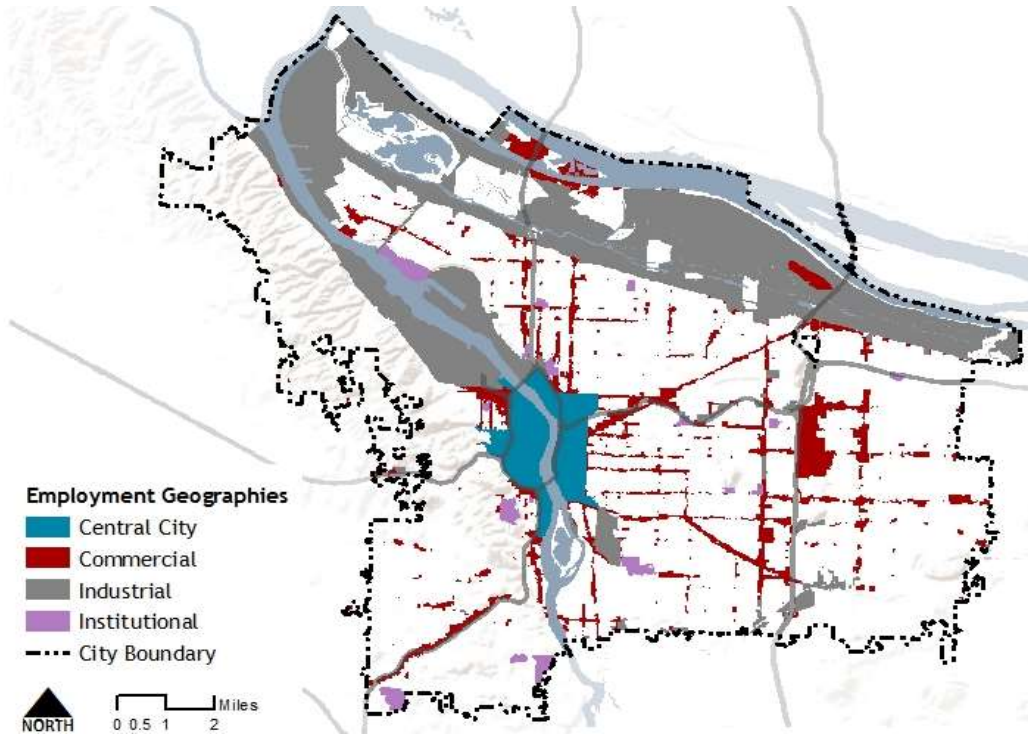


Figure 9. Employment geographies in Portland

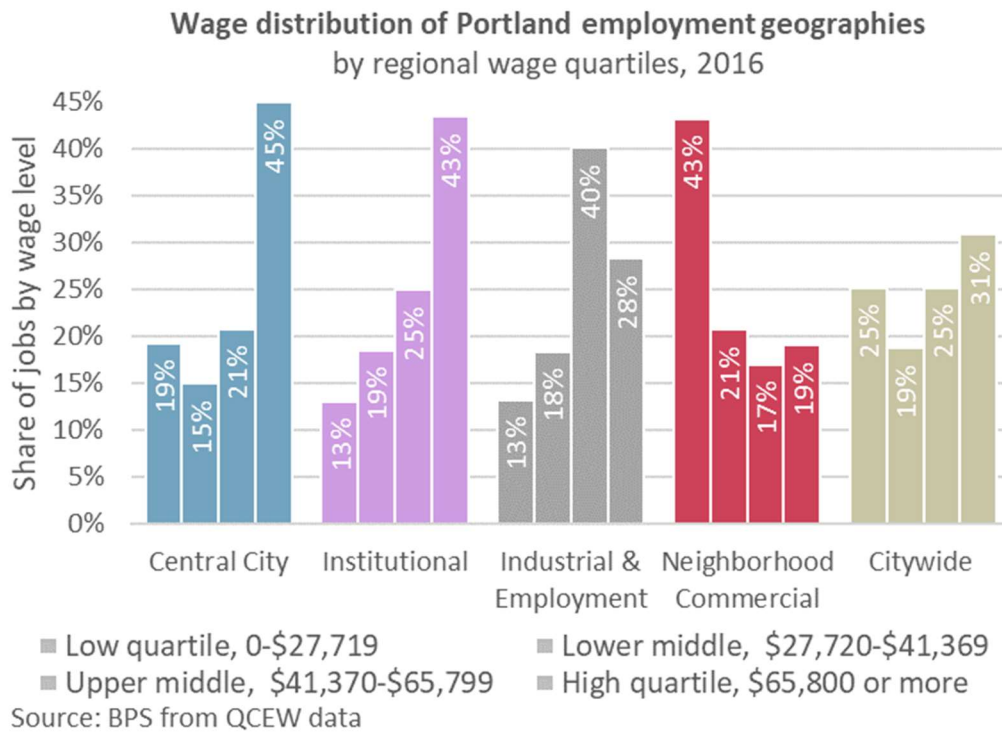
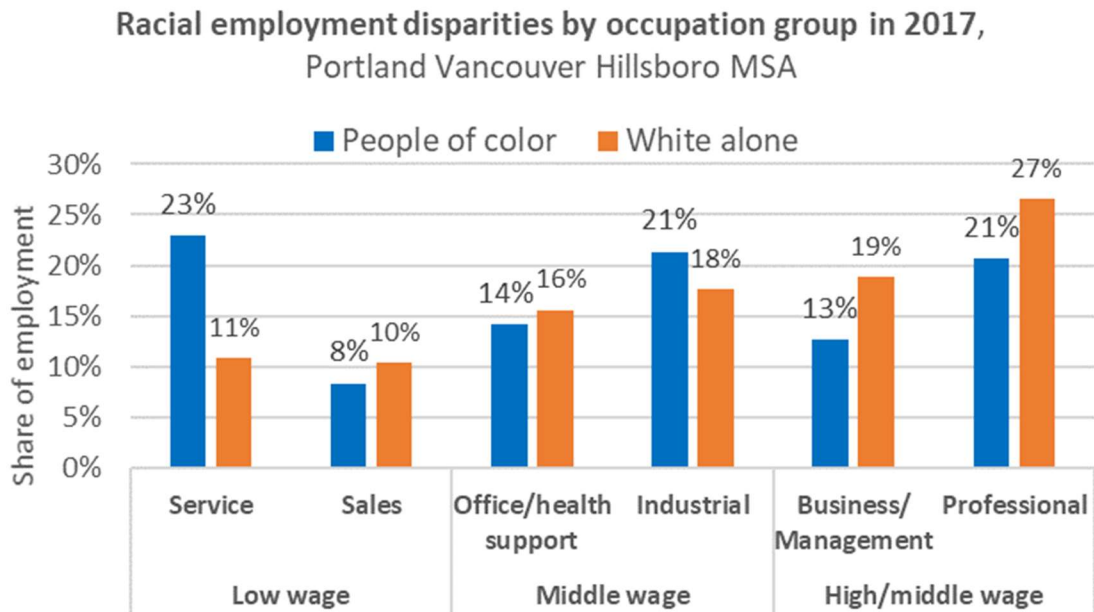


Figure 10. Wage distribution of Portland employment geographies by regional wage quartiles, 2016.

Workers of color are widely underrepresented in the region’s high-wage occupations and overrepresented in the low-wage occupations (Figure 11). Given this occupational profile, the region’s wage-polarized growth trends discussed below appear to disproportionately impact workers of color and contribute to racial income disparities. Among middle- and high-wage occupations, industrial jobs stand out as the only major occupation group in the Portland region that hires proportionally more workers of color than workers that are white alone.



Source: BPS from ACS data

Figure 11. Racial employment disparities by occupation group in 2017, Portland Vancouver Hillsboro MSA1

Figure 12 provides more detail, comparing income distribution by race and education for people employed in harbor-dependent sectors relative to the region’s other sectors combined. Portland’s harbor-area geography used by ECONorthwest (BPS, unpublished at time of staff proposal) to identify harbor-dependent sectors generally corresponds to the area that Johnson Economics found significant job impacts from tree code changes. The chart demonstrates the relationship between race, sector, and education by visualizing the relative distributions (the black bisecting lines representing medians) of each group’s work-related income. Some groups, like multiracial non-Hispanic workers with a BA or Black non-Hispanic workers with an AA, demonstrate measurably higher incomes in harbor-dependent industries compared to other sectors. Jobs within harbor-dependent industries seem to offer a path upwards, usually providing higher floor and ceiling pay to workers at each major step of educational attainment.



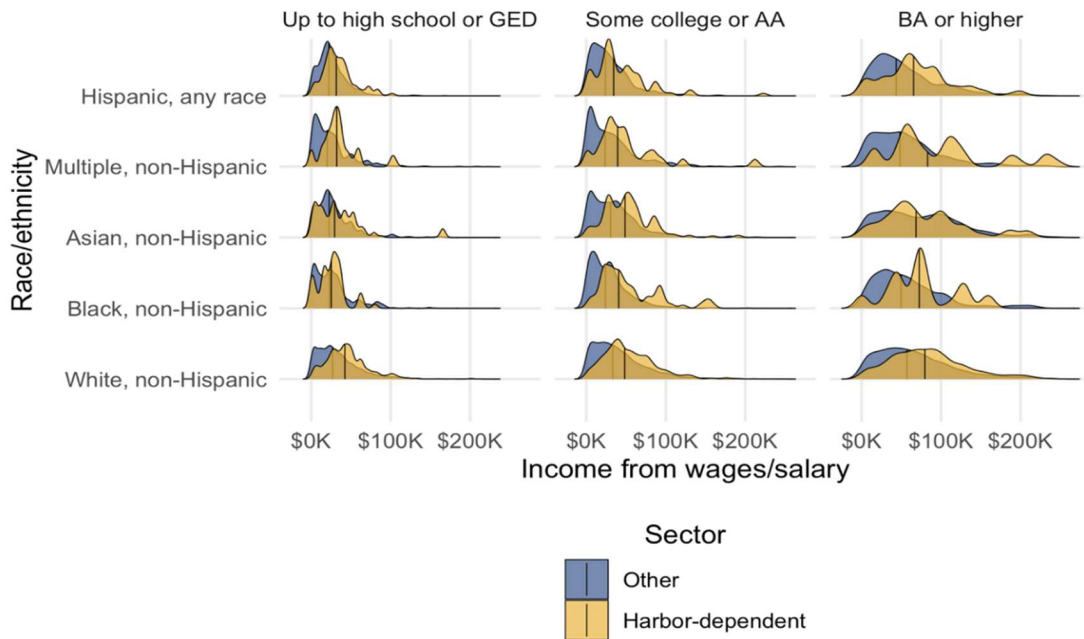


Figure 12. Distribution of income by race/ethnicity and education in harbor-dependent sectors relative to all other sectors. Source: ECONorthwest from 2014-2018 ACS PUMS data

### **Increasing regional income inequality**

Lower levels of industrial job growth will accelerate the region’s declining share of middle-wage jobs and related increase in income inequality. Nearly all of the region’s job growth since 2000 (the last two business cycles) has been in high- and low-wage occupations (Figure 13). As a result, the middle-wage occupations declined from 58 percent in 2000 to 48 percent in 2018, nearly twice as much as the national change from 56 percent to 51percent in that period. This is inconsistent with City policy which calls for equitable access to opportunities and reducing and mitigating the impacts of development on income disparity.

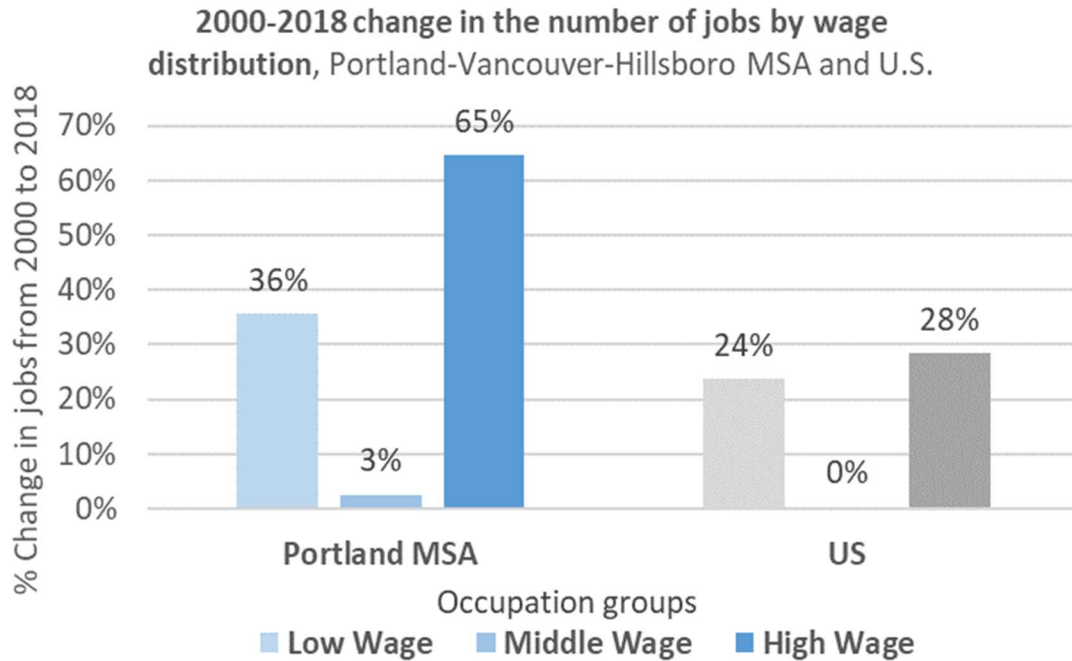


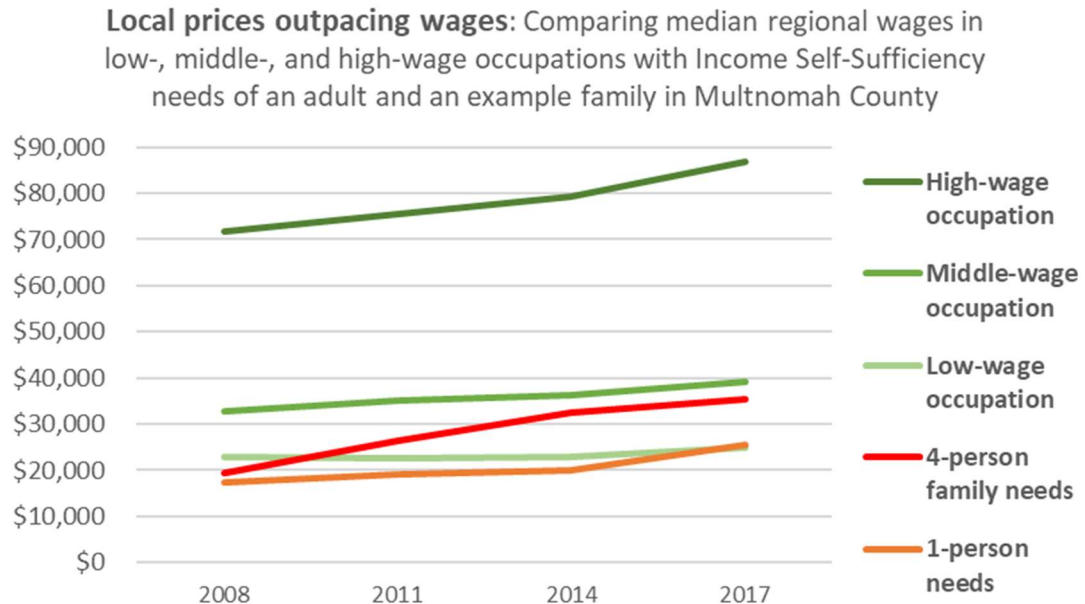
Figure 13. 2000-2018 change in the number of jobs by wage distribution, Portland Vancouver Hillsboro MSA and US

***Income self-sufficiency (increasing poverty)***

In 2017, 34 percent of Multnomah County households were poor, measured by the Income Self Sufficiency Standard, up from 23 percent in 2008 ([Multnomah County 2019](#)). Lower levels of industrial job growth are likely to incrementally contribute to this trend by reducing high-wage alternatives to low-wage jobs for workers without college degrees. The Income Self-Sufficiency Standard ([WorkSystems Inc 2017](#)), which is used by a variety of states (including Oregon and Washington), provides a more detailed local accounting than federal poverty statistics of people in need, measuring the minimum budget necessary to cover basic essentials by families of varying sizes at county-level prices (Figure 14). Essentials include rent, childcare, food, transportation, health care, household needs, and taxes. The region’s wage-polarized job growth trends contribute to the county’s declining income self-sufficiency rate in two ways: 1) alternatives to low-wage occupations are reduced for workers without bachelor’s degrees, and 2) the strong growth in high-wage wage occupations puts upward pressure on local prices for basic needs, particularly housing and childcare. As shown in the chart above, middle-wage jobs have an equity role in lifting families above income self-sufficiency levels relative to low-wage occupations.

Income Self-sufficiency can be aided by expanding access to self-sufficient wage levels and career ladders for low-income people by maintaining an adequate and viable supply of employment land and public facilities to support and expand opportunities in

Portland for middle- and high-wage jobs that do not require a 4-year college degree, limiting negative impacts of plans and investments on middle and high wage job creation and retention. The Portland Plan (BPS 2012) aims to increase income self-sufficiency to 90 percent by 2035, the opposite direction of recent trends, as one of 12 measures of community success.

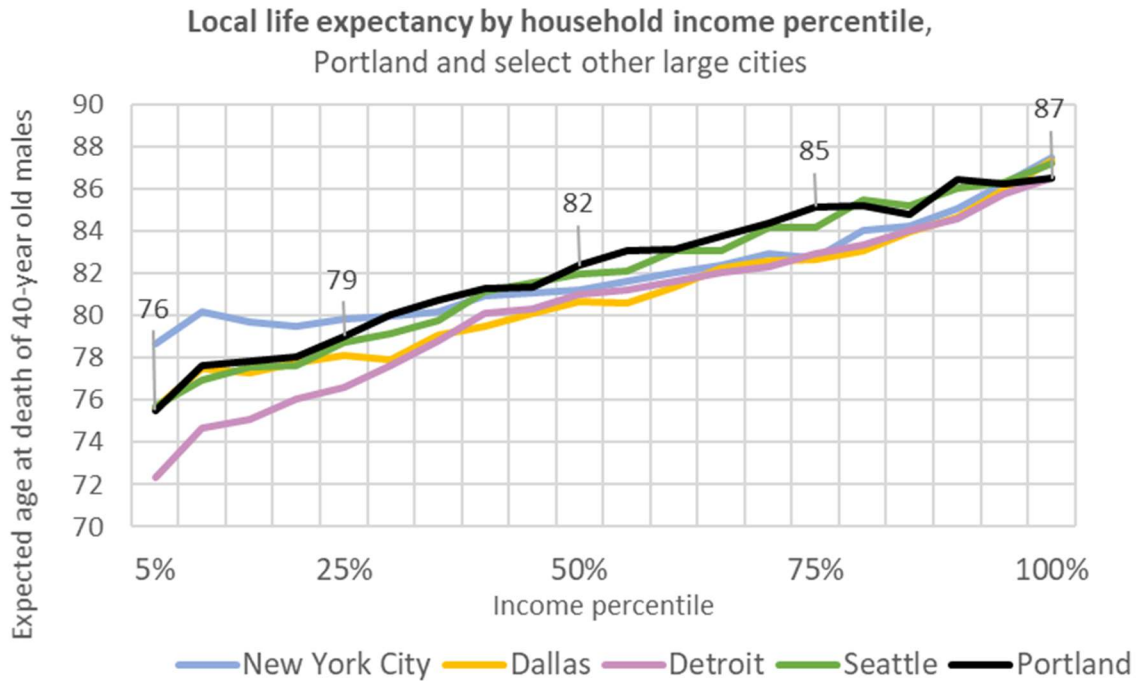


Source: BPS from OES and ISS data (Pearce). Nominal \$ (not inflation adjusted) Example 4-person family: 2 working adults, preschooler and school-age child.

Figure 14. Income self-sufficiency needs compared to median wage levels in Multnomah County.

### **Income-related disparities in public health**

Lower levels of industrial job growth are likely to contribute to income-related health disparities by reducing high-wage alternatives to low-wage jobs for workers without college degrees. Life expectancy and other public health outcomes are strongly related to income level. A national study comparing income and mortality among U.S. cities from 1999 to 2014 (Chetty et al. 2016) found that people in the highest 5-percent income category live about 10-15 years longer on average than people in the lowest 5-percent (Figure 15). In Portland, the highest-paid residents (top 5 percent) live about 4 years longer an average than median-income residents, who live about 7 years longer than the lowest-income 5 percent of residents.



Source: Chetty, et al., 2016, race-adjusted

Figure 15. Local life expectancy by household income percentile in Portland other cities.

## V. Climate-Related Equity Considerations

In July 2020, City Council responded to the global climate crisis by unanimously issuing a Climate Emergency Declaration. The resolution began with an acknowledgement that frontline communities, including Black, people of color, indigenous, and refugees are often least responsible for contributing to climate change and yet disproportionately experience the impacts and burdens.

The resolution states that climate change “threatens our city, our region, our state, our nation, humanity and the natural world, and that such an emergency calls for an immediate mobilization effort initiating greater action, resources, collaboration and new approaches to restore a safe climate.” The resolutions further notes that “protecting, restoring, and managing our urban natural resources – including rivers, streams, wetlands, floodplains, trees, and unique habitats – mitigates risks, sequesters carbon, and builds resilience to the impacts of climate change, provides benefits to human physical and mental health, protects private property and public infrastructure, and supports the intrinsic value of natural ecosystems and biodiversity.”

In issuing the declaration, City Council directed relevant City bureaus to update regulations that protect and enhance tree canopy to reduce heat island impacts on public health. Given the proximity of industrial areas to riparian zones and habitat, the heat island impacts caused by the prevalence of paved surfaces, and the lack of tree canopy relative to other

areas of the city, it is appropriate to view this project in alignment with that directive. It is similarly necessary that this project thoroughly assess the impact on the frontline communities who live and work either in or adjacent to these areas of the city.

### A. Air Quality

As has been discussed previously, people of color in Portland disproportionately live adjacent to the city’s industrial zones. Figure 14 illustrates that 38 percent of minorities in Portland live in close proximity to the city’s 10 biggest sources of air pollution. These facilities contribute a combined 35 percent of all air pollution produced within Portland (Kane et al. 2020). The map demonstrates many of these facilities are in North Portland within the IH zones considered in this project.

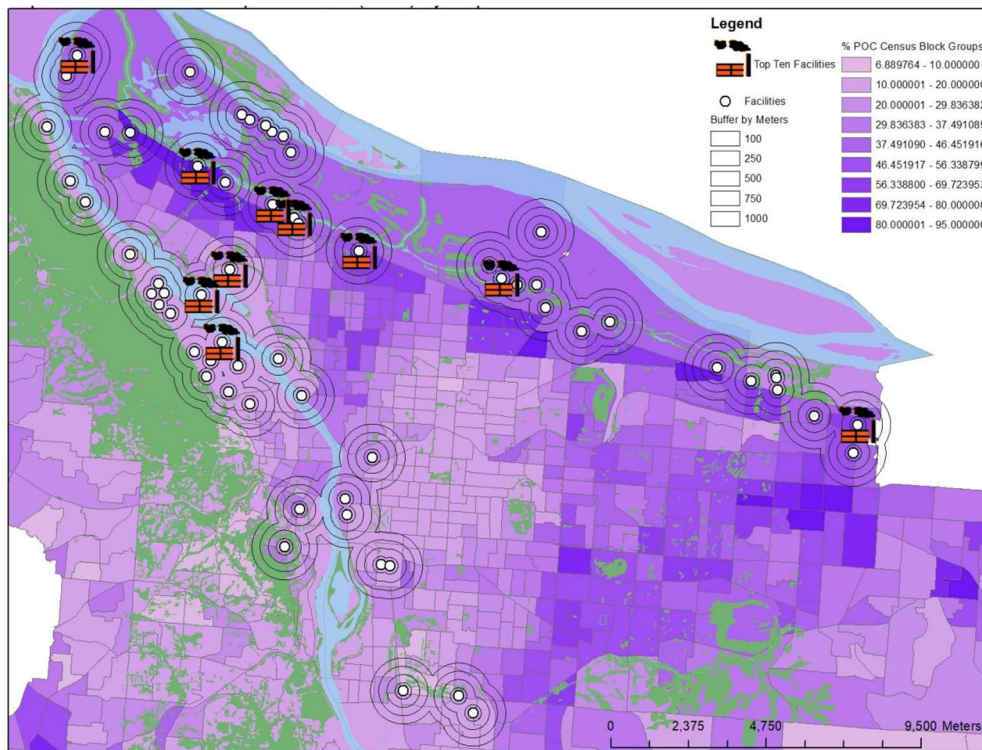


Figure 14. Top 10 facilities and people of color by population share

The impacts of air quality on health and life expectancy are well established. Long-term exposure to pollutants increases the likelihood of respiratory and cardiovascular diseases. Further, preliminary research in response to the COVID-19 pandemic has found “a small increase in long-term exposure to PM<sub>2.5</sub> leads to a large increase in the COVID-19 death rate.” It is important to note that non-point sources such as emissions from heavy duty vehicles, light duty cars and trucks, and wood burning stoves are a major contributor of PM<sub>2.5</sub> in the Portland region (DEQ). As such this impact should not be attributed primarily to the presence of industrial facilities. Nonetheless, industrial facilities are a significant contributor of air pollutants in addition to drawing heavy

freight traffic to North Portland via Columbia Blvd and Lombard Ave. along which a high percentage of people of color live and work.

These considerations are noteworthy in this report because of the documented role that urban trees play in removing pollutants from the air. In particular, trees remove PM<sub>2.5</sub> and other gaseous air pollutants through leaf uptake (Nowak et al, 2013). As such, tree removal and lack of required tree planting in the industrial zones in conjunction with anticipated future development can be reasonably expected to contribute to air quality concerns for communities working in and living adjacent to these areas.

## B. Urban Heat Islands

Trees are also a primary tool in reducing the heat island impacts prevalent in urban areas. A 2018 study by the Sustaining Urban Places Research (SUPR) Lab at Portland State University (Voelkel et al 2018) found that afternoon temperatures are significantly higher in areas of the city with low tree canopy, increased prevalence of concrete or asphalt, and along freeways and major arterials. Figure 4, previously cited, demonstrates temperatures in industrial areas can be almost 10 degrees Fahrenheit higher than in the well treed neighborhoods of the city.

Reducing urban heat island effects has emerged as a major public health priority in recent years and is a specific action point in Portland's Climate Emergency Declaration. The proposed code changes are expected to improve tree preservation in development situations while also increasing mitigation payments into the Tree Planting & Preservation Fund which can support increased planting efforts. Nonetheless, maintaining the exemption to preservation and tree density requirements in IH zones will likely result in continued tree removal and lack of new tree planting as those properties are developed over the next 20 years consistent with the Comprehensive Plan.

## VI. Potential Outcomes of Proposed Amendments on Tree Preservation and Planting

It is difficult to estimate the effects of this proposal in terms of numbers of trees preserved or fees in lieu of preservation collected. Conditions of specific sites will vary widely; the number of trees, their location, the ability to be flexible with building footprint, and the economic consequences of preserving or not preserving a tree or trees. However, it may be possible to use information based on a similar amendment passed in 2016 to extrapolate possible outcomes, with qualifications.

### A. Effect of 2016 Large Tree Stop-Gap Amendment

As discussed in more depth in sub-section I.A, the 2016 amendment required all non-exempt trees 36 inches dbh or greater to be preserved or an assessed fee in lieu of preservation. It also changed the fee in lieu of preservation for non-exempt trees 36 inches dbh or greater to an inch-per-inch fee (currently \$450/inch), instead of the pre-amendment flat fee of \$1800. As a result, removal of a 36 inch dbh tree now requires a fee-in-lieu of preservation of \$16,200.

Data suggests the 2016 amendment has been effective at encouraging preservation of large diameter trees (36 inches or greater dbh). From the effective date of the amendment, May 13, 2016, through March of 2019, the number of large diameter trees preserved increased by 71 percent while the number of trees large diameter trees removed decreased by 64 percent (Table 11). At the same time, the fees in lieu of preservation collected more than doubled, despite the number of permits remaining relatively consistent (Table 12). However, currently there is no data collected to understand decision making that led to more large diameter trees being preserved. Preservation of the larger diameter trees may be the result of a choosing to retain the tree instead of paying the greater fee in lieu of preservation, designing the project to retain the tree or, particularly on larger sites, preserving the tree because it was unaffected by development.

*Table 11. Number of 36 inch or larger dbh trees removed and preserved prior to current large tree amendment (in 2015) and after amendment (average per year in full years, 2018 and 2019).*

	Pre-Amendment (2015)	Post-Amendment (Average/Year)	%Change
<b># Non-exempt 36" + Trees Removed:</b>	42	15	-64%
<b>#36" + Trees Preserved</b>	91	156	71%

*Table 12. Issued permits and Fees in lieu collected for 36 inch or larger dbh trees, prior to current large tree amendment (in 2015) and after amendment (average per year in full years, 2018 and 2019).*

	Pre-Amendment (2015)	Post-Amendment (Average/Year)	%Change
<b>Fee In Lieu of Preservation Revenue</b>	\$200,400	\$462,376	131%

## B. Possible Outcomes of Staff Proposal

### 1. Reduction of tree preservation threshold from 36 inches to 20 inches dbh in currently non-exempt zones.

Applying the same percentage decrease in number of trees removed (64 percent) that occurred for 36 inch dbh and greater trees to trees 20 to 36 inches dbh trees, after this proposed amendment, results in an estimated decrease of 65 trees removed on average per year, as shown in Table 13. The data in Table 13 is data from permits in full years 2018 and 2019.

*Table 13: Projected number of 20 to 36 inch dbh tree removals per year as a result of proposed amendment (reducing size threshold from 36 inches dbh to 20 inches dbh), compared to current number of 20 to 36 inch dbh trees removed (average/year, over full years 2018 and 2019).*

	Current (Average/Year)	Proposed Amendment (Average/Year, Projected)	%Change
<b># Non-exempt 20 to 36" Trees Removed:</b>	101	36	-64%

Additionally, even if 65 additional trees are preserved per year, the fees-in-lieu of preservation would still increase by 15%, due to the inch-per-inch fee in lieu of preservation calculation as shown in Table 14. The data in Table 14 is from permits in full years 2018 and 2019 and accounts for fees based on actual tree sizes removed in 2018 and 2019, with the 64% decrease applied to the amount of trees removed for each tree size 20 to 36 inches dbh.

*Table 14. Projected fees in lieu of preservation for 20 to 36 inch dbh tree removals per year as a result of proposed amendment (reducing size threshold from 36 inches dbh to 20 inches dbh), compared to current fees collected for 20 to 36 inch dbh trees removed (average/year, over full years 2018 and 2019).*

	Current (Average/Year)	Proposed Amendment (Average/Year, Projected)	%Change(Projected)
<b>Total Fees In Lieu of Preservation</b>	\$363,600	\$419,580	15%



**Qualifications:** There are several reasons why these projections may be higher or lower than actual results if the proposed amendments are adopted:

- **Higher prevalence of 20 to 36 inch dbh trees than trees 36 inch dbh or greater. Smaller trees are more prevalent than larger trees.** Data collected through permit research previously shown in Tables 7 and 8 indicate an average of 1.7 20 to 36-inch dbh trees per acre in single and multi-dwelling zones and an average of .75 36-inch dbh or greater trees per acre in the same zones. In industrially-oriented zones, as shown in Table 5, the average trees per acre are estimated to be 4.4 trees per acre in the 20 to 36 inch dbh category and .9 trees per acre for trees 36 inches dbh or greater. The greater prevalence of the 20 to 36-inch dbh trees could mean that there is less flexibility to accommodate both a building and disturbance area and preservation of 20 to 36 inch dbh trees, *possibly resulting in 20 to 36-inch dbh trees being removed at a higher rate than those that are 36-inch dbh or greater.*
- **Smaller root protection zones.** On the other hand, smaller trees have smaller root protection zones, areas that cannot be impacted by building area or other disturbance, than larger trees. The standard root protection zone is one-foot radius for every one inch diameter tree size, with an encroachment allowance of 25 percent of the root protection zone area. A 36-inch dbh tree has a root protection zone that is 36 feet in radius, or 72 feet in diameter minus the allowed encroachment; a 20-inch dbh tree has a root protection zone that is 20 feet in radius, or 40 feet in diameter minus the allowed encroachment. Smaller root protection zones will provide more flexibility for accommodating tree preservation, *possibly resulting in trees 20 to 36-inch dbh being removed at a lower rate than those that are 36-inch dbh or greater.*
- **Incentive to provide alternate root protection zones.** As an alternative to the standard root protection zone described above, applicants may choose to propose an alternate root protection zone prepared by a certified arborist. An alternate root protection zone can take into consideration specific conditions like the species of the tree, site characteristics and specific construction activities. These root protection zones can often be smaller than the standard root protection zones. If adopted, this amendment would increase the fee-in-lieu of preservation and may incentivize investment in an arborist's consultation and proposed alternate root protection zone. This could *possibly result in trees 20 to 36-inch dbh being removed at a lower rate than they are under the current regulations.*

## 2. Removing exemptions in CX, EX, IG1 and IH zones

By combining the data obtained by the SWCA tree canopy analysis as shown in Table 5, and applying the rates of preservation gathered through permit research as shown in Tables 7 and 8, potential outcomes on tree preservation by removing the tree preservation exemption in IG1 zone may be estimated. Similarly, we can estimate the missed outcomes by not removing the tree preservation exemption in the IH zone. Outcomes in the CX and EX zones are not estimated due to the amount of data available

for those zones and the fact that they are more apt to develop at a building coverage where they are exempt from tree preservation regardless. *As opposed to the possible outcomes for additional tree preservation currently non-exempt zones described above which are expressed as an average per year, these potential outcomes are expressed as total possible outcomes over an indefinite period of time.* This is because there is no historical permit data to estimate outcomes on a per year basis, and because it does not account for how many or which properties will develop or redevelop on an annual basis.

As shown in Table 11, trees subject an inch-per-inch fee in lieu of preservation are preserved at a rate that is ten times that of trees removed (15 trees removed versus 156 trees preserved per year). Removing the exemption in the IG1 zone could result in preservation of 236 additional trees 20 to 36” dbh (Table 15). By not removing the tree preservation exemption in IH, 1,947 trees 20 to 36” in diameter would not be required to be preserved of a fee paid in lieu of preservation.

*Table 15 Number of trees 20inches dbh or greater projected to be preserved and removed in unlimited timeframe in IG1 and IH if tree preservation exemption is removed.*

Zone	Total # of Trees Estimated	# of Trees Preserved (Projected)	# of Trees Removed (Projected)
IG1	261	236	25
IH	2154	1947	207

**Qualifications:** There are several reasons why these projections may be higher or lower than actual results if the proposed amendments are adopted:

- Estimated Rates of Preservation.** These projections use past data on the rate of preservation versus removal of trees 36-inches dbh or greater. As explained above, *the rate of preservation for smaller trees may be less than for larger trees.*
- Other exemptions to tree preservation and tree density requirements.** This proposal does not alter other exemptions, notably an exemption for tree preservation for sites with existing or proposed building coverage of 85 percent or more. All three zones where the exemptions are proposed for removal, CX, EX, and IG1 allow for 100 percent building coverage, though this condition is more prevalent in CX and EX than in IG1 zones. Similarly, for tree density, sites get credit for the land area used for building coverage above what is required to calculate the base tree density requirements. For sites with high levels of building coverage, no tree preservation (or payment in lieu of preservation) or planting would be required by Title 11. This will *lower the overall rate of preservation and planting in all three zones combined, though note that preservation estimates were not provided for CX and EX zones.*

- **Site Variables.** In industrial areas outside of the central city, trees are often clustered or located at the fringes of development sites, which could make them easier to preserve. In addition, though 100 percent building coverage is allowed in all four zones, the characteristics of typical development outside of the central city include exterior development areas such as parking areas, loading areas, or other areas that leave space open and/or already require landscaping through Title 33, Planning & Zoning, providing open space to plant or preserve trees to meet tree density requirements. These conditions *could increase the rate of preservation and planting*, especially in areas outside of the central city.

In addition, since CX, EX, and IG1 zones are currently exempt from tree preservation and tree density, there is no permit data to verify current rates of preservation or tree removal in these zones. The possible outcomes use data gathered from single-dwelling and multi-dwelling zones. There different development characteristics between these groups of zones that may not allow for an accurate projection for CX, EX, IG1 and IH zones. Single and multi-dwelling zoned sites are typically smaller and present less opportunity for creative site design. However, those zones also require a minimum amount of non-developed area; where sites in CX, EX, IG1, and IH zones are allowed to develop with 100 percent building coverage, and would be exempt from tree preservation or tree density requirements altogether.

- **Overall,** given the existing exemptions for sites with high levels of building coverage, the possible outcomes on tree preservation and tree density for all four zones combined *would be expected to be lower* than indicated in the possible outcomes.

## VII. Conclusion and Staff Proposal

These proposed amendments were brought forth to City Council by the UFC and the PSC out of concern for loss of tree canopy in industrial and commercial zones during development. Additionally, the UFC recommended reducing the size threshold for tree preservation from 36 inches to 20 inches dbh, with associated increase in inch-per-inch mitigation fees in order to preserve more trees throughout the city (there are more 20 inch dbh and greater trees than 36 inch dbh and greater trees) . The proposed amendments address public and environmental health disparities due to the unequal distribution of tree canopy in Portland. Trees are important components of urban infrastructure and provide numerous public health and environmental services. Unfortunately, low income communities and communities of color often reside in or adjacent to low canopy areas of the city- particularly industrial areas, where tree preservation and tree planting are not required during development.

Concurrently, state mandated land use planning goals require a certain amount of developable land to support economic growth. Industrial areas- particularly, the Harbor Access and Airport & Harbor geographies, are a source for middle wage job opportunities for workers without bachelor's degrees. Data from BPS shows that jobs related to the Harbor

Access sector provide greater opportunity for people of color and address polarized job growth resulting from regional wage income gaps (lack of middle wage jobs).

Removing exemptions to tree preservation and tree planting requirements in IG1, EX and CX zones provides an opportunity to the above, supporting climate, canopy and economic goals for Portland. Economic analysis also demonstrates that reducing the size threshold for tree preservation during development on private property also provides an opportunity for supporting more canopy throughout the city, without significantly increasing the cost of housing. Furthermore, when tree preservation cannot be accommodated, fees in lieu of mitigation paid into the Tree Preservation and Planting Fund allow for tree planting and preservation to occur where needed most, as identified in Urban Forestry's Growing a More Equitable Urban Forest Citywide Tree Planting Strategy.

Further analysis of how requiring tree preservation and tree planting while supporting economic development in the IH zones is recommended as an immediate next step.

**Considering:**

- The purpose of Title 11 and the goals of this project;
- Input from community members;
- The outcomes of the Economic Analysis that was informed by the Tree Canopy Analysis;
- Opportunities to advance tree canopy and economic equity outcomes; and
- The direction of City Council expressed in Resolution 37473;

**Project staff propose the following:**

- **Remove** the exemption from tree preservation and tree density in IG1 (General Industrial 1), EX (Central Employment), and CX (Central Commercial) zones on private or City-owned/managed property.
- **Retain** the exemption from tree preservation and tree density in IH (Heavy Industrial) zone on private and City-owned or managed property.
- **Reduce** the threshold for required preservation of trees on private property from 36 inches to 20 inches in diameter, wherever tree preservation is required.
- **Reduce** the threshold for inch-per-inch fee in lieu of preservation for trees on private property from 36 inches to 20 inches in diameter.

**The staff proposal does not:**

- Change any of the other existing exemptions from tree preservation or tree density.
- Change anything else about the rules for tree preservation or tree density in development situations.

Staff also proposes to re-examine the exemptions from tree preservation and tree density in the IH zone through the 5-year update to the Economic Opportunities Analysis (EOA)

required by the State of Oregon to demonstrate compliance with Statewide Planning Goal 9, undertaken by the Bureau of Planning and Sustainability as part of their regular work program. The last EOA was adopted in 2016. Public engagement for the 5-year update is anticipated to begin in early 2021. In that forum, mitigating strategies may be established to offset the development constraints presented by adding tree preservation and tree density regulations in the IH zone.

While staff understands the analysis does not allow for the exemption to be removed, as has been documented in this report, the lack of existing tree canopy in these areas coupled with the volume of impermeable surfaces directly result in higher air and land surface temperatures, decreased air quality, stormwater management challenges, and habitat degradation within sensitive riparian zones, amongst a multitude of other environmental and public health impacts now exacerbated by the climate crisis.

These are concerns ~~are~~ shared by many stakeholders. Staff recommends the City commit to identify solutions using all available tools to preserve and grow canopy coverage in IH zones to improve public and environmental health outcomes, in a future project. Beyond exploring the removal of the IH zone exemptions in the next required Economic Opportunities Analysis conducted by BPS, additional actions could include but not be limited to, determining alternative fee-in-lieu levels to maintain compliance with Goal 9, reviewing environmental regulations in industrial zones of other Oregon cities, and exploring amendments to Title 33 or other City codes which relate to the retention and planting of trees in industrial zones.