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MEMO

DATE: July 19, 2016

TO: Planning and Sustainability Commission

FROM: Sallie Edmunds, Central City Planning Manager

CC: Susan Anderson, Director; Joe Zehnder, Chief Planner

SUBJECT: **CC2035 Review Process and Staff Proposed Amendments to the Proposed Draft CC2035 Plan**

We are pleased to begin the legislative process for Central City 2035. Our draft schedule is as follows:

July 26	PSC Hearing (2 hours)
August 9	PSC Hearing (3 hours)
August 12	Deadline for PSC guidance to staff (proposed)
September 27	PSC Worksession (3 hours)
November 8	PSC Worksession (3 hours)
November 22	PSC Worksession/Decision (1 hour)

In the Proposed Draft Central City 20353 Plan (CC2035) published on June 20th, staff noted a few areas where further work was needed and could be completed prior to the first hearing. Since that time staff have also identified some errors that should be corrected so that they don't cause confusion and a few other amendments that came to our attention through the Discussion Draft review and should have been included in the Proposed Draft. Some of the amendments are substantive, others are minor or wording changes. This memo briefly describes these changes and references attachments where necessary.

Substantive Amendments

#	Volume	Page #	Proposed Amendment	Notes/Rationale	Attachment
1	2A1	147	Ground Floor Active Uses, 33.510.225.C.2.d. The street-facing façade must include windows and doors, or be structurally designed so doors and windows can be added when the space is converted to active building uses. <u>Windows into storage, vehicle or bike parking, garbage or recycling areas do not qualify.</u>	Revised to describe activities that are not allowed behind windows. Source: BDS and the Design Commission during the Discussion Draft. References to types of activities behind windows are proposed on page 139 in the Ground Floor Windows section, however, staff identified it would also be useful to clarify this in the Ground Floor Active Use provision.	None
2	2A2	15	Revise commentary for 33.475.050, Property Line Adjustments	The existing commentary does not correctly describe the intent of the this standard, which is to ensure that two different sets of river/greenway overlay zones (other than the River Environmental) are not created through a property line adjustment.	A
3	2A2	23-24	Add a purpose statement and revise commentary for 33.475.215, Marine Passenger Docks and Marine Passenger Terminals standard.	The purpose statement describes the intent of the standard and allows for adjustments in unique situations. The replacement commentary section better explains the purpose statement and standard.	B
4	2A2		Add code and commentary for 33.475.250, Nonconforming Uses and Development.	Add a section on nonconforming uses and development in 33.475 based on a similar section in 33.440.270.	C
5	2A2	309-310	Revise the commentary for river-related definition amendment, 33.900.030 Definitions.	Add specificity about allowed river-related uses and development associated with marine passenger docks and terminal.	D

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#	Volume	Page #	Proposed Amendment	Notes/Rationale	Attachment
6	2A2	343	33.930.150 Identifying a Decrease in Slope. A decrease in slope is a change in percent slope from a steeper to a less steep grade. For example, a change from 40 percent slope to 30 percent slope is a decrease in slope of 10 percent. A change from 35 percent slope to 15 percent slope is a decrease in slope of 20 percent. To identify the decrease in slope, transects must be surveyed every 10 feet and the slope must be sampled every 3 feet along the transect between the ordinary high water mark and a point 50 feet from the ordinary high water mark. See Figure 930-20.	Revised to clearly state how often the slope measurements must be taken in order to establish the top of bank.	None
7	3A3	Multiple	Replace photos, maps and illustrations to accurately reflect the written ESEE decisions	Corrects formatting errors on a number of pages caught after publication.	E
8	3B	N/A	Expand Willamette River Central Reach Natural Resource Inventory into a Natural Resource Protection Plan. Amendments include changes to various chapters.	Add an evaluation of compatible and conflicting uses and decisions regarding the protection of resources to establish the rationale for the application of the river overlay zone.	F
9	5	N/A	Add action: Develop a business case to support the most economically, environmentally, and socially sustainable way to restore the White Stag sign view corridor from the Burnside Bridge. Co-leads: OMF and PPR Implementation: 2-5 years.	The Scenic Resources Protection Plan identifies the White Stag sign as a focal feature. This action is to explore ways to maintain the view of the sign from the Burnside Bridge	None
10	5	18	By 2035, there will be a total of 408 acres of ecoroofs in the Central City. This includes 228 acres of ecoroof on new development. Targets have not been set by sub districts.	Adds a specific target for ecoroofs as part of new development.	None

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#	Volume	Page #	Proposed Amendment	Notes/Rationale	Attachment
11	4	5	Add new cost memo and an ecoroof bibliography.	BES has drafted additional supporting documents for Volume 4.	G

Minor Amendments

The changes below include corrections staff feel are necessary to clarify proposals and a few City bureaus requested changes to the work plan component of Volume 5 that were inadvertently left out. The table references attachments where necessary.

#	Volume	Page #	Change	Attachment
12	2A1	427	Replace code reference in the 2nd paragraph ~~33.510.261.I.6~~ with 33.510.263.	None
13	2A2 2A1	193 32	Edit the exemption for Exterior Lighting to be clear that public rights-of-way and property owned by Portland Parks and Recreation are exempt from the standards.	None
14	2A2	338	Edit 33.920.200 Commercial Outdoor Recreation example to read: Examples include amusement parks, theme parks, golf driving ranges, miniature gold facilities, zoos, marinas, marine passenger docks and subregional cruise ships such as Willamette and Columbia River cruises.	None
15	2A2	309-310	Replace references to ~~Recreational Trails~~ with Major Public Trails. Delete ~~Subregional travel~~ and ~~regional travel~~ from the 4th bullet.	None
16	2B	6-12	Update legends for TSP classification maps to correct old/inaccurate legend content. Remove all remaining "deleted"/dotted line segments from the map to clearly show the proposed system.	H
17	2B	17	Add the "North Portland Greenway Trail, Segment 5" project (#30091) to the CC2035 list of candidate projects. "Title: North Portland Greenway Trail, Segment 5; Project # 30091; Lead Agency: PBOT; Project Timeline: Years 11 – 20; Estimated Cost: $7,306,910. Description: Build a multi-use trail along the Albina Yard connecting Swan Island to the Rose Quarter."	None
18	3A1	63	Update numbers in last paragraph to be consistent with Table 2.	None
19	3A1	68	Replace ~~base~~ with bonus in SW46 examples 1 and 2	None
20	3A1	85	Remove references to SW02.	None
21	3A1	106	Remove SE30 label because it's an allow decision.	None
22	5	97	Action EN3: Change BES to lead implementer, add BPS as partner	None

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#	Volume	Page #	Change	Attachment
23	5	142	Action EN14: Make BES partner implementer; make PPR lead implementer	None
24	5	95	Action EN32: Delete BES as lead	None
25	5	96	Action UD83: Remove BES as lead and add as partner; add BPS as co-lead implementer	None
26	5	104/130	Action HN13: Add BES as partner implementer	None
27	2A2	12	33.475.040.O "no native trees are ~~not~~ removed"	None
28	2A2	18	33.475.060.2.e "location of proposed fencing, indicat~~ed~~ing ~~with~~ whether the fencing is temporary ~~and~~ or permanent"	None
29	2A2	83	33.430.190 "major public trails"	None
30	2A2	300	33.272.020.A, commentary 6th line, The applicant will be ~~asked~~ required to grant…	None
31	2A2	351	Revise overlay zone map commentary to replace references to g with g*. Delete last sentence under scenic overlay description: ~~Height limits are described on the back of this insert.~~	None
32	5	197	1st sentence, change "map B5" to "Map 3-4"	None
33	5	214	Move Action UD24 header and the following two paragraphs of action description to follow Action UD16. Action UD24 was inadvertently inserted into the middle of the description of Action UD 16.	None

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Attachments

The following attachments provide proposed amendment language where it is not already included in one of the two tables in the memo body.

A. **Attachment for Amendment 2:** Revised commentary for 33.475.050, Property Line Adjustments standard. Updates Volume 2A Part 2.

B. **Attachment for Amendment 3:** Draft purpose statement for the 33.475.215 Marine Passenger Docks and Marine Passenger Terminals standard. Updates Volume 2A Part 2.

C. **Attachment for Amendment 4:** New code subsection called 33.475.250 Nonconforming Uses and Development copied from existing code section 33.440.270. Updates Volume 2A Part 2.

D. **Attachment for Amendment 5:** Revised commentary for the definition of "river-related" in 33.900.030 Definitions. Updates Volume 2A Part 2.

E. **Attachment for Amendment 7:** Corrected versions of multiple pages from the ESEE in Volume 3A Part 3.

F. **Attachment for Amendment 8:** A new Natural Resource Protection Plan created by expanding the Natural Resource Inventory included in the Proposed Draft published on June 20, 2016. Updates Volume 3B.

G. **Attachment for Amendment 11:** A new memo and bibliography for the costs of ecoroofs from BES. Updates Volume 4.

H. **Attachment for Amendment 16:** Proposed Transportation System Plan street classification maps with corrected legends and proposed line segments only. Updates Volume 2B.

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Commentary

33.475.050 Property Line Adjustments

~~In the past, property line adjustments have been approved that resulted in eliminating river frontage.~~ The proposed regulations ensure that property line adjustments do not create more than one river overlay zone on the site with the exception of the River Environmental overlay zone, which is intended to coincide with other river overlay zones. The intent of the standard is not to have two different sets of overlay zone regulations apply to a property such as River g* and River g.~~The river overlay zones each have a different purpose and use regulations. River 'g' overlay zone is the one exception since it does not have specific use regulations.~~

Commentary

33.475.215 Marine Passenger Docks and Marine Passenger Terminals

~~This proposal limits the net building area (5,000 square feet) for river related development associated with marine passenger terminal within the river setback. Staff proposes that the river-related components of this development that are essential to the loading and unloading of passengers can fit in this footprint, especially queuing and security areas. Some amount of passenger waiting area (with seating) is appropriate, especially for seniors and folks with special needs. If a larger waiting area is needed, it can locate adjacent to the river setback. Staff looked at the queuing area at the Salmon Springs dock and the square footage for other related uses provided by an interested property owner to determine the square footage limitation. Limiting the footprint of this development in the river setback to essential river-related development will help address other Willamette River goals and objectives including enhancing ecosystem functions such as flooding and habitat improvements.~~

~~Staff will be providing the Planning and Sustainability Commission a purpose statement for this code section at the public hearing on July 26, 2016. This will allow an applicant who desires to request a modification or adjustment to the standard to have a purpose statement with which to demonstrate how their development proposal meets or exceeds the intent of the purpose statement.~~

As stated in 33.910.030, the river-related definition is updated to add certain uses and development associated with a marine passenger dock and a marine passenger terminal that's primary purpose is to load and unload passengers from marine vessels. Passenger waiting and queuing areas, security checkpoints, cold food storage and machine shops associated with marine passenger docks and marine passenger terminals can locate in the river setback

Section 33.475.215 limits the net building area to 5,000 square feet for river-related development associated with a marine passenger terminal within the river setback. Staff looked at the queuing area at the Salmon Springs dock and the square footage for other related uses provided by an interested property owner to calculate the square footage limitation. The elements that are essential to the loading and unloading of passengers are the queuing and security areas. Some amount of passenger waiting area for seniors and those with special needs (with seating) is appropriate within the setback. Any additional waiting area can be located outside the river setback. Limiting the footprint of this type of development within the river setback will allow the area to achieve other Willamette River goals and objectives including landscaping, public access, and enhancing ecosystem functions such as flooding and habitat improvements.

33.475.215 Marine Passenger Docks and Marine Passenger Terminals

A. Purpose. ~~[NOTE: the purpose statement for this code section will be provided at the Planning and Sustainability Commission public hearing on 7/26.]~~ The standard to limit the built area of river-related development associated with marine passenger docks and marine passenger terminals in the river setback ensures that other goals of the Willamette River Greenway (Statewide Planning Goal 15) such as conservation, enhancement and maintenance of natural resources, recreation and public access, scenic and historic values can be met.

B. Passenger waiting and queuing areas, security checkpoints, cold food storage and machine shops associated with marine passenger docks ~~for subregional travel~~ and marine passenger terminals ~~for regional travel~~ are limited to 5,000 square feet within or riverward of the river setback.

Attachment C

Commentary

Note: New code section not underlined for ease of reading

33.475.250 Nonconforming Uses and Development

What are nonconforming uses and development?

Nonconforming uses and development exist where a site met all the regulations at the time it was developed but do not meet the current regulations because of subsequent changes to the Zoning Code. For example, many parking lots were built before Portland required landscaping. Such development is "grandfathered in," meaning that it can remain as long as there are no changes to the site.

Chapter 33.440, Greenway Overlay Zones, includes a section that addresses nonconforming uses and development within the greenway setback. Staff proposes to replicate this standard in 33.475 for nonconforming uses and development in the Central Reach's river setback. The language allows nonconforming development to continue and permits other nonconforming uses to occur if within *the existing building footprint*. Expansion of the development may occur within the existing building footprint provided that it is not within or riverward of the river setback. This means that overhanging or cantilever structures like decks or bay windows are not allowed. These structures would bring the nonconforming development further out of compliance with river setback regulations. Development may change to allow river-dependent and river-related development by right, consistent with Statewide Planning Goal 15, Willamette River, and other zoning code regulations.

33.475.250 Nonconforming Uses and Development

Nonconforming uses and development in the River General (g*) overlay zone are subject to the regulations and reviews of Chapter 33.258, Nonconforming Situations. The additional regulations stated below apply to development within or riverward of the river setback that is not river-dependent or river-related.

A. The development may continue.

B. The development may be changed to an allowed river-dependent or river-related development by right.

C. The development may be changed to another nonconforming development if within the existing building. If it is outdoors, it may not be changed to another nonconforming development

D. The development may be expanded, but not within or riverward of the river setback unless expansion is limited to adding square footage to an existing building within the boundary of the existing footprint.

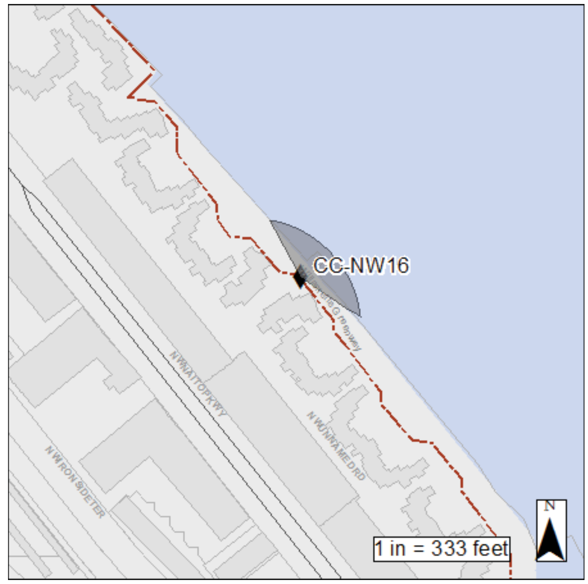
River-Related:
The definition is expanded to state that resource enhancement projects adjacent to the river are river-related. These projects directly relate to improving fish and wildlife habitat within the Willamette River Greenway.

Another addition to the river-related code definition is the inclusion of specific uses/development associated with a marine passenger terminal and its passenger vessels. The river-related uses and development proposed in this definition are directly related to a ~~A~~ marine passenger terminal that's primary purpose is to load and unload passengers from marine vessels ~~is proposed to be classified as a river-related~~. The dock and gangway for the marine vessels are river-dependent. Passenger waiting and queuing areas, security checkpoints, cold food storage and machine shops associated with marine passenger docks and marine passenger terminals can locate in the river setback. .A cold food storage facility that holds cold food for passenger consumption on vessels in close proximity to these vessels to promote food safety is river-related. A machine shop that serves the ongoing in-water maintenance and operations of vessels is considered river-related. Other types of on-site facilities that support maintenance and operations of the terminal facility or out-of-water vessel maintenance are not considered river-related. Other uses and development associated with a marine passenger terminal like a restaurant or other retail food services like a café or concession stand, restrooms, business offices, and supply storage areas are not river-related Such uses and development can locate outside of the river setback. Overall, t~~T~~his facility, adjacent to the river, supports state and local goals for activating the riverfront, river transportation, recreation and economy.

River-Related. A use or development ~~which~~ that is not directly dependent upon access to a water body but which provides goods or services that are directly associated with river-dependent land or waterway use or development, and which, if not located adjacent to water, would result in a public loss of quality in the goods or services offered. Residences (including houseboats), parking areas, spoil and dump sites, roads and highways, restaurants, businesses, factories, and recreational vehicle parks are not generally considered dependent or related to water. ~~Recreational~~ Major public trails and viewpoints adjacent to the river are river-related development~~. Bridge exit and entrance ramps supported by piers or pillars, as opposed to fill, are river-related development. Removal or remedial actions of hazardous substances conducted under ORS 465.200 through 465.510 and 475.900 are considered river-related development for the duration of the removal or remedial action.~~ The following are considered river-related development:

- ~~Recreational~~Major public trails ~~and~~
- ~~v~~Viewpoints ~~adjacent to the river are river-related development.~~
- Resource enhancement projects
- Passenger waiting and queuing areas, security checkpoints, cold food storage, and machine shops associated with marine passenger docks ~~for subregional travel~~ and marine passenger terminals ~~regional travel~~.
- Bridge exit and entrance ramps supported by piers or pillars, as opposed to fill~~, are river-related development.~~
- Removal or remedial actions of hazardous substances conducted under ORS 465.200 through 465.510 and 475.900 are considered river-related development for the duration of the removal or remedial action.

CCNW16: GREENWAY TRAIL WEST – BETWEEN THE BROADWAY AND STEEL BRIDGES



<u>Site-Specific ESEE Decision:</u> The ESEE decision is to:

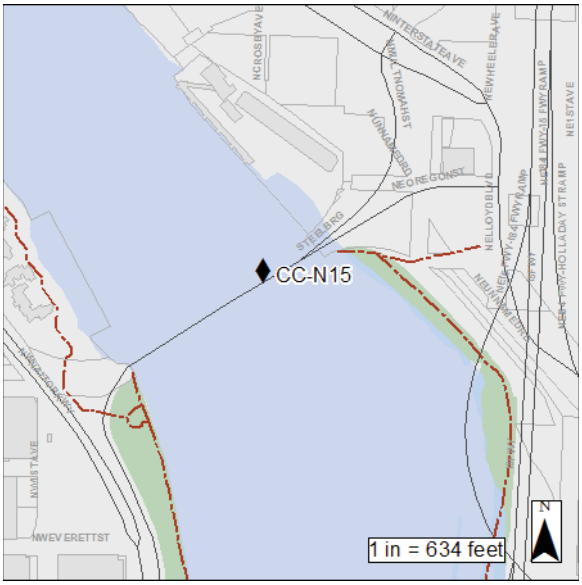
1. *Limit* conflicting vegetation within view corridor to the Willamette River, Broadway Bridge, and Steel Bridge.
2. *Allow* conflicting structures.

<u>Protected focal feature(s) of the view:</u> Willamette River, Broadway Bridge, Steel Bridge

<u>Explanation:</u> This view across the Willamette River from the Greenway Trail is framed by the Broadway and Steel Bridges. The Fremont Bridge, grain mill, and riverbank are secondary focal features. There is a development site located along N Thunderbird Way between the river and Moda Center that, depending on its design, could contribute positively or negatively to the view. The view from CCNW16 is ranked Group B.

The general recommendation for a Group B view without Mt Hood or Mt St Helens as a primary focal feature is to allow conflicting structures and limit conflicting vegetation within view corridors to primary focal features. That recommendation stands (shown in yellow). However, due to the location of this viewpoint along the Greenway Trail West, there is no potential for structures to block the view. Vegetation could grow up and block the view. The recommendation is to limit conflicting vegetation within the view corridor to maintain a view of the Willamette River, Broadway Bridge, and Steel Bridge.

CCN15: STEEL BRIDGE – NORTH SIDE, EAST



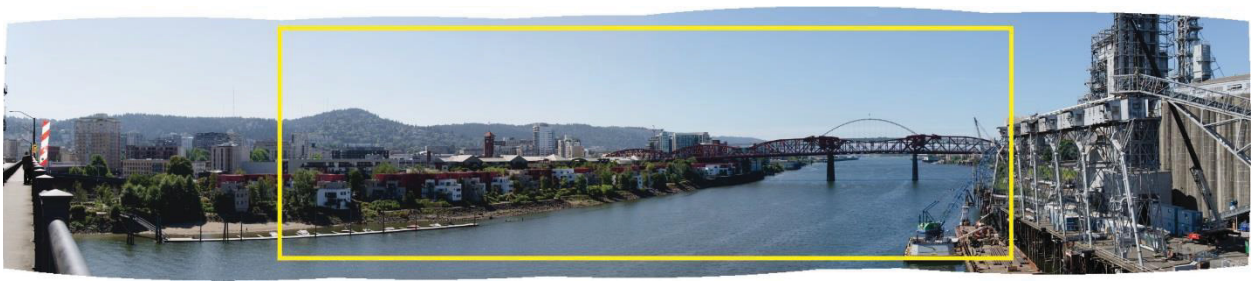
Site-Specific ESEE Decision: The ESEE decision is to:

1. *Allow* conflicting structures within view corridor to Fremont Bridge, West Hills, Broadway Bridge, and Willamette River.
2. *Limit* conflicting vegetation within view corridor to Fremont Bridge, West Hills, Broadway Bridge, and Willamette River.

Protected focal feature(s) of the view: Willamette River, West Hills, Broadway Bridge, Fremont Bridge

Explanation: This view from the northeast side of the Steel Bridge is taken such that the Fremont Bridge is centered behind the Broadway Bridge. The Willamette River, West Hills, and Forest Park contribute a natural scenic quality to the scene. On the right, the prominent grain mill adds an element of the industrial while, on the left, the Old Town/Chinatown waterfront and Union Station lend an urban feel to the view. The upper deck, from which this view was taken, does not have a separated bike lane, the sidewalk is narrow and there are no pedestrian refuges from which to enjoy the view. Though there is a guardrail between the sidewalk and traffic lanes, it is low and the viewpoint does not feel like a safe place to stop and enjoy a view. The view from CCN15 is ranked Group B.

The general ESEE recommendation for a Group B view without views of Mt Hood or Mt St Helens is to allow conflicting height and limit conflicting vegetation within view corridors to primary focal features. That recommendation stands. However, because this viewpoint is on a bridge out over the Willamette River, there are no conflicting uses (structures or vegetation) that could block the view of the Fremont Bridge, Broadway Bridge, Willamette River, or grain mill. Based on existing height limits, future development will not completely block a view of the West Hills.



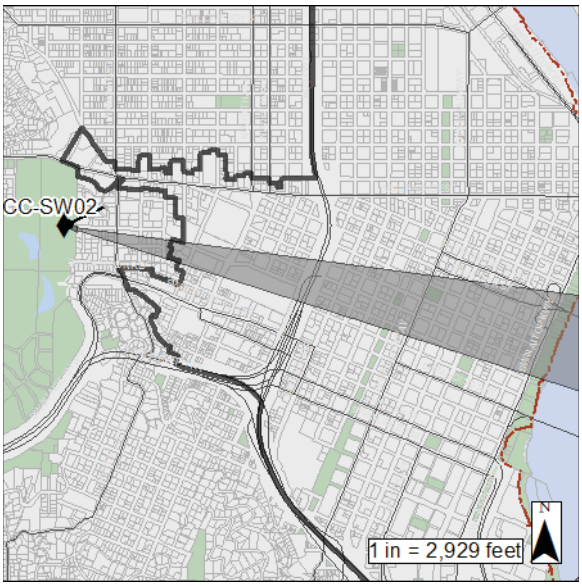
CCSW02: LEWIS AND CLARK MONUMENT AT SW PARK PLACE

Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures and vegetation within view corridor to Mt Hood.

Protected focal feature(s) of the view: Mt Hood

Explanation: Located at the entrance to Washington Park from SW Park Place, this view acts much like a corridor with the path and landscaping in the foreground. Mt Hood is visible in the background but is partially obscured by a large building. Large trees are encroaching on the view from both sides, although the side vegetation also frames the view. Vegetation management will be needed to maintain the view of Mt Hood. The view from CCSW02 is ranked Tier II.

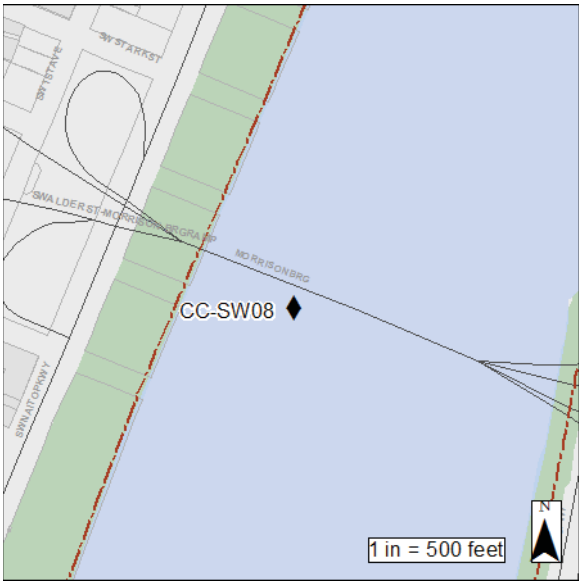


The general ESEE recommendation for a Tier II view where Mt Hood or Mt St Helens is a primary focal feature is to limit conflicting structures and vegetation within the view corridor to Mt Hood. There is an existing height limit associated with this historic view corridor from the Lewis and Clark Monument to Mt Hood. Though the view of Mt Hood is already compromised – there's an apartment building that encroaches on the view of the mountain – the viewpoint is located in an accessible area at the entrance of Washington Park. Therefore, the recommendation is to prohibit conflicting uses and to retain the height restriction associated with the view of Mt Hood from this viewpoint (shown in red) and limit vegetation (shown in yellow).

CCSW08: MORRISON BRIDGE – SOUTH SIDE, WEST

Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures and vegetation within view corridor to Central City skyline, and Hawthorne Bridge, with the Willamette River below.

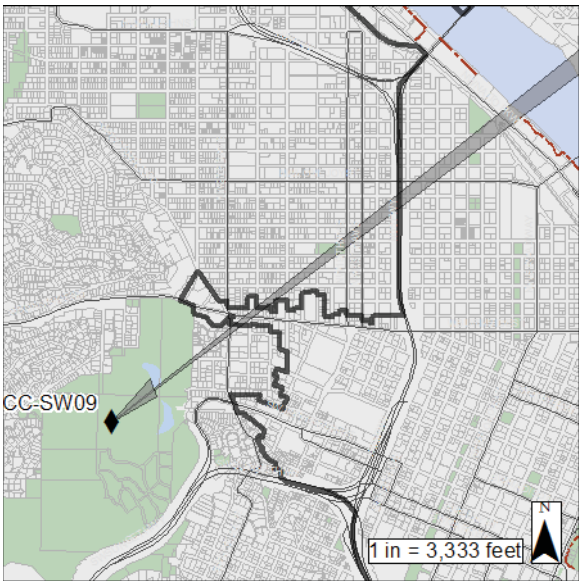


Protected focal feature(s) of the view: Willamette River, Central City skyline, Hawthorne Bridge

Explanation: This view looks up (south) the Willamette River toward the Hawthorne Bridge with the Marquam Bridge and West Hills visible in the background. The left side shows the inner southeast with foothills in the distance. The right side includes views of Waterfront Park and the Central City skyline. The south side of the Morrison Bridge, from which this view was taken, has a separated bike lane and there are two pedestrian refuges from which one can stop and take in the view; this was taken from the western refuge. The south side of the Morrison Bridge is easier to access than the north side and is safer due to the separation of transportation modes and a guardrail separating the bike lane from automobile traffic. Though not shown in the panoramic photo, Mt Hood is visible on the other side of the bridge tower on a clear day. The view from CCSW08 is ranked Group A.

The general recommendation for Group A views is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens or a bridge is a primary focal feature, and to limit conflicting structures and vegetation within view corridors to other primary focal features. Due to the location of this viewpoint on the Morrison Bridge out over the Willamette River, there is no potential for development or vegetation to block the view of the Willamette River, Hawthorne Bridge, or Central City skyline. The Central City skyline and Willamette River are both integral to this view. Therefore, the decision is to prohibit conflicting uses to maintain a view of the Central City skyline and Hawthorne Bridge, with the Willamette River below (shown in red).

CCSW09: INTERNATIONAL ROSE TEST GARDEN – NEAR GARDEN STORE, NORTH POINT



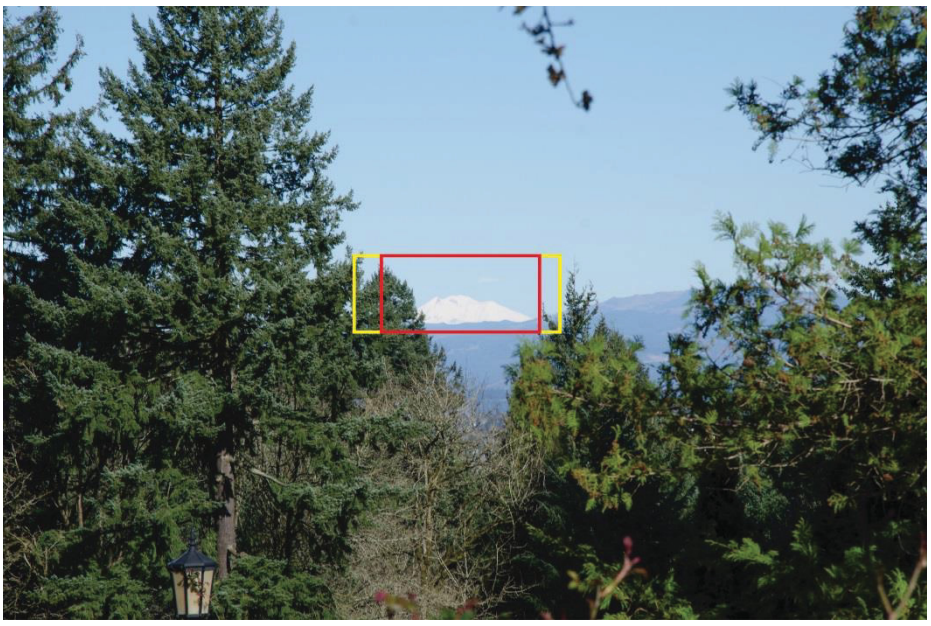
Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures within view corridor to Mt Adams.
2. *Limit* conflicting vegetation within the view corridor to Mt Adams.

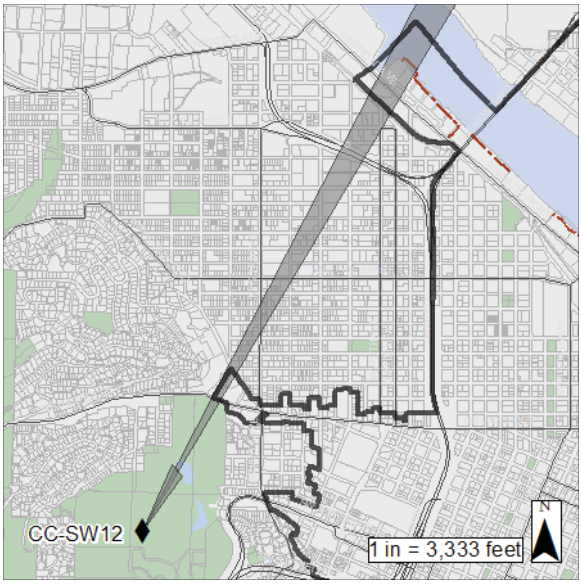
Protected focal feature(s) of the view: Mt Adams

Explanation: This view from in front of the garden store at the Rose Garden looks out to the eastern foothills and Mt Adams. The Rose Garden is a major tourist attraction and draws many visitors throughout the year. This is the most highly developed viewpoint in the Rose Garden and consists of a viewing platform area with tables and chairs, benches, two telescopes, restrooms, a water fountain, bike racks, and lighting. There are multiple vantage points from this large viewing platform. This viewpoint is in front of the garden store and is a view of Mt Adams; the other is just to the south (CCSW10). The view from CCSW09 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens or a bridge is a primary focal feature, and to limit conflicting structures and vegetation within view corridors to other primary focal features. The elevation of the viewpoint is at a high enough elevation that structures within the Central City boundary, even if built to their allowed heights, will not block the view of Mt Adams. However, vegetation is encroaching on the view from the bottom and sides and is beginning to obscure a clear view of Mt Adams. This is the most complete view of Mt Adams identified through the CCSRI. Therefore, the recommendation is to prohibit conflicting vegetation to maintain a view of Mt Adams (shown in red).



CCSW12: WASHINGTON PARK – ZOO TRAIN STATION BY ROSE GARDEN



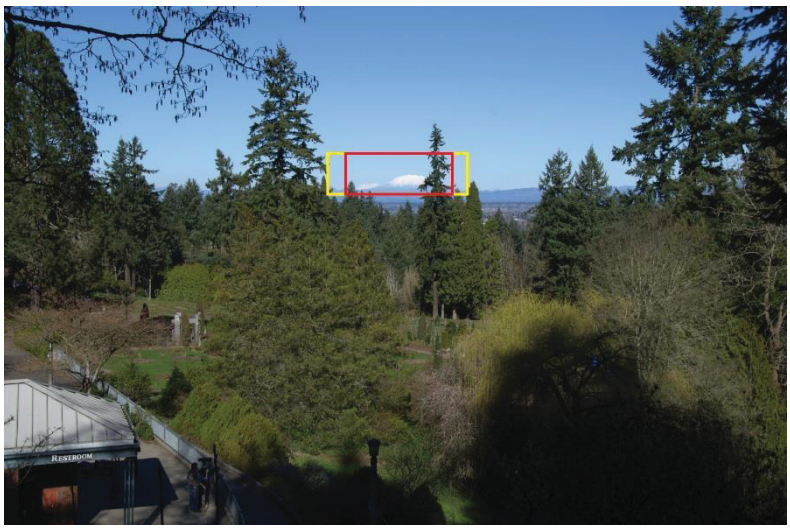
Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures within view corridor to Mt St Helens and Mt Rainier.
2. *Limit* conflicting vegetation within the view corridor to Mt St Helens and Mt Rainier.

Protected focal feature(s) of the view: Mt St Helens, Mt Rainier

Evaluation: The viewpoint at the Washington Park zoo train platform by the Rose Garden offers a rare view of Mt St Helens with Mt Rainier peeking out from behind. Historically, this view provided a panoramic overlook that also included views of the Downtown skyline and Mt Hood, in addition to Mt St Helens. Today, the view is almost entirely blocked by vegetation and Mt Hood and the skyline are no longer visible. Glimpses of the rose garden can be seen in the foreground along with glimpses of the eastern foothills in the distances. The historic view could be restored through vegetation management. The view from CCSW12 is ranked Tier I.

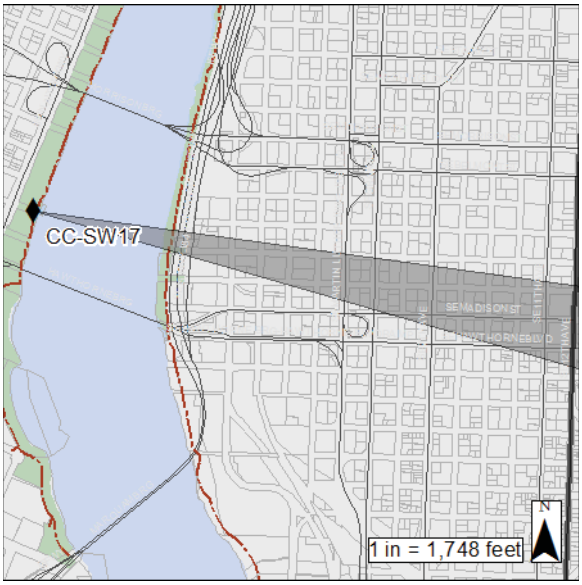
The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens or a bridge is a primary focal feature and to limit conflicting structures and vegetation within view corridors to other primary focal features. The viewpoint at the zoo train station by the Rose Garden is at a high enough elevation that structures within the Central City boundary, even if built to their allowed heights, will not block the view of Mt St Helens. However, vegetation is beginning to obscure the view of Mt St Helens. This is also one of the only views of Mt St Helens where Mt Rainier is identifiable. Therefore, the recommendation is to prohibit conflicting structures and vegetation to maintain a view of Mt St Helens and Mt Rainier (shown in red).



CCSW17: GREENWAY TRAIL WEST – AT SALMON STREET SPRINGS

Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures and vegetation within view corridor to Mt Hood.
2. *Limit* conflicting vegetation within view corridors to the Willamette River, Morrison Bridge, and Hawthorne Bridge.
3. *Allow* conflicting structures within view corridors to the Willamette River, Morrison Bridge, and Hawthorne Bridge.

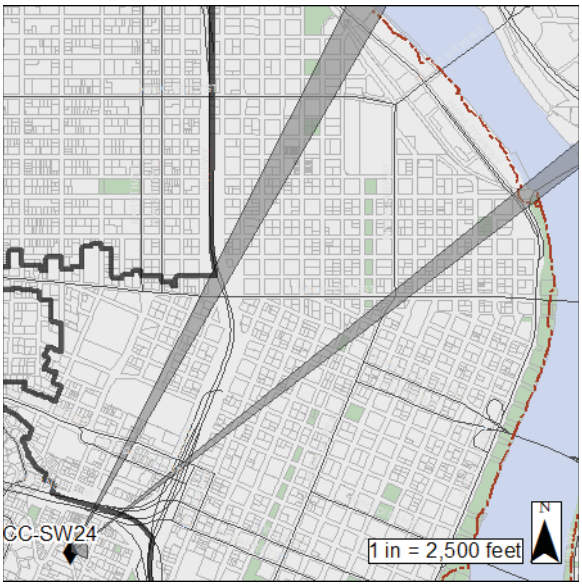


Protected focal feature(s) of the view: Willamette River, Hawthorne Bridge, Morrison Bridge, Mt Hood

Explanation: Located at the Salmon Street Springs fountain, this view looks out across the Willamette River and the Central Eastside to Mt Hood. There is also a primary view of the Hawthorne Bridge. The Morrison Bridge, riverbank, and Mt Tabor are secondary focal features. The vegetation on the east side, including the conical conifers contributes to the scenic quality of this view. This developed viewpoint is located at Governor Tom McCall Waterfront Park and on a highly trafficked and accessible section of the Greenway Trail. The viewpoint is quite large and includes upper and lower paths, a curved staircase, and the approach from Salmon Springs. It has two telescopes, educational signs, and an amphitheater staircase where a viewer can sit and take in the view. The viewpoint receives high volumes of visitors, particularly during events like the Rose Festival, which draw tourists from the entire Metro Region. The view from CCSW17 is ranked Group B.

The general ESEE recommendation for Group B views where Mt Hood or Mt St Helens is a primary focal feature is to limit conflicting uses within the view corridor to Mt Hood or Mt St Helens, and to limit conflicting vegetation and allow conflicting structures within view corridors to other primary focal features. Due to the location of the viewpoint along the seawall, there is no potential for development or vegetation to block a view of the Willamette River and bridges. However, structures or vegetation on the east side could block a view of Mt Hood. CCSW17 was included in the analysis of views of Mt Hood from bridges and the Greenway Trail. There were 10 potential views of Mt Hood considered. Of the ten, SW17 is one of two viewpoints with a decision to prohibit conflicting uses within the view corridor to Mt Hood (shown in red). This viewpoint was chosen based on its location, existing infrastructure, accessibility and current use as a viewpoint. The general ESEE recommendation stands for the Willamette River and bridges (shown in yellow).

CCSW24: SW UPPER HALL STREET HAIRPIN TURN



Site-Specific ESEE Decision: The ESEE decision is to: allow.

1. *Prohibit* conflicting structures and vegetation within view corridors to the Central City skyline, Mt Adams, and Mt St Helens.
2. *Limit* conflicting vegetation within view corridors to Mt Hood and the Fremont Bridge.

Protected focal feature(s) of the view: Mt Hood, Mt St Helens, Mt Adams, Central City skyline, Fremont Bridge

Explanation: This viewpoint offers one of the most expansive views of the Central City skyline from within the Central City. It provides a wide panorama with views of Northwest Portland, the Downtown skyline, Mt Hood, Mt St Helens, Mt Adams, the Fremont Bridge, and the eastern foothills. The U.S. Bancorp Tower, Wells Fargo Center, Park Avenue West Tower, and KOIN Center are all visible. Viewpoint access is limited due to its remote location, lack of parking, bike lanes, or transit access, and incomplete sidewalk. The view from CCSW24 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to other primary focal features. There are no BLI and nine non-BLI conflicts within the view corridor to Mt St Helens, one BLI and 12 non-BLI conflicts to Mt Adams, and three BLI and 11 non-BLI conflicts to Mt Hood. CCSW24 has two existing height limitations; one is an extended view corridor to Mt Hood and the other is a wider but shallower panoramic view corridor directly adjacent to the viewpoint. This viewpoint is difficult to get to, has limited parking, and an incomplete sidewalk, and is not likely to be accessed by anyone other than people living nearby; however, the expert panel ranked it as one of the best views. Staff recommend retaining height limits within the view corridor to the Central City skyline and adding new height limits within view corridors to Mt Adams and Mt St Helens; staff recommend removing the height limits within the view corridor to Mt Hood. Therefore, the decision is to prohibit conflicting uses to maintain a view of the Central City skyline, Mt Adams, and Mt St Helens (shown in red) and to limit conflicting vegetation to maintain a view of Mt Hood and the Fremont Bridge as long as the views remain (shown yellow).

CCSW25: HAWTHORNE BRIDGE – SOUTH SIDE, CENTER

Site-Specific ESEE Decision: The ESEE decision is to:

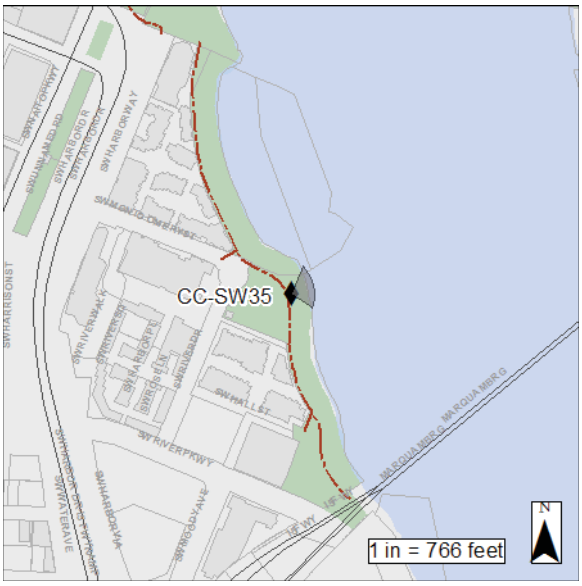
1. *Limit* conflicting vegetation within view corridors to the Willamette River and Central City west skyline.
2. *Allow* conflicting structures.

Protected focal feature(s) of the view: Willamette River, Central City west skyline

Explanation: This view from the south side of the Hawthorne Bridge looks up (south) the Willamette River to the Marquam Bridge. Tilikum Crossing is also visible further upriver. Interstate 5 dominates the left side and detracts from the scenic quality of the view. On the right are views of South Waterfront, Riverplace Marina, the West Hills, Hawthorne Bowl, and the Downtown skyline. The Hawthorne Bridge is highly trafficked but lacks a guardrail between the bike/ped path and automobile traffic lanes. There's a relatively wide bike/ped path with striping to separate bikes from pedestrians on the bridge approach; however, the striping does not continue across the actual bridge. There are no pedestrian refuges from which to stop and enjoy the view. The view from CCSW25 is ranked Group B.

The general ESEE recommendation for Group B views where Mt Hood is not a primary focal feature is to allow conflicting structures and to limit conflicting vegetation within view corridors to primary focal features. That recommendation stands (shown in yellow). However, due to the location of this viewpoint on the Hawthorne Bridge, out over the Willamette River, there's no potential for structures or vegetation to block the view of the Willamette River or Downtown skyline.

CCSW35: GREENWAY TRAIL WEST – SOUTH OF RIVERPLACE PUBLIC DOCK



Site-Specific ESEE Decision: The ESEE decision is to:

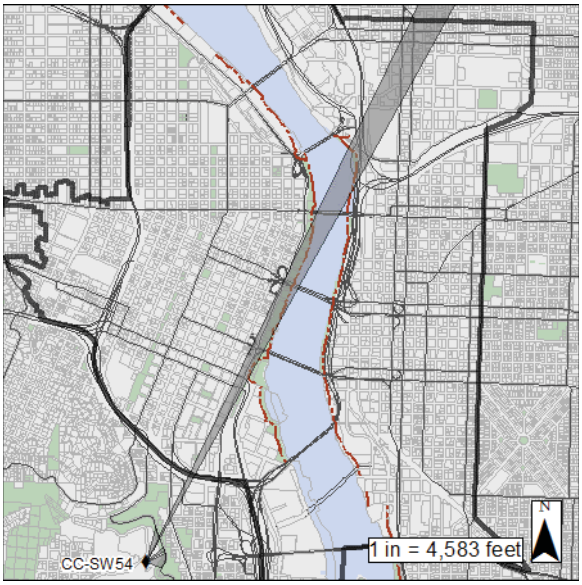
1. *Limit* conflicting vegetation within view corridor to the Willamette River.
2. *Allow* conflicting structures.

Protected focal feature(s) of the view: Willamette River

Explanation: This viewpoint is right above the ramp leading down to the Riverplace public dock by the Newport Seafood Grill and adjacent to the park at the end of SW Montgomery Street. The view includes the Willamette River and Marquam Bridge. Tilikum Crossing, the Hawthorne Bridge, Riverplace Marina, the riverbank, and the Downtown skyline are secondary focal features. Though the viewpoint is developed and has benches, it is located directly above a trash can storage area which makes the viewpoint unpleasant. The view from CCSW35 is ranked Group B.

The general ESEE recommendation for Group B views where Mt Hood is not a primary focal feature is to allow conflicting structures and to limit conflicting vegetation within view corridors to primary focal features. That recommendation stands. However, due to the location of this viewpoint along the Greenway Trail West, there is no potential for development to block the view. Vegetation along the riverbank below the viewpoint could obstruct the view. Staff recommend applying the limit conflicting vegetation within a view cone to the Willamette River (shown in yellow). Staff also recommend relocating the existing trash and recycling receptacles away from the viewpoint.

CCSW54: OHSU PETER O. KOHLER PAVILION – LOWER LEVEL



Site-Specific ESEE Decision: The ESEE decision is:

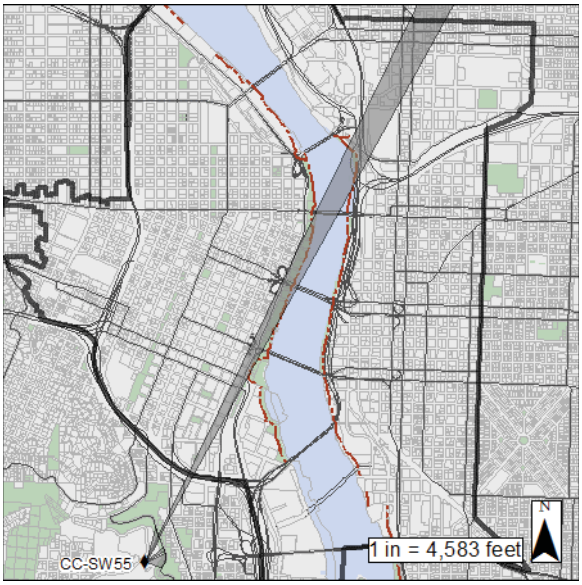
1. *Prohibit* conflicting structures within view corridor to Mt St Helens.
2. *Defer* to South Waterfront Public Views and Visual Permeability Assessment (2006) regarding ESEE decision for conflicting structures within view corridor to Mt Hood.
3. *Limit* conflicting vegetation within view corridors to Mt St Helens, Mt Hood, Mt Adams and Tilikum Crossing with the Willamette River below.

Protected focal feature(s) of the view: Mt St Helens, Mt Hood, Mt Adams, Tilikum Crossing, Willamette River

Explanation: Two pavilions are located at the Oregon Health and Sciences University Peter O. Kohler Pavilion that are developed as viewpoints, this lower pavilion and an upper one (see CCSW55). The lower pavilion provides a wide panoramic view of Mt St Helens, Mt Adams, Mt Hood, the Willamette River, Rocky Butte, Kelly Butte, Powell Butte, Mt Tabor, Mt Scott, the eastern foothills, South Waterfront, Tilikum Crossing, and the Lloyd District. While the lower deck of the OHSU pavilion offers a nice view, it is not easily accessible by the general public. The view from CCSW54 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to all other primary focal features. Because there are two viewpoints with views of area mountains, the upper level rather than the lower level is recommended for protection. Vegetation should be maintain to protect the view of the City Skyline; of particular note is a tall Douglas fir that is partially obscuring Mt St Helens. There are no existing or foreseeable building conflicts blocking this view of Mt Hood and, as South Waterfront continues to develop, all new buildings will be held to the *South Waterfront Public Views and Visual Permeability Assessment*, which considers east-west visibility through the developed area. The ESEE decision is to defer to the 2006 *South Waterfront Public Views & Visual Permeability Assessment* for height and massing restrictions within the view corridor to Mt Hood, to limit conflicting structures and vegetation Mt Adams, Mt Hood, Mt St Helens, and Tilikum Crossing with the Willamette River below (shown in yellow).

CCSW55: OHSU PETER O. KOHLER PAVILION – UPPER LEVEL



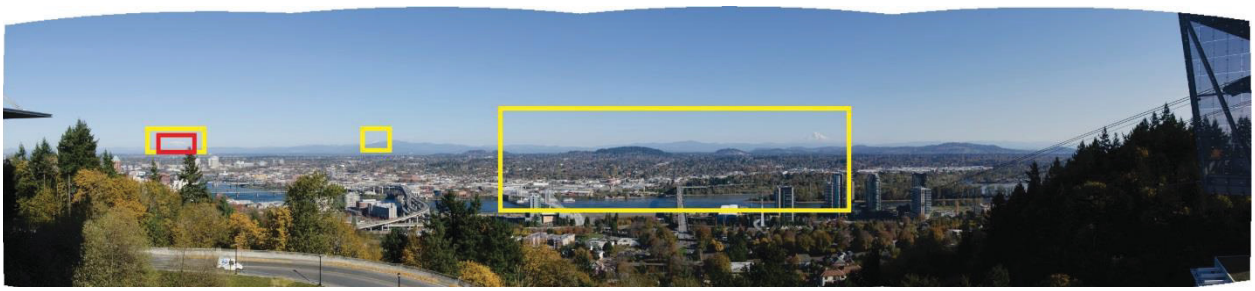
Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures within view corridor to Mt St Helens.
2. *Defer* to South Waterfront Public Views and Visual Permeability Assessment (2006) regarding ESEE decision for conflicting structures within view corridor to Mt Hood.
3. *Limit* conflicting vegetation within view corridors to Mt St Helens, Mt Hood, Mt Adams, and Tilikum Crossing with the Willamette River below.

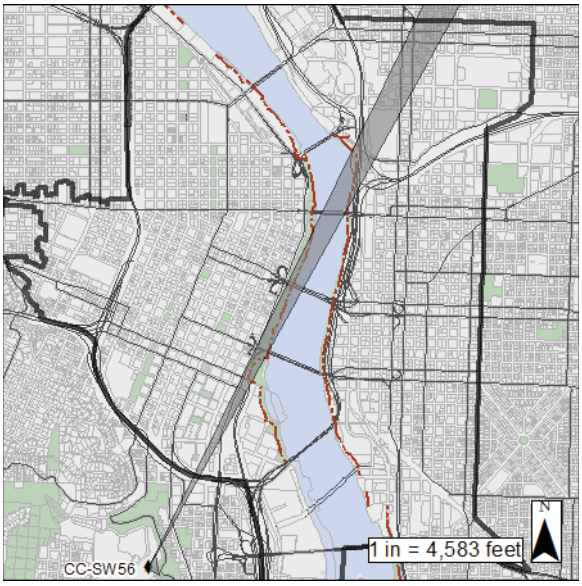
Protected focal feature(s) of the view: Mt Hood, Mt St Helens, Mt Adams, Tilikum Crossing, Willamette River

Explanation: Two pavilions are located at the Oregon Health and Sciences University Peter O. Kohler Pavilion that are developed as viewpoints, this upper pavilion and a lower one (see CCSW54). Showcasing all three of Portland's iconic mountains and many buttes, this is one of the best views Portland has to offer. This wide panoramic view includes Mt Hood, Mt St Helens, Mt Adams, the Willamette River, Rocky Butte, Kelly Butte, Powell Butte, Mt Tabor, Mt Scott, the eastern foothills, South Waterfront, Tilikum Crossing, and the Lloyd District. While the upper level of the OHSU pavilion is developed as a viewpoint and offers a nice view, it is not easily accessible by the general public. The view from CCSW55 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to all other primary focal features. Building heights and vegetation may block the view of Mt St Helens. There are no existing or foreseeable building conflicts blocking this view of Mt Hood and, as South Waterfront continues to develop, all new buildings will be held to the *South Waterfront Public Views and Visual Permeability Assessment*. Though not primary focal features, Mt Adams and multiple bridges are visible and add to the scenic quality of this view. The ESEE decision is to defer to the 2006 *South Waterfront Public Views & Visual Permeability Assessment* for height and massing restrictions within the view corridor to Mt Hood, to prohibit conflicting structures to maintain a view of Mt St Helens (shown in red), and to limit conflicting vegetation to maintain views of Mt Adams, Mt Hood, Mt St Helens, and Tilikum Crossing with the Willamette River below (shown in yellow).



CCSW56: PORTLAND AERIAL TRAM OHSU TERMINAL – NORTH PLATFORM



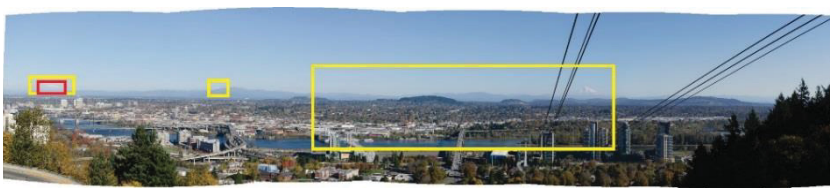
Site-Specific ESEE Decision: The ESEE decision is:

1. *Prohibit* conflicting structures within view corridor to Mt St Helens.
2. *Defer* to South Waterfront Public Views and Visual Permeability Assessment (2006) regarding ESEE decision for conflicting structures within view corridor to Mt Hood.
3. *Limit* conflicting vegetation within view corridors to Mt St Helens, Mt Hood, Mt Adams and Tilikum Crossing with the Willamette River below.

Protected focal feature(s) of the view: Mt St Helens, Mt Hood, Mt Adams

Explanation: The view from the north platform of the Portland Aerial Tram Oregon Health and Science University terminal includes elements of the most iconic views in Portland: Mt Hood, Mt St Helens, and Mt Adams, seven bridges (Ross Island, Tilikum Crossing, Marquam, Hawthorne, Morrison, Burnside, and Steel), the Willamette River, the eastern foothills, South Waterfront, Ross Island, the Convention Center spires, and the Lloyd District. (See CCSW60 for view from south platform.) The view is bounded on the left by the tram platform structure and on the right by vegetation. The tram cables create a strong linear element that draws the viewer's eye down toward the water and South Waterfront development but also obstructs a clean view of the horizon and ridgeline. Though at the top of the tram, this viewpoint is not easily accessible by any means other than the tram. The view from CCSW56 is ranked Tier I.

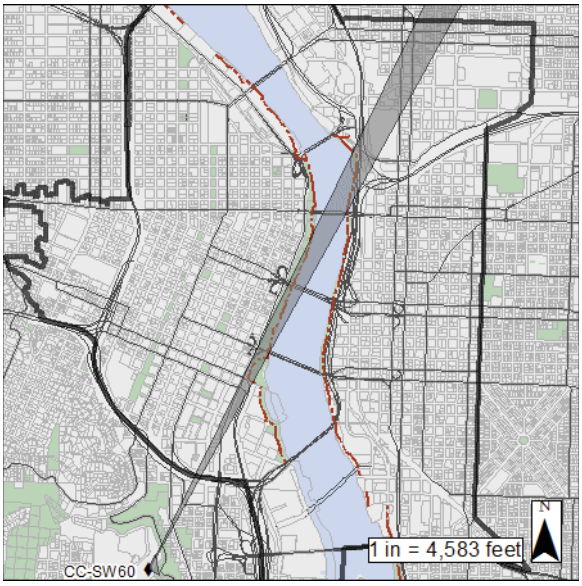
The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to all other primary focal features. Building heights and vegetation may block the view of Mt St Helens. There are no existing or foreseeable building conflicts blocking this view of Mt Hood and, as South Waterfront continues to develop, all new buildings will be held to the *South Waterfront Public Views and Visual Permeability Assessment*. The view of Mt Adams and glimpses of the Willamette River and bridges are also important to the character of this view. Vegetation could grow up and block views of the mountains or river. The ESEE decision is to defer to the 2006 *South Waterfront Public Views & Visual Permeability Assessment* for height and massing restrictions within the view corridor to Mt Hood, to prohibit conflicting structures to maintain a view of Mt St Helens (shown in red), and to limit conflicting vegetation to maintain views of Mt Adams, Mt Hood, Mt St Helens and Tilikum Crossing with the Willamette River below (shown in yellow).



CCSW60: PORTLAND AERIAL TRAM OHSU TERMINAL – SOUTH PLATFORM

Site-Specific ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures within view corridors to Mt St Helens.
2. *Defer* to South Waterfront Public Views and Visual Permeability Assessment (2006) regarding ESEE decision for conflicting structures within view corridor to Mt Hood.
3. *Limit* conflicting vegetation within view corridor to Mt St Helens, Mt Hood, Mt Adams and Tilikum Crossing with the Willamette River below.

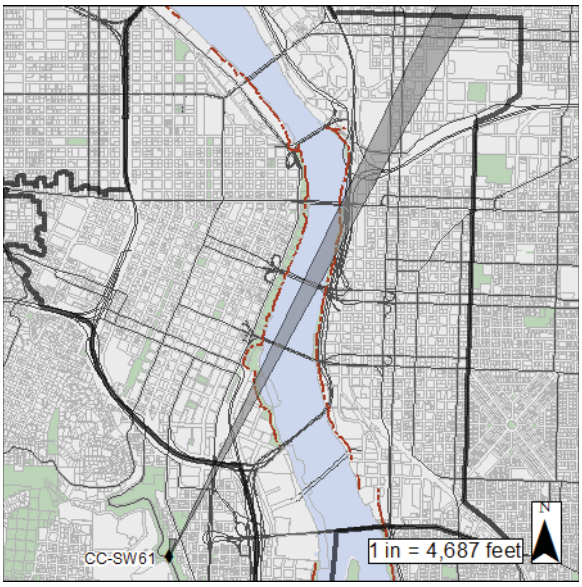


Protected focal feature(s) of the view: Mt St Helens, Mt Hood, Mt Adams

Explanation: The view from the south platform at the Portland Aerial Tram OHSU terminal includes elements of the most iconic views in Portland: Mt Hood, Mt St Helens, Mt Adams, seven bridges (Ross Island, Tilikum Crossing, Marquam, Hawthorne, Morrison, Burnside and Steel), Willamette River, eastern foothills, South Waterfront, Ross Island, Downtown skyline, Convention Center spires and Lloyd District. The view is bounded on the left by the platform structure and on the right by vegetation. Compared to the view from the north platform (CCSW56), this view includes the Downtown skyline. The tram cables create a strong linear element that draws the viewer's eye down toward the river and South Waterfront development but also obstructs a clean view of the horizon and ridgeline. Though at the top of the tram, this viewpoint is not easily accessible by any means other than the tram. The view from CCSW60 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to all other primary focal features. The viewpoint at the Portland aerial tram OHSU terminal south platform is at a high enough elevation that structures within the Central City boundary, even if built to their allowed heights, will not block the view of Mt Hood or Mt Adams. Views across South Waterfront were heavily considered in the recent South Waterfront planning process. There are no existing or foreseeable building conflicts blocking this view of Mt Hood and, as South Waterfront continues to develop, all new buildings will be held to the *South Waterfront Public Views and Visual Permeability Assessment*. Mt Adams and glimpses of the Willamette River and bridges are also important to the character of this view. Vegetation could grow up and block views of the mountains or river. The ESEE decision is to defer to the 2006 *South Waterfront Public Views & Visual Permeability Assessment* for height and massing restrictions within the view corridor to Mt Hood, to prohibit conflicting structures to maintain a view of Mt St Helens, and to limit conflicting vegetation to maintain views of Mt Adams, Mt Hood, Mt St Helens and Tilikum Crossing with the Willamette River below.

CCSW61: SW TERWILLIGER BOULEVARD – SOUTH OF SW CAMPUS DRIVE



Site-Specific ESEE Decision: The ESEE decision is to:

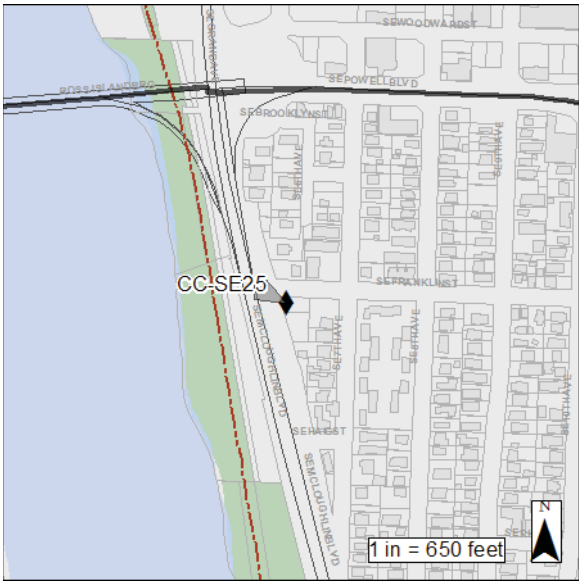
1. *Prohibit* conflicting structures and vegetation within the view corridor to Mt St Helens.
2. *Limit* conflicting structures and vegetation within the view corridor to the Central City skyline.

Protected focal feature(s) of the view: Mt St Helens, Central City skyline

Explanation: This viewpoint from the automobile pull-out along SW Terwilliger Boulevard south of SW Campus Drive includes a view of Mt St Helens and the Downtown skyline. The Willamette River, Convention Center spires, Lloyd District, eastern foothills, and the Hawthorne, Morrison, and Burnside Bridges are also visible. This viewpoint is highly accessible and located on a developed automobile pull-out from the road. The view from CCSW61 is ranked Tier I.

The general ESEE recommendation for a Tier I view is to prohibit conflicting structures and vegetation within view corridors where Mt Hood, Mt St Helens, or bridges are primary focal features, and to limit conflicting structures and vegetation within view corridors to all other primary focal features. There are four BLI and four non-BLI conflicts within the view corridor to Mt St Helens. Moreover, while having some vegetation present contributes to the scenic quality of the view, vegetation could grow to block this view. Therefore, the ESEE recommendation is to prohibit conflicting structures and vegetation to maintain a view of Mt St Helens (shown in red) and to limit conflicting structures and vegetation to maintain a view of the Central City skyline (shown in yellow).

CCSE25: Brooklyn Community Garden



Site-Specific ESEE Decision: The ESEE decision is to:

1. *Limit* conflicting vegetation within the view corridor to the Central City skyline and the West Hills.

Protected focal feature(s) of the view: West Hills, Central City Skyline

Explanation: This view is primarily of the Central City skyline and the West Hills. Tilikum Crossing, the Ross Island Bridge, and the Willamette River are also visible. Traffic speeds, multiple lanes of traffic, and a concrete traffic barrier detract from the view. The view from CCNE09 is ranked Tier II.

The general ESEE recommendation for a Tier II view without a view of Mt Hood or Mt St Helens is to allow conflicting structures and to limit conflicting vegetation within view corridors to primary focal features. That recommendation stands. Staff recommend applying the limit conflicting vegetation decision within a view corridor to the Central City skyline and the West Hills, with the Willamette River below.

NW 12th Avenue and NW Lovejoy Street: View of Fremont Bridge

ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures and vegetation within view corridor to the Fremont Bridge.

Protected focal feature(s) of the view: Fremont Bridge

Explanation:
This view street extends north along NW 12th Avenue from NW Lovejoy Street. The view terminates at the Fremont Bridge and captures the section of the bridge where the bridge deck meets the bridge arch. This two-way view street has travel lanes, parking and sidewalks on both sides of the street. The view is best seen from the middle of the street, within the crosswalk.

The general ESEE recommendation for a view street is to limit conflicting structures and vegetation that would block, partially block, or substantially reduce the air space around the focal terminus. Because the architecturally interesting feature of the Fremont Bridge, where the deck meets the arch, is slightly off-center from the middle of the ROW, development along the west side of NW 12th could block or partially block the view of the Fremont Bridge. Therefore, the ESEE recommendation is to prohibit conflicting building heights along NW 12th Avenue to maintain a view of where the deck meets the arch on the Fremont Bridge.

NW Johnson Street and NW 15th Avenue: View of Union Station Clock Tower

ESEE Decision: The ESEE decision is to:

1. *Prohibit* conflicting structures and vegetation within view corridor to the Union Station clock tower.

Protected focal feature(s) of the view: Union Station clock tower

Explanation:
This view street extends east along NW Johnson Street from NW 15th Avenue to the Union Station clock tower. Street trees (primarily during leaf-on) and the post office partially obscure the view. Redevelopment of the post office site will affect this view. This two-way view street does not have separated bike lanes but is a designated Neighborhood Greenway. There are sidewalks on both sides of the street though the clock tower is most visible from the crosswalk, slightly south of center.

The general ESEE recommendation for a view street is to limit conflicting structures and vegetation that would block, partially block, or substantially reduce the air space around the focal terminus. While the clock tower can be seen from the ROW, it sits slightly off center from the middle of the ROW. Thus, it is possible that new development on the north side of SW Johnson Street could block or partially block the view of the clock tower looking east along NW Johnson Street. Therefore, the ESEE decision is to prohibit conflicting building heights along NW Johnson Street to maintain a view of the clock tower from NW Johnson Street and NW 15th Avenue.

SW Broadway from SW Taylor Street to SW Jefferson Street: View of Portland Sign

ESEE Decision: The ESEE decision is to:

1. *Limit* conflicting vegetation within view corridor to the "Portland" sign.
2. *No conflicting structures.*

Protected focal feature(s) of the view: "Portland" sign (on Arlene Schnitzer Concert Hall)

Explanation:
This view street extends along SW Broadway from SW Jefferson Street to SW Taylor Street. The view terminus for this view is the Portland sign on the Arlene Schnitzer Concert Hall and is located in the center of the view street extent. The bottom of the sign is obscured by street trees during leaf-on; however, the full extent of the sign is visible during leaf-off. The view looking north from SW Broadway and SW Jefferson Street has a clearer view of the Portland sign but goes against the flow of bicycle and automobile traffic; the view looking south from SW Taylor Street, with the flow of traffic, is more obscured by street trees. Though there are sidewalks on both sides of the street, the full extent of the sign is best seen from the eastern sidewalk.

The general ESEE recommendation for a view street is to limit conflicting structures and vegetation that would block, partially block, or substantially reduce the air space around the focal terminus. The Portland sign is located on the Arlene Schnitzer Concert Hall, on the west side of SW Broadway; the view is best from the corner of SW Broadway and SW Jefferson Street. The view corridor is entirely within the ROW such that no development could block a view of the sign; however, vegetation partially blocks the sign, particularly during leaf on. Furthermore, this section of SW Broadway is part of the Broadway Unique Sign District. Therefore, the ESEE decision is to limit conflicting vegetation located on either side of the Portland sign to maintain a clearer view of the Portland sign from two blocks away in either direction along SW Broadway.

SW 5th Avenue and SW Taylor Street: View of Portlandia

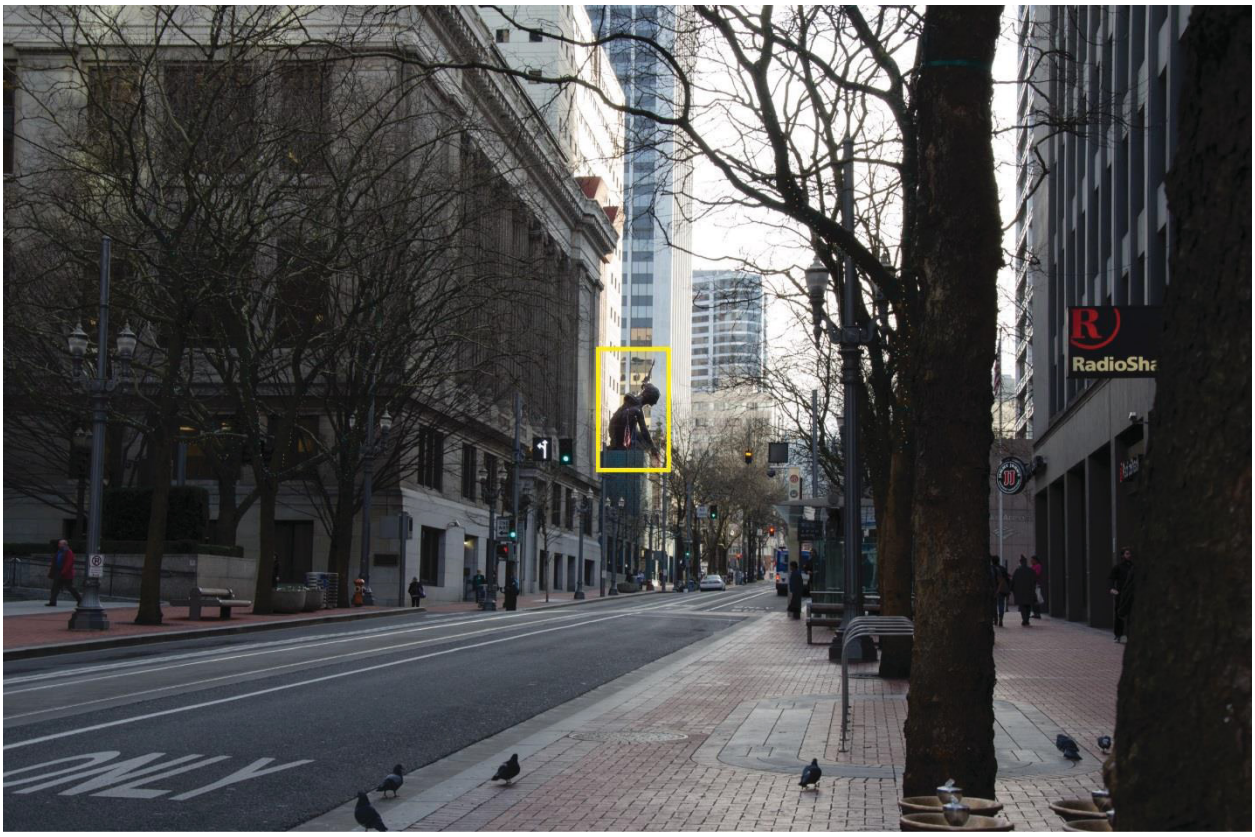
ESEE Decision: The ESEE decision is to:

1. *Limit* conflicting vegetation within view corridor to Portlandia statue.
2. *No conflicting structures.*

Protected focal feature(s) of the view: Portlandia statue

Explanation:
This view street extends south down SW 5th Avenue from SW Taylor Street. The view is of the Portlandia statue located above the entrance to the Portland Building on SW 5th Avenue between SW Main Street and SW Madison Street. Portlandia statue is best seen during leaf-off; during leaf-on, street trees almost entirely obscure the statue, even from up close. SW 5th Avenue is part of the Portland Transit Mall. Automobile, bus, and light rail traffic flow one-way toward the statue. There are no designated bike lanes but there are wide sidewalks on both sides of the street.

The general ESEE recommendation for a view street is to limit conflicting structures and vegetation that would block, partially block, or substantially reduce the air space around the focal terminus. Portlandia statue is located on the Portland Building, on the east side of SW 5th Avenue; the view is best from the corner of SW 5th Avenue and SW Taylor Street. The view corridor is entirely within the ROW such that no development could block a view of the statue; however, vegetation partially blocks the statue, particularly during leaf on. Therefore, the ESEE decision is to limit conflicting vegetation located on either side of Portlandia statue to maintain air space around Portlandia statue.



N Tillamook Street and One Block East of N Kerby Avenue: View of Fremont Bridge

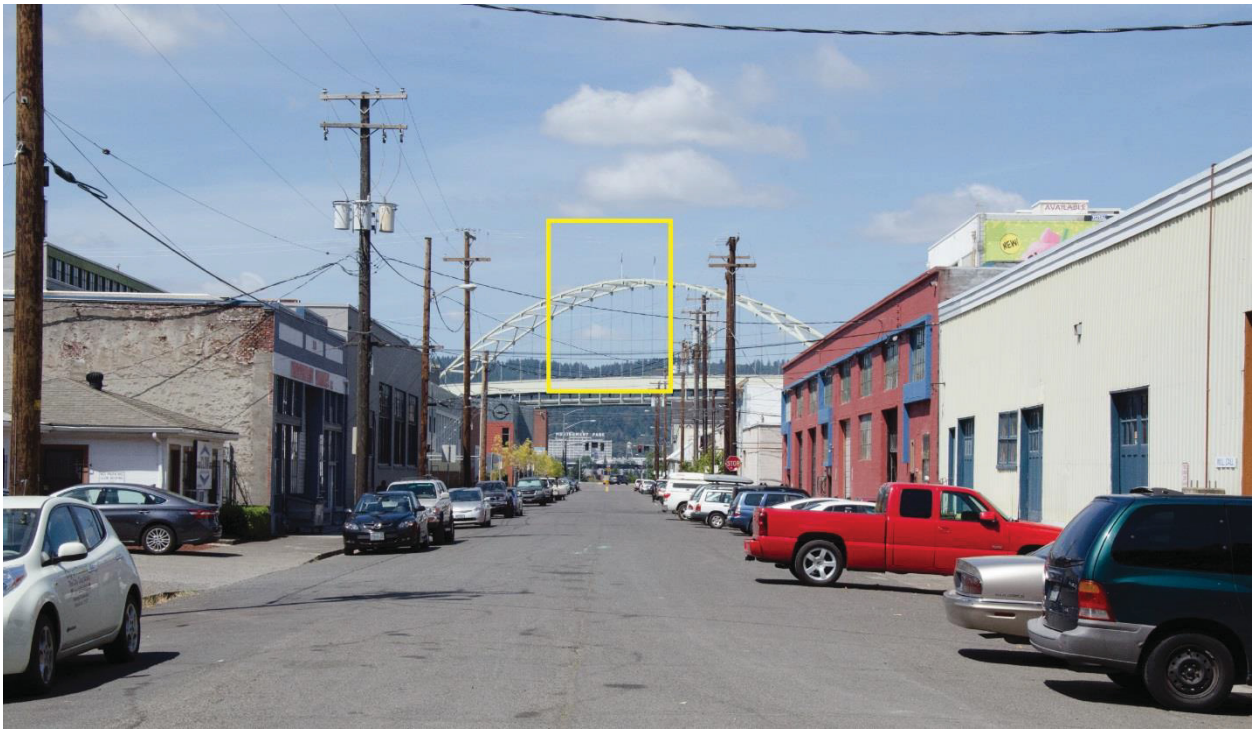
ESEE Decision: The ESEE decision is to:

1. *Limit* conflicting structures and vegetation within view corridor to the Fremont Bridge and Forest Park west of N Interstate Avenue.

Protected focal feature(s) of the view: Fremont Bridge, Forest Park

Explanation:
This view street extends west on N Tillamook Street from one block east of N Kerby Avenue. The view terminates at the Fremont Bridge with Forest Park visible in the background. N Tillamook Street is a two-way street. There is a sidewalk on the south side of the street and a partial sidewalk on the north side of the street, but the view is best seen from the middle of the street.

The general ESEE recommendation for a view street is to limit conflicting structures and vegetation that would block, partially block, or substantially reduce the air space around the focal terminus. Currently, much of the Fremont Bridge can be seen. However, only the center of the bridge is in line with the ROW; if buildings were to be built taller along either the north or south sides of N Tillamook Street, the visibility to the Fremont Bridge would shrink significantly and the sides of the arch would no longer be visible. N Tillamook Street slopes down west of N Interstate Avenue. Thus, staff recommend limiting height along the north and south side of N Tillamook Street west of N Interstate Avenue and allowing height east. Should new development go in along N Tillamook Street east of N Interstate that blocks the sides of the Fremont Bridge arch, this view street extent could be shortened to begin at N Interstate Avenue, rather than one block east of N Kerby Avenue.



Attachment F

Willamette River Central Reach Natural Resources Protection Plan

Attachment F adds new and amended chapters that transform the Willamette River Central Reach Natural Resources Inventory into a Natural Resources Protection Plan (NRPP). These new and amended chapters include an evaluation of compatible and conflicting uses and decisions regarding the protection of resources to establish the rationale for the application of the river overlay zone.

Because this is an update to an existing document, some pages are being replaced and others added. Rather than print a whole new document, please use this list and the attached pages as companion to the existing Volume 3B.

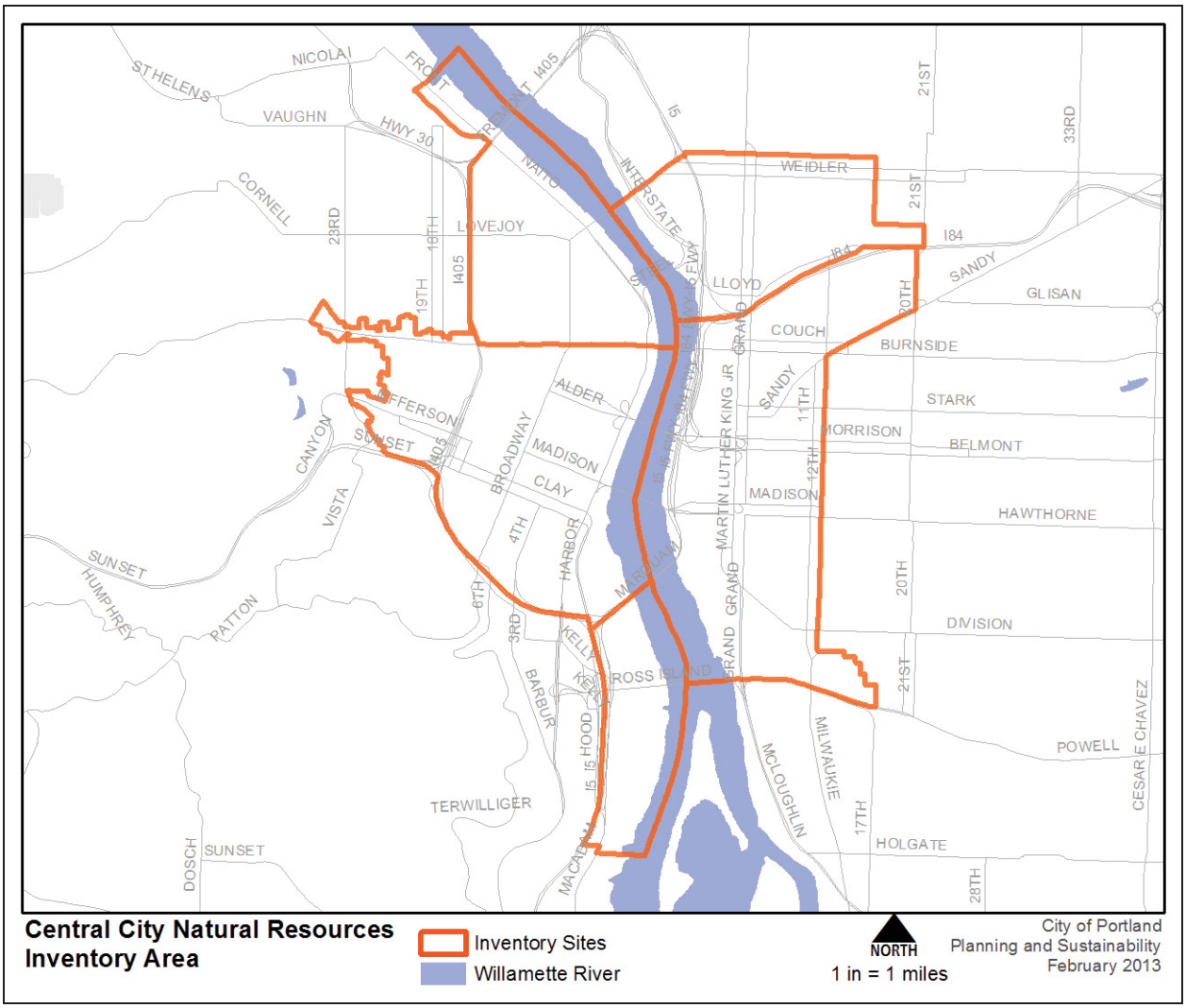
1. Executive Summary – replaces pages i-iv
2. Chapter 1: Introduction – replaces pages 1-10
3. Chapter 2: Regulatory Context (new) – add before page 11 of the existing document
4. Existing Chapter 2: Project Approach and Methodology Overview, becomes Chapter 3.
5. Chapter 4: Analysis of Protection Options and General Recommendations (new) – add before page 33 existing document
6. Existing Chapter 3: Central City Natural Resources Inventory, becomes Chapter 5: Results. The changes to the Results chapter are as follows:
    a. At the end of each inventory site narrative, a new section called Natural Resource Protection Recommendation is added. The recommendation is the same for each inventory site and is therefore only printed once in this attachment. This paragraph will be repeated on pages 60, 76, 92, 107 and 124.
    b. There is a new map for each inventory site that depicts the protection recommendation. Each map is included in this attachment and should be added after pages 66, 82, 98, 114 and 130.
7. Chapter 6: Implementation Tools (new) – add before page 131
8. References – replaces pages 131-132
9. Appendix B: Regulatory Requirements Memo is deleted because Chapter 2 now explains the regulatory context.

EXECUTIVE SUMMARY

Background and Process

As part of the River Plan / Central Reach and Central City 2035 (CC2035) projects, the City is updating the existing environmental information and management tools to protect and enhance natural resources. This update is needed to aide in meeting watershed health goals and advancing the City's compliance with local, regional, state and federal regulations.

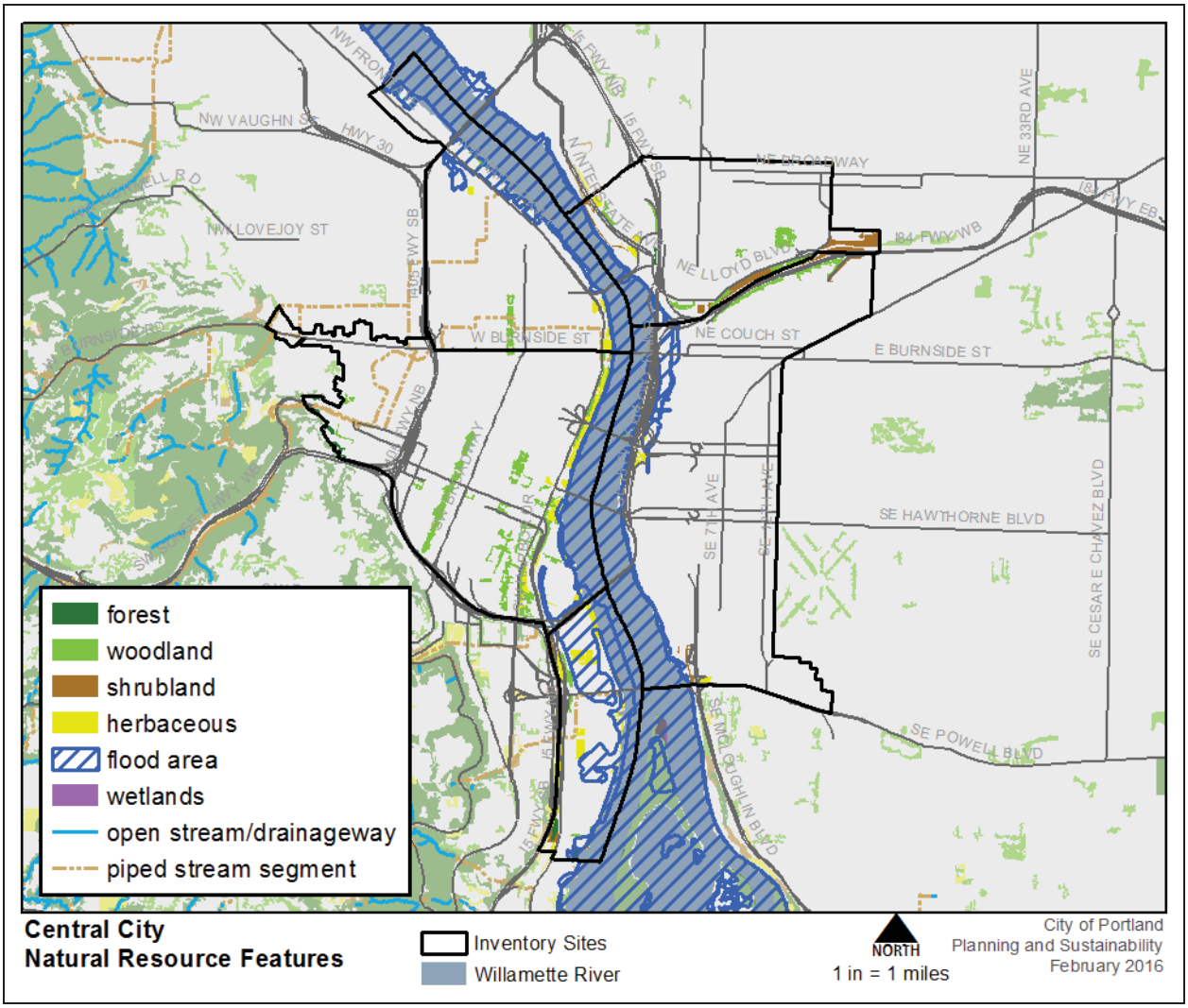
The Willamette River Central Reach Natural Resources Protection Plan (NRPP) describes the existing natural resources (e.g., vegetation, floodplain) in the CC2035 planning area, evaluates the functions and values they provide (e.g., flood storage, microclimate and shade) and recommends levels of protection along with tool to implement the recommendations..

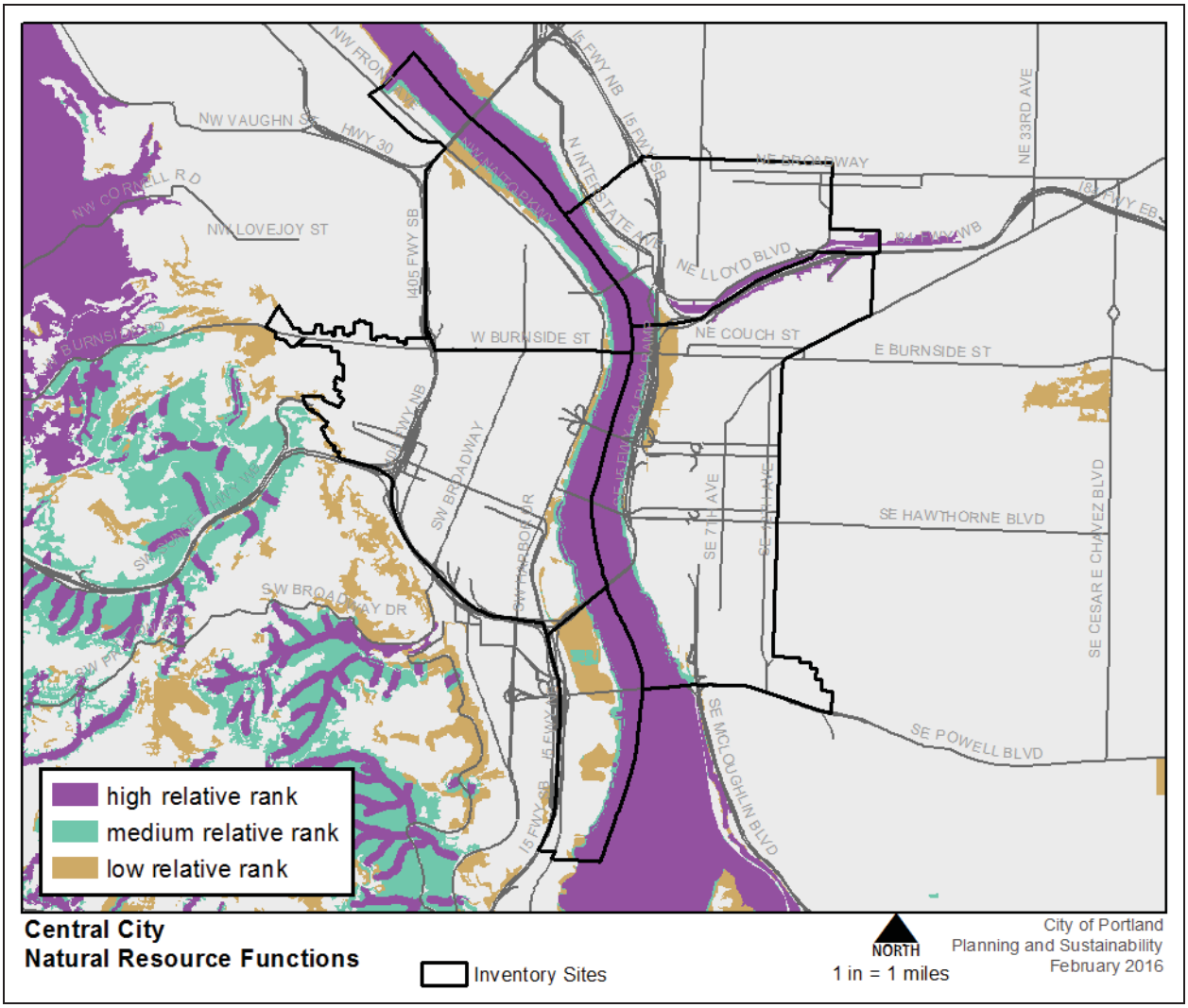


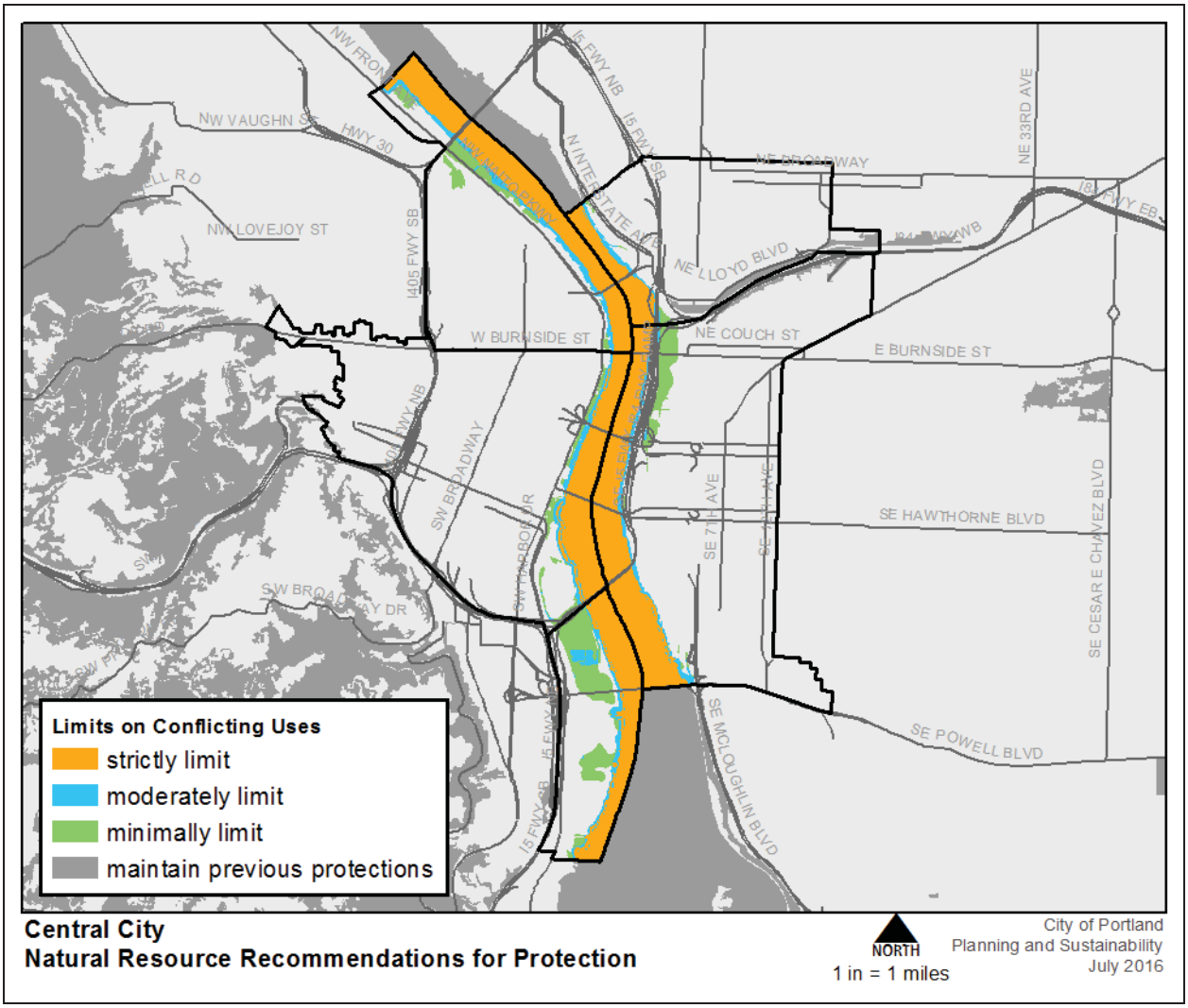
Results

The NRPP results contain narrative descriptions of the natural resource features, functions and recommendations for protections in the CC2035 planning area. In addition to the narratives, geographic information system (GIS) models are used to display the functions provided by the features, produce ranks of high, medium and low that depict the relative amount of functions provided by any given feature, and depict the recommendations for protection. For example, a large stand of trees located adjacent to the river provides numerous functions, such as shading the in-water habitat, and contributing leaf litter, structure and nutrients to the river. In a situation like this, the trees would receive a high relative rank for riparian corridor functions and the recommendation would be to strictly limit impacts on those resources.

The following three maps show the features, the results of the geographic information system (GIS) modeling and the recommendations for protections of resources in the CC2035 planning area.




high relative rank
medium relative rank
low relative rank
Central City
Natural Resource Functions
Inventory Sites
NORTH
1 in = 1 miles
City of Portland
Planning and Sustainability
February 2016
NW VAUGHN ST
HWY 30
NW LOVEJOY ST
I405 FWY SB
W BURNSIDE ST
NE LLOYD BLVD
NE COUCH ST
E BURNSIDE ST
SW BROADWAY
SW BROADWAY DR
SE HAWTHORNE BLVD
SE CESAR E CHAVEZ BLVD
SE POWELL BLVD
SE MCLOUGHLIN BLVD
NE 33RD AVE
SE 7TH AVE



Central City
Natural Resource Recommendations for Protection

Below is a brief summary of the results of the NRPP.

The Willamette River

The Lower Willamette River flows through the CC2035 planning area, providing the primary migration corridor for Endangered Species Act (ESA) listed Chinook, coho, and chum salmon, and steelhead and bull trout, to the Columbia River. These fish depend on clean, cool water and shallow areas for resting and feeding during migration. There are numerous small pockets of shallow water habitat along the Willamette's Central Reach.

The Willamette River is part of the Pacific Flyway and is utilized by more than 200 resident and migratory bird species. Shorebirds and waterfowl use shallow water areas and exposed sand and mud. Waterfowl and gulls use the vegetated shoreline along the river. Peregrine falcon nest on Willamette River bridges and perch on pilings and buildings.

The Willamette River receives a high relative rank for riparian corridor functions and wildlife habitat and it is designated a *Special Habitat Area* for ESA-listed fishes.

The recommendation is to strictly limit uses that conflict with natural resource features and functions of the Willamette River.

River Banks

The features and quality of the Willamette's river banks are directly tied to the river itself. These riparian corridors provide the transition between the river, stream banks and upland areas.

Vegetation on the banks, even in a narrow strip, is important to watershed health. Native plant species generally provide a broader suite of benefits – such as varied wildlife food sources and effective slope stabilization – than non-native plants. However, plants of all types, including invasive species, provide functions such as water storage, nutrient cycling and cover and nesting opportunities for wildlife. Vegetated river banks receive a high or medium relative rank for riparian corridor functions.

The river banks in the Central Reach are impacted by development, fill and hardening. Hardened, non-vegetated river banks do not provide a suite of riparian corridor functions like vegetated river banks do. However, because of the direct impact and important relationship between all river banks and in-water habitat, hardened, non-vegetated river banks are still identified in the inventory as a feature. They receive a low relative rank.

The recommendation is to strictly limit uses that conflict natural resource features and functions of the Willamette River below top of bank and to moderately limit conflicting uses within high and medium ranked resources located above the top of bank.

Flood Area

Most of the flood area in the Central Reach is comprised of the Willamette River itself and the river banks. Open water and vegetated flood areas provide a host of important functions, including water storage, nutrient cycling, microclimate and channel migration. In some locations, the flood area extends over the banks and into developed lands. The developed flood area provides for water storage during large storm events like the flood in early 1996.

The vegetated flood area receives a high or medium relative rank for riparian corridor functions, while the developed flood area receives a low relative rank to acknowledge only the flood storage capacity it provides.

The recommendation is to moderately limit uses that conflict natural resource features and functions of undeveloped floodplain and to minimally limit conflicting uses within developed floodplain.

Trees and Landscape Vegetation

For purposes of the NRPP mapping and modeling, only patches of trees that are at least one-half acre in size are assigned a relative rank for wildlife habitat. In the Central City there are no patches of tree canopy that large. However, smaller landscaped areas and individual street trees, while not receiving a rank in the inventory, do provide functions including cleaning and cooling the air and water, capturing greenhouse gases, capturing and uptaking stormwater, reducing energy demand and providing wildlife habitat.

Across the entire planning area, neo-tropical migratory songbirds utilize landscape trees and shrubs for foraging and resting as they pass through during migration. Resident and migratory songbirds, raptors and hummingbirds use mature tree canopy along the North and South Park blocks, other street trees, patches of vegetation and landscaped areas.

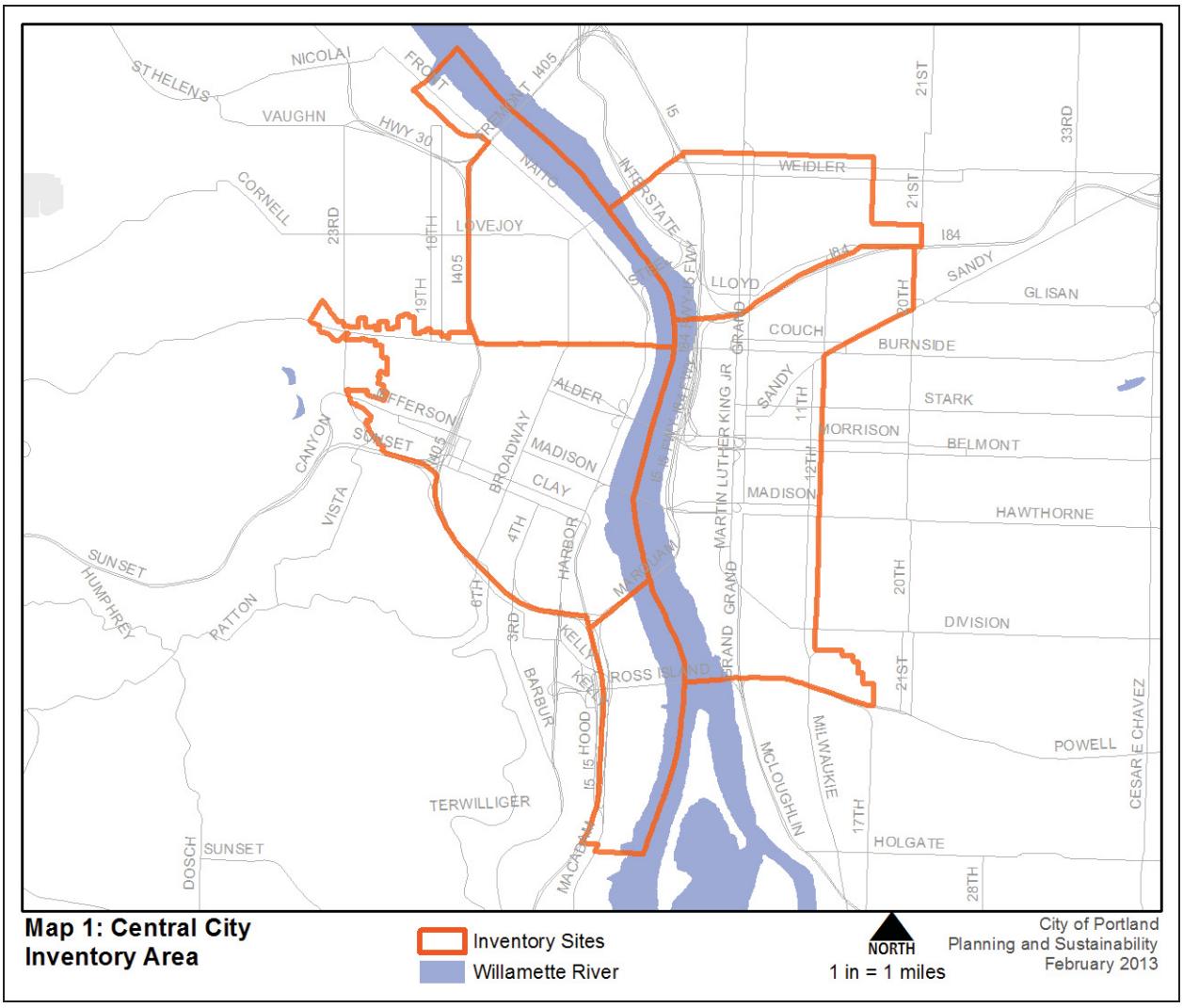
Along I-84 is a steep, vegetated ravine called Sullivan's Gulch. A mix of tall native trees, including Big Leaf Maple, and non-native (primarily invasive) understory, including Himalayan Blackberry, provide habitat for multiple species. Migratory and resident birds, including red-tailed hawks, Bewick's wren, song sparrow and spotted towhee, nest in Sullivan's Gulch. White crowned sparrow and Anna's hummingbird were observed during a Spring 2011 site visit. The slope is prone to landslides and wild fire. Sullivan's Gulch is designated a *Special Habitat Area* and receives a high relative rank as a unique feature in the Central City.

Because the NRPP only address patches of trees at least one-half acre in size or larger, there are no specific recommendations regarding protecting smaller patches of trees. City Zoning Code Title 11, Trees, addresses the removal and replacement of individual trees.

CHAPTER 1. INTRODUCTION

1. Purpose and Plan Area

Willamette River Central Reach plan area extends from south of the Ross Island Bridge to the Broadway Bridge and is characterized primarily by commercial/mixed-use development on the west side of the Willamette and industrial uses on the east side of the river. The inventory includes the Willamette River, other natural resource features and developed lands adjacent to the natural resource features. The area encompasses, and is larger than, the area currently contained within the City's Willamette Greenway Overlay Zones, and is generally coincident with the boundaries of the Central City 2035 planning boundary, except Lower Albina, which is included in the Willamette River North Reach (Map 1).



2. Relationship to Central City 2035

Central City 2035 is a comprehensive, multi-objective plan for the Central City includes the River Plan/Central Reach. It will update and replace the 1987 Willamette Greenway Plan, zoning code and

design guidelines, which serve as Portland's compliance with State Planning Goal 15: Willamette River Greenway.

Over the past 25 years, planning for natural resources along the Willamette River has occurred through the following citywide initiatives:

Willamette Greenway Plan – The Willamette Greenway Plan was first adopted in 1979 to fulfill the requirements of Statewide Planning Goal 15: Willamette River Greenway. The plan was adopted in 1987. The purpose of Goal 15 is "to protect, conserve, enhance and maintain the natural, scenic, historical, agricultural, economic and recreational qualities of lands along the Willamette River as the Willamette River Greenway." The Central City Natural Resources Inventory (CCNRI) is an update of a portion of the Willamette River Wildlife Habitat Inventory that supported the Willamette Greenway Plan.

River Renaissance Vision and River Renaissance Strategy – In March 2001, the Portland City Council adopted the River Renaissance Vision by resolution. The Vision articulates a set of goals and aspirations for a revitalized river. It includes five mutually supportive and interrelated themes that proclaim Portland's aspirations to:

- Ensure a clean and healthy river for fish, wildlife, and people
- Maintain and enhance the city's prosperous working harbor
- Embrace the river and its banks as Portland's front yard
- Create vibrant waterfront districts and neighborhoods
- Promote partnerships, leadership and education

In December 2004, the Portland City Council adopted the River Renaissance Strategy by resolution. The Strategy is intended to lead the City toward the future outlined in the River Renaissance Vision. The Strategy serves as the City's blueprint for river-related activities and investments by establishing policy guidance, progress measures and an action agenda.

The River Concept – The River Concept was adopted by the Portland City Council in April 2006 as a guiding document for the River Plan. The Concepts synthesizes river-related planning over the last decade. The guidance for the Central Reach includes:

Pearl District – The riverfront will play a renewed role in the future of downtown and the Pearl District. North of Waterfront Park, redevelopment of the Centennial Mill riverfront will offer a new public space that completes the Central City waterfront park system. This revitalized area will serve as the Pearl and Northwest Districts' waterfront connection. Sustainable development practices will provide stormwater management and energy-efficient design.

Central Eastside – The Central Eastside will continue to support light industry while developing into a center for new urban industries that create jobs and provide products and services to the region. Capitalizing on the district's proximity to the river, cultural and recreational uses will add vitality to the area. Sustainable practices, including green streets and ecoroofs, will be incorporated into new development.

South Waterfront – South Waterfront will grow into a vibrant Central City neighborhood that derives its character and identity from its relationship to the river and Ross Island. It will feature science and technology-sector jobs, diverse housing options, mixed-use buildings that include retail, restaurants and internal open spaces, and a waterfront designed to support fish and wildlife and provide people with a natural retreat from the urban environment.

Portland Watershed Management Plan – The Portland Watershed Management Plan was adopted by the Portland City Council in March 2006. The Plan describes the approach that will be used to evaluate conditions in Portland's urban watersheds and recommends projects to improve watershed health. The overarching themes of the Plan are to achieve improved watershed health through: (1) protection and enhancement of remaining natural resources, (2) low-impact development, (3) installation of innovative stormwater infrastructure, (4) modern and effective approaches to City

repair and maintenance of existing infrastructure, and (5) an integrated City response to local, state and federal environmental requirements.

The inventory is intended to inform and support a broad array of City and community activities relating to the Central City 2035 planning area. Such activities include long-range planning, implementing and updating City programs to manage natural resources, identifying priority areas for restoration, enhancement, and public acquisition, designing development and redevelopment projects, and meeting regional, state and federal regulatory requirements.

Over the long term, this inventory can help the City achieve its River Renaissance Vision for clean and healthy rivers, and meet its watershed health goals. The inventory will inform the development of regulatory and non-regulatory tools through Central City 2035 and The River Plan. This NRPP is also part of the City's compliance with the Title 13, Nature in Neighborhoods program.

3. Organization of the Plan

The purpose of this NRPP is to provide useful, current and accessible information on the location of existing natural resource features, their functions for Portland's Central City and recommendations regarding the protection of the resources. The NRPP includes descriptions and maps of the current relative condition of riparian corridors and wildlife habitat located within the Willamette River Central Reach, river banks, flood plains and upland features.

The report is organized into chapters that provide a context for inventory work, describe the inventory methodology and present an inventory of natural resources for the Central City. The following is a brief summary of the material contained in each chapter of this document:

Chapter 1: Introduction – This chapter provides background information and an overview of the Willamette River.

Chapter 2: Regulatory Context - The purpose of this chapter is to summarize the environmental regulations, policies and goals that relate to natural resource protection and management within the Willamette River and adjacent lands. The chapter is organized starting with the two bodies of regulations that most directly relate to natural resources: Oregon State Land Use Planning Program and Metro Urban Growth Management Plan. Following those explanation are summaries of the City's Comprehensive Plan and other relevant environment regulations, goals and policies.

Chapter 3: Inventory Approach and Methodology Overview – This chapter provides an overview of the citywide inventory project approach and the methodology used to identify and evaluate riparian corridor functions and wildlife habitat attributes.

Chapter 4: Analysis of Protection Options and General Recommendations – This chapter describes the trade-offs associated with different choices for protecting and managing natural resources in the Central Reach. The chapter ends with a recommendation about which resources should be protected.

Chapter 5: Results – The Willamette River Central Reach is divided into five inventory sites. For each inventory site, an evaluation of current riparian corridor functions and wildlife habitat is included, followed by a series of maps, aerial photographs, water-related features, vegetation features, riparian corridor relative ranks, wildlife habitat relative ranks and combined riparian/wildlife habitat relative ranks. The general protection recommendation is applied to the resources within the inventory site and a map is produced that depicts the recommendation.

Chapter 6: Implementation Tools – The tools to implement the recommendations regarding protection of natural resources are described within this chapter.

4. Overview of the Willamette River

Regionally situated in the Lower Columbia River Basin, the Willamette River Basin is an 11,500 square mile watershed located between the Cascade Mountains to the east and the Coast Range to the west. The 187-mile long Willamette River flows north through 128 jurisdictions including Eugene, Corvallis, Salem and Portland as well as eight counties: Lane, Linn, Benton, Marion, Polk, Yamhill, Clackamas and Multnomah. Nearly 70 percent of Oregon's population lives in the Willamette River Basin. The basin contains a broad range of land uses including forestry, agriculture and urban.

The basin occupies roughly 12 percent of Oregon's land and plays an important role in the ecology of the region. The basin extends from mountains, approximately 10,000 feet in elevation, to the Columbia River, which is just 10 feet above sea level. The Willamette Basin's 12 tributary sub-basins are diverse in terms of elevation, hydrology and landscape character. The Willamette Basin helps to disperse aquatic and avian species among rivers and streams, upland forests, valleys, floodplains and to and from the Columbia River and the Pacific Ocean. It is part of the Pacific Flyway for migratory birds, and is a key component of the extensive network of spawning streams for anadromous salmon and steelhead.

Figure 2: Willamette River Basin

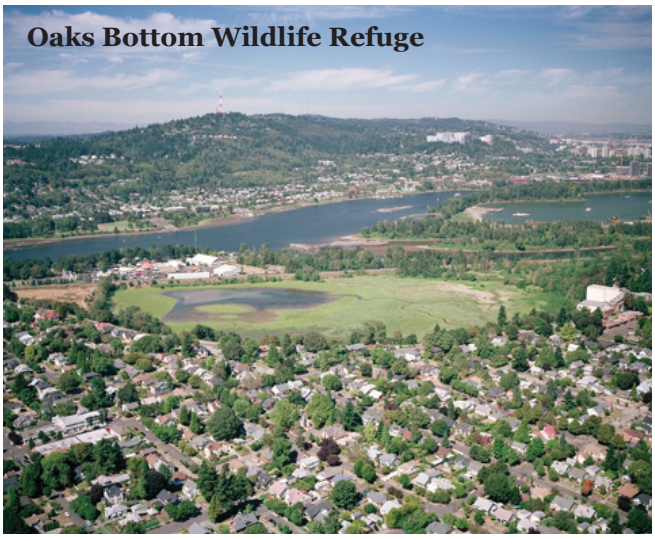
The Lower Willamette River is a tidal freshwater system with water levels that are influenced by a complex and dynamic set of factors, most notably discharge, Pacific Ocean tides and Columbia River flow conditions. Willamette River flows are governed by seasonally variable rainfall patterns, snowmelt in the Willamette Valley's Coast and Cascade mountain ranges, and the operation of dams on many of the major tributaries. Diurnal tidal fluctuations in the lower Willamette are typically on the order of 2 feet per day, but can range from 0 to 8 feet depending on the influence of flow conditions in the Willamette and Columbia Rivers. The Pacific Ocean's tidal prism runs up the Columbia River estuary and into the Willamette River, where it exerts force against downstream flows and influences water surface elevation up to Willamette Falls near Oregon City at RM 27.

The flows in the Willamette River are highest between December and February, with a 40-year monthly average between 50,000 and 70,000 cubic feet per second (cfs). The maximum flow over the period of record is 420,000 cfs and it occurred on February 9, 1996, during what was nearly a 100-year flood event. Columbia River water levels rise in mid-spring due to spring freshets that occur in the Columbia system east of the Cascades. This results in a higher river stage in the Willamette. Under certain conditions, Willamette river flows reverse as rising tides back water up into the Lower Willamette.

It is important to note that flow patterns in both the Willamette and Columbia basins have been dramatically altered over time, largely due to dam and reservoir operations. Following floods in 1943 and 1945, the U.S. Army Corps of Engineers constructed 13 reservoirs, 11 of which have flood control functions. Operation of the reservoirs reduces winter peak flows in the Willamette River by as much as 30 to 50 percent, and augments summer flows to approximately double historical low-flow levels. The reservoirs also provide water for irrigation, navigation, recreation, power generation, public water supply, pollution abatement and anadromous fish propagation. These are important social, economic, and environmental benefits; however, the disruption of the river's flow regime has reduced the periodic flooding that sustains the functions of side channels, sloughs, flood plain areas, wetlands and riparian vegetation. Seasonal flooding and fluctuating currents are known to play an important role in shaping the aquatic environment by distributing nutrients and sediment to maintain gravel bars, deep channel pools, in-channel wood and other characteristics that create diverse aquatic habitats.

The Willamette River provides important habitat for fish and other aquatic and terrestrial species. Beach, near-shore shallow water areas, undercut banks, and large woody debris provide refugia habitat for

salmonids that are listed as threatened species under the Endangered Species Act, and feeding areas for shorebirds and other wildlife (ODFW, 2005).



The Willamette River supports a diverse assemblage of fishes. Farr and Ward (1993) identified 39 different fish species occurring within the study area. Species include resident fish, seasonal migrants, and opportunistic migrants representing 17 different families. Resident fish include both warmwater and coldwater species. Seasonal migrants include salmon, steelhead, sturgeon and shad. Opportunistic migrants include white sturgeon and starry flounder. Fish assemblages within the Lower Willamette River are in a state of flux and have been for most of this century. Factors contributing to this constant state of change include the introduction of, and colonization by, hatchery fishes; altered flow regimes; removal of riparian bottomland forests; filling and diking within the flood plain; non-indigenous species; water quality degradation; urban development; and a wide range of fisheries management practices. Numerous non-indigenous species were introduced into the river system in the period between 1890 and 1910. Soon after, overall fish abundance and diversity decreased to historically low levels during the 1940s due to high pollution levels (Farr and Ward, 1993). Many of the introduced species tolerate warmer, more polluted water, and have thrived better in the mainstem and large tributaries — sometimes to the detriment of salmonids.

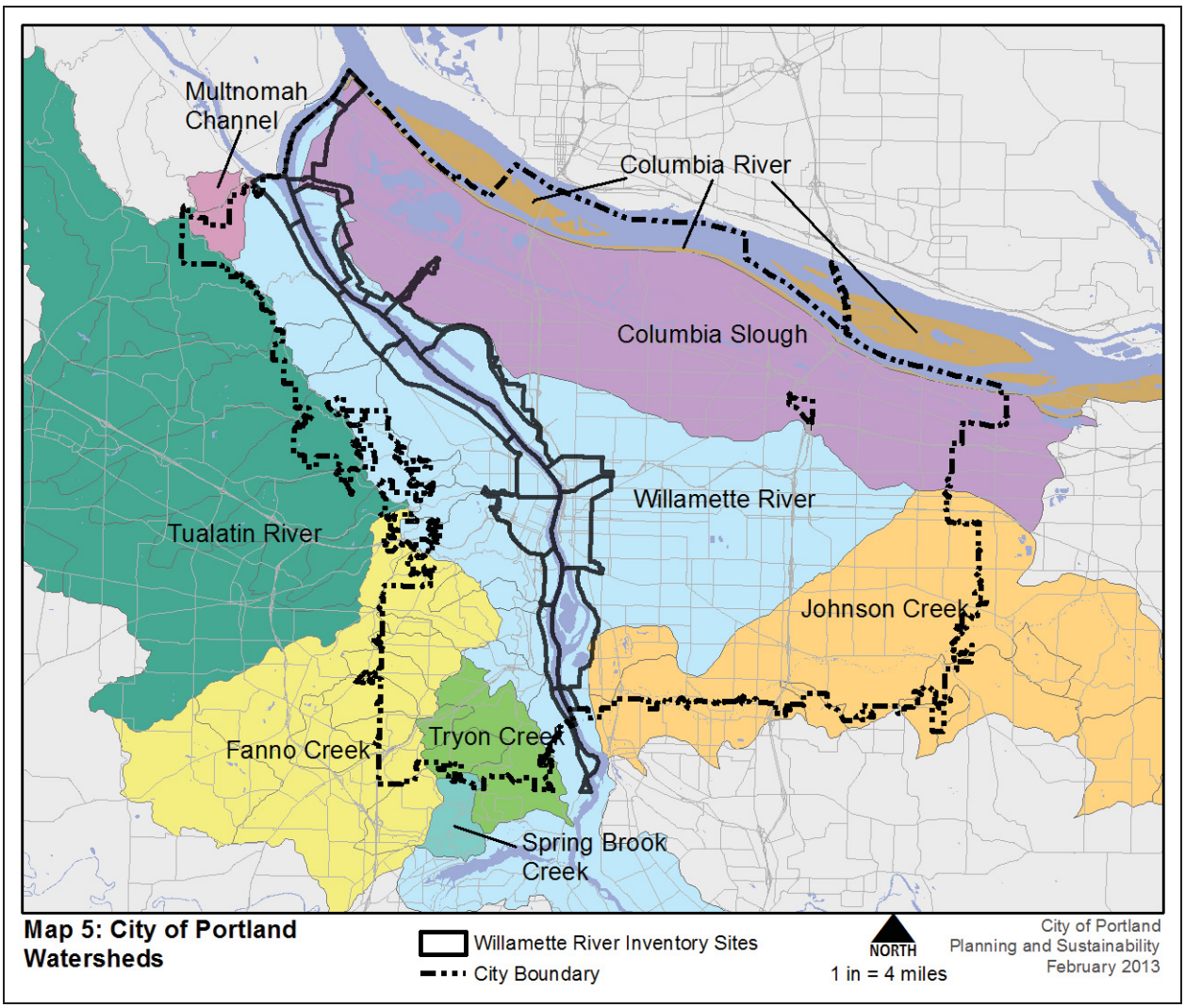
The lower Willamette River is designated critical habitat for several evolutionarily significant units (ESUs) of anadromous salmonids listed as threatened under the federal Endangered Species Act (ESA). These include: upper Willamette River Chinook salmon and steelhead trout, and lower Columbia River Chinook salmon and steelhead trout. In addition, the lower Willamette River is proposed to be included in the designation of critical habitat for coho salmon this year, and is key migratory habitat for Pacific lamprey, a federal species of concern (Chilcote, 1999). Critical habitat designated for most Columbia River ESUs includes the lower Willamette River up to Willamette Falls because it serves the Columbia River as a tributary stream and provides rearing and refuge habitat to its migrating salmon and trout populations. (http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Maps/upload/chumcr-2.pdf)

Recent studies have looked at salmonid and salmonid predator use of the Willamette River in Portland. Ward *et al.* (1994) found that juvenile salmonids use near-shore habitats in Portland. In particular, most salmonids were caught, through vertical gill netting, in waters 18 feet or less in depth. Friesen et al. (2004) conducted comprehensive fish sampling within Willamette River in Portland and found that beaches appeared to be an important habitat for younger salmonids, particularly Chinook salmon. Beaches were also preferred by radio-tagged coho salmon. Friesen et. al. (2004) found that densities of large predators were consistently highest at sampling sites dominated by rocky habitats (both natural and riprap) and pilings, and radio-tagged predators are prevalent at sites with riprap in summer and autumn. Radio-tagged coho salmon, and to a lesser extent Chinook salmon, are less prevalent at sites with riprap.

The Willamette River is also part of the Pacific Flyway. Nearshore mudflats, shoals and beaches provide habitat for migratory shorebirds: least sandpipers, solitary sandpipers and semi-palmated plovers.

The 27 miles of river between Willamette Falls and the Columbia River are often referred to as the Lower Willamette River. This portion of the basin connects directly with the regional ecosystem that includes Sauvie Island, Ridgefield and Shillapoo Wildlife Areas, Vancouver Lake, Tualatin Mountains, Burlington and Oaks Bottom, the Smith and Bybee Wetlands preserve, Sandy River and estuarine islands in the Columbia River. The Lower Willamette River corridor provides connectivity for north/south and east/west wildlife movement. For example, the river connects to Forest Park and further west to the Tualatin Mountains and Coast Range. These large, forested areas provide a major wildlife migration

corridor for deer and elk, and are a source of species recruitment. The Lower Willamette River corridor provides important wintering habitat for waterfowl and raptors, and breeding habitat for Neotropical migratory songbirds. To the east, the Willamette River corridor connects to the East Buttes in the Johnson Creek watershed and the Sandy River delta via the Columbia Slough and the Columbia Gorge. A seven-mile escarpment runs along the east side of the river within the city, providing important native oak habitat and wildlife habitat connectivity. Local neighborhoods contain tree canopy and vegetation that help manage stormwater by intercepting rain and filtering pollutants from overland flow. Neighborhood vegetation can also provide important wildlife habitat areas and corridors. Map 5 shows Portland's watersheds and the boundary of the Willamette River Inventory Sites.



The Lower Willamette River is a tidal freshwater system, and its flow and water levels are influenced by a complex and dynamic set of factors, including tides, seasonally-variable rainfall patterns, snowmelt in the Willamette Valley's Coast and Cascade mountain ranges, as well as by a number of dams on many of the major tributaries. The diurnal tidal fluctuations in the lower Willamette are typically on the order of 2 feet per day, but can range from 0 to 8 feet depending on the influence of flow conditions in both the Willamette and Columbia rivers. Tidal flows are transmitted from the Columbia River estuary to the Willamette River by way of the Columbia River, and the tidal influence extends up to Willamette Falls near Oregon City at RM 27.

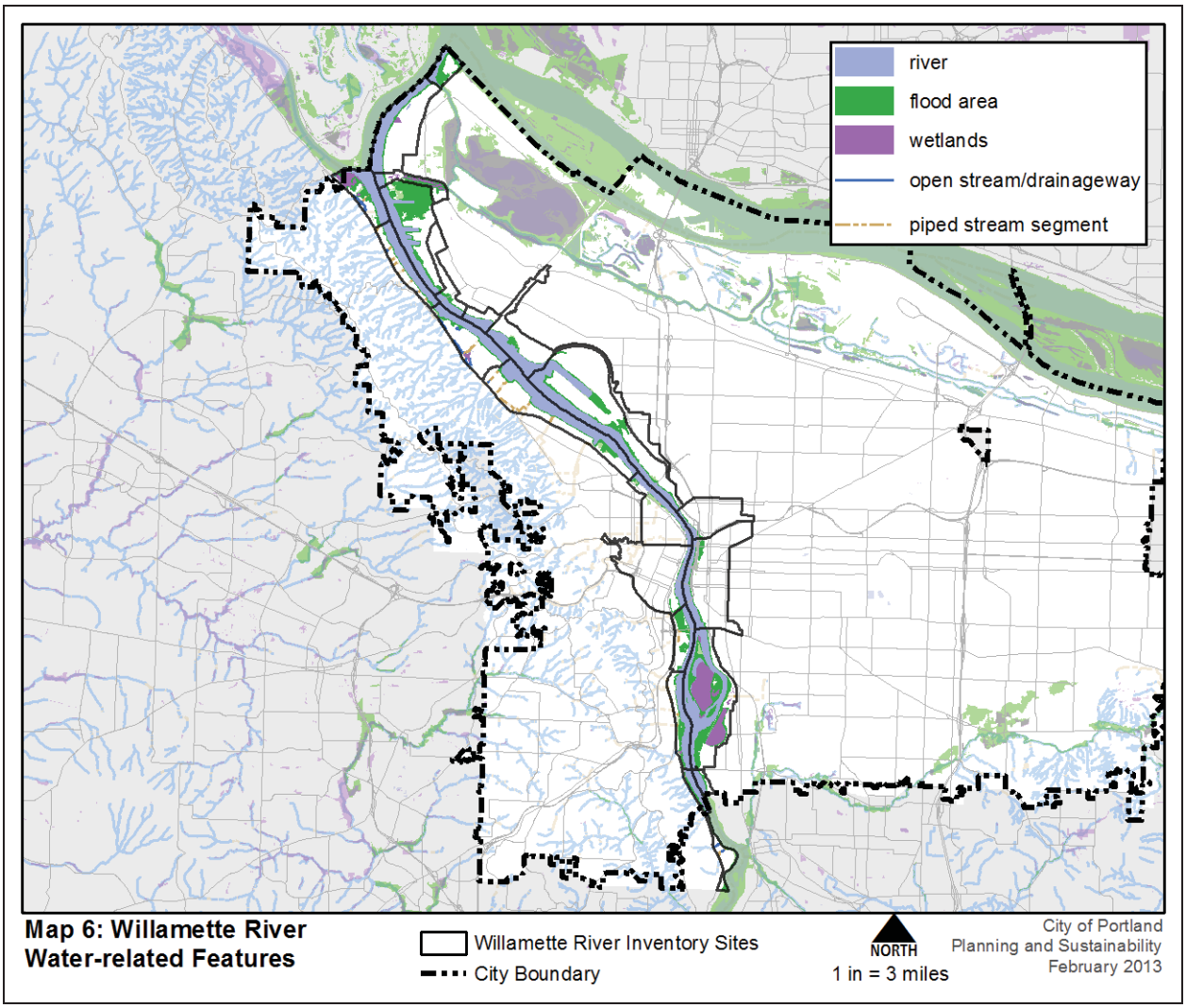
The Lower Willamette River does not meet water quality standards for bacteria, mercury, dioxin, temperature and various other toxics and heavy metals (see Table 5). Total maximum daily loads

(TMDLs) for bacteria and temperature as well as a phased TMDL for mercury were established in 2006. Oregon Water Quality Index values from 2001 to 2010 for the Lower Willamette River in Portland have been fair and the trend is steady. High in-stream temperatures in the Lower Willamette River during the summer months are of concern to migrating anadromous salmonids. Tributary streams can have mitigating influence on the water temperature in the Willamette River by providing cool water refugia. However, many tributaries to the river do not meet standards for temperature and other pollutants, including bacteria, and toxics are also of concern.

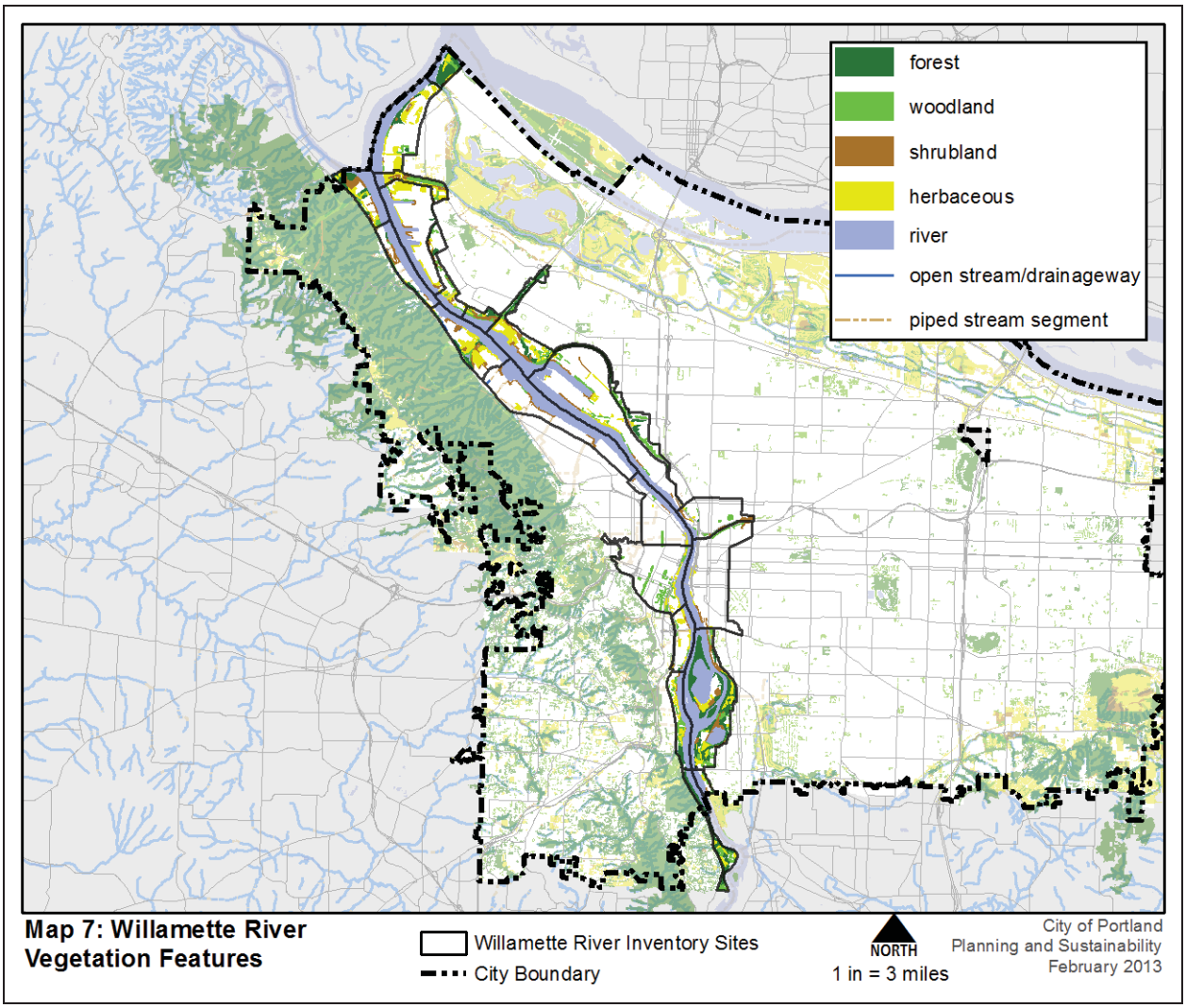
Table 5: Water Quality (303(d)) Listings in the Lower Willamette River and Tributaries

Pollutant	**Season**	**Year River was Listed for this Pollutant**	**Risk Factors**
Pesticides and Toxics (DDT/DDE, Dieldrin, Aldrin, Pentachlorophenol, PCB, PAH)	Year-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Heavy Metals (iron, manganese, mercury)	Year-round	1998, 2002	Fishing, drinking water, resident fish and aquatic life, anadromous fish passage
Bacteria (Fecal Coliform)	Fall/Winter/Spring	1998	Water-contact recreation
Temperature	Summer	1998	Salmonid fish rearing, anadromous fish passage
Biological Criteria	N/A	1998	Resident fish and aquatic life

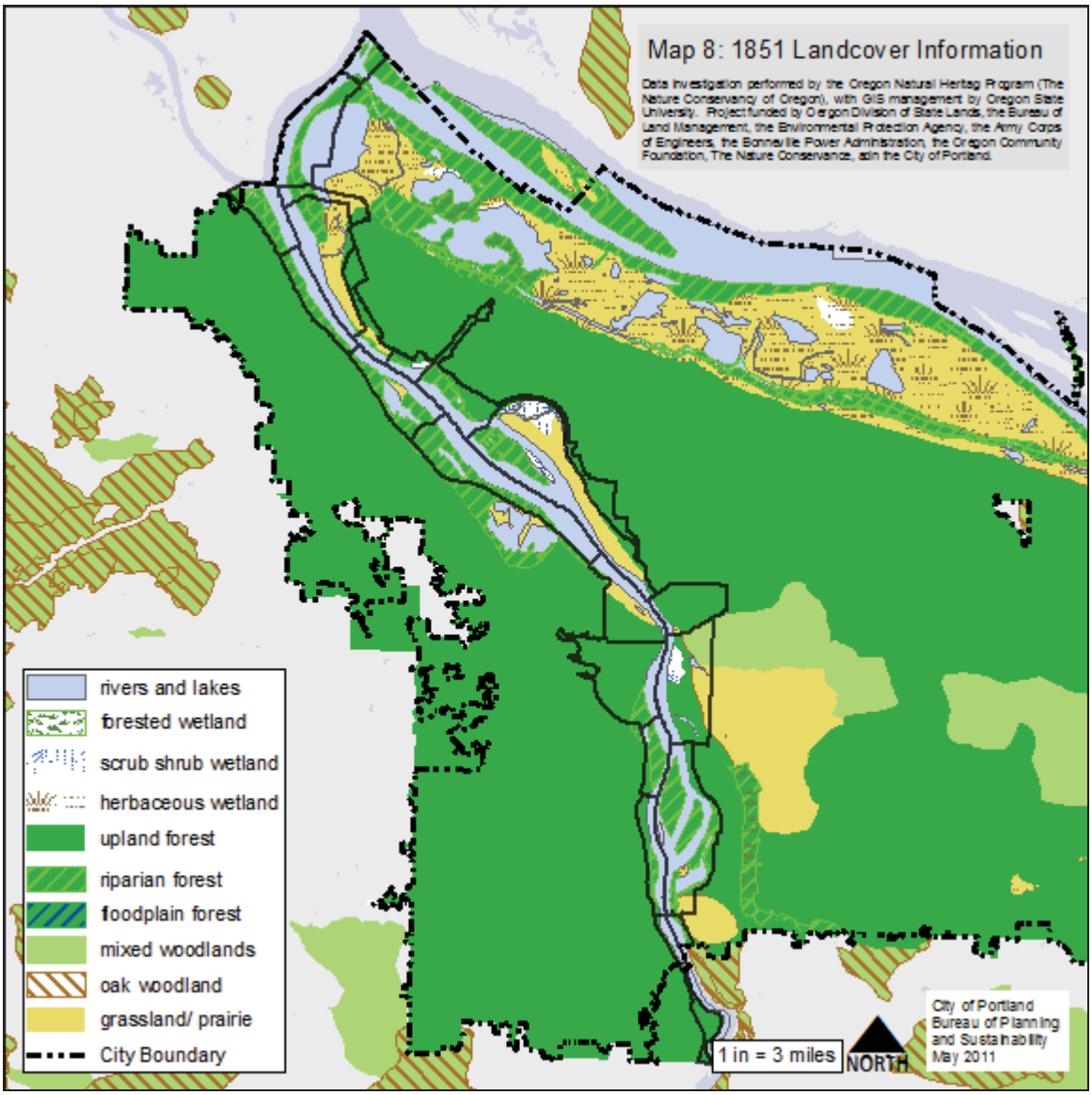
The entire Portland Willamette River inventory study area (North, Central and South reaches combined) includes 19 miles of the Lower Willamette River from Elk Rock Island northward through Portland to its confluence with the Columbia River. Of this, 17 miles are within city limits**.** Many of the smaller tributary streams originate in Forest Park and the West Hills, and are piped through the study area. Map 6 shows water-related features located in the River Plan study area and Map 7 shows vegetation features.



The Willamette River channel within Portland is generally wide, although in the southern portions of the city and urbanizing pockets of Multnomah County, the river is constrained by historic basalt flows. Historically, the Willamette River in the Portland area was comprised of an extensive, interconnected system of active channels, open slack waters, emergent wetlands, riparian forests, mid-channel islands and adjacent upland forests. Prior to European settlement of the Willamette Valley, the river was used primarily by Native Americans for travel, trade, fishing and gathering of plant materials. Permanent and seasonal villages existed on both sides of the river to facilitate these uses, and many of these traditional uses are carried on today by local Native Americans.



Vegetation in bottomland and wetland forests was dominated by black cottonwood, Oregon ash and willow, and associated native understory assemblages of shrubs, grasses and herbs. Denser, mixed-conifer forests of Douglas fir, big leaf maple, western red cedar, western hemlock, grand fir and red alder dominated the west hills and some parts of the east terrace. Foothill savannas of Oregon white oak, Pacific madrone, red alder and big leaf maple were found on the eastern side of the river.



Today, the Willamette River in Portland provides for many uses, including shipping; industrial and commercial enterprises; residential uses; subsistence, commercial, and recreational fishing; other types of recreation; and fish and wildlife habitat. The Lower Willamette River channel has been substantially altered in Portland. The river bottom is occasionally dredged to improve navigation and allow large barges and ships to access Portland terminals. The Willamette River federal navigation channel extends from the mouth of the Willamette River upstream 11.5 miles to the Broadway Bridge in Portland. The width of the channel varies between 600 and 1,900 feet and the maintained depth is 40 feet. The Portland District U.S. Army Corps of Engineers maintains this federal navigation channel. The channel was last dredged in 1997. Maintenance dredging has been suspended until legal and technical issues are resolved regarding dredging within the boundaries of the Portland Harbor Superfund site, as well as how dredging impacts critical habitat for many stocks of Federally-protected endangered aquatic species. Portions of the channel are now less than 40 feet deep, which can pose a hazard to large cargo ships navigating through the Harbor.

Eleven bridges cross the Willamette River in Portland. The Sellwood, Marquam, Ross Island, Hawthorne, Morrison, Steel, Broadway, Fremont and St. Johns bridges are designed to accommodate automobile and truck traffic. Just south of the St. Johns Bridge, a railroad bridge crosses the Willamette. Several of the

bridges provide habitat. For example, the St. Johns, Railroad, Fremont and Marquam bridges provide nesting opportunities for Peregrine falcons.

Substantial stretches of the river's banks have been hardened with riprap, seawalls and docks. Pilings, piers and other human-made structures extend out from the bank into the channel. Numerous structures related to marine cargo facilities are located along the river within the city. Shipping activities are common in the North Reach and a portion of the Central Reach of the Willamette River, with large vessels docking at berths between the Broadway Bridge at RM 11.5 and the mouth where it converges with the Columbia River.

In Portland, the Willamette River's historic floodplain and lowlands were located between the lower Tualatin Mountains/Southwest Hills on the west and the remnant oak bluffs above the Swan Island corridor on the east. Over the last 150 years, many floodplain areas, bottomland forests and wetlands were filled or drained, and developed. There are remnant corridors and pockets of riparian forest, wetlands and upland vegetation. Few large, connected and intact habitats remain in the flood plain in Portland, as multiple jurisdictions and private landowners manage it to meet various objectives. Below are maps from the Willamette River Atlas (City of Portland, 2001) that depict the historic (circa 1888) and current Willamette River.

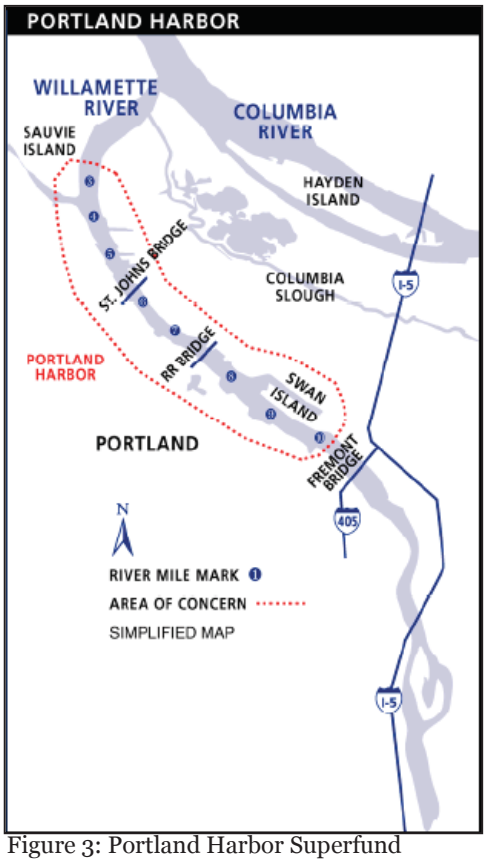


Figure 3: Portland Harbor Superfund

The Portland Harbor, which includes the Willamette River from roughly the Fremont Bridge downstream to river mile 2 near the tip of Sauvie Island, has been listed on the National Priorities List, or as a "Superfund" (Figure 2). Sediments in the river are contaminated with various toxic compounds, including metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), chlorinated pesticides and dioxin. Levels of these pollutants in the river appear to be highest near contaminated upland sites adjacent to the river. One of the main ways in which people come in contact with these toxic compounds is by consuming fish caught in the Willamette. In June 2004, the Oregon Department of Human Services issued a fish advisory related to high PCB levels found in fish caught from the Willamette River in Portland Harbor. The advisory recommends that children and pregnant or nursing women should not consume fish from the Willamette. For more information about the Portland Harbor Superfund, see the Department of Environmental Quality's website: www.deq.state.or.us/lq/cu/nwr/PortlandHarbor/index.htm.

The City of Portland's combined sewer overflow reduction program, and Clean Water Act program implemented by the Oregon Department of Environmental Quality, have been credited with most of the water quality improvements in the Lower Willamette River. Further cleanup mandated through the EPA Superfund process is expected to improve conditions in the lower river in the near future.

Despite changes to the Willamette River's physical, chemical and biological habitats, there remain processes that continue to shape and maintain watershed functions. Within Portland, significant riparian and wildlife habitat resources still exist at Kelley Point Park, Harborton Wetlands, South Rivergate Corridor, Ross Island, the Oaks Bottom Wildlife Refuge, numerous smaller tributaries, wetlands, active flood plain and other vegetated areas along the Willamette corridor, and the Willamette River itself. These areas provide flood storage, water cooling and sediment filtering, and fish and wildlife habitat. These areas also provide important wildlife connectivity corridors along the river and to other significant resources within Portland and the region.

5. History of Resource Protection in the Central Reach

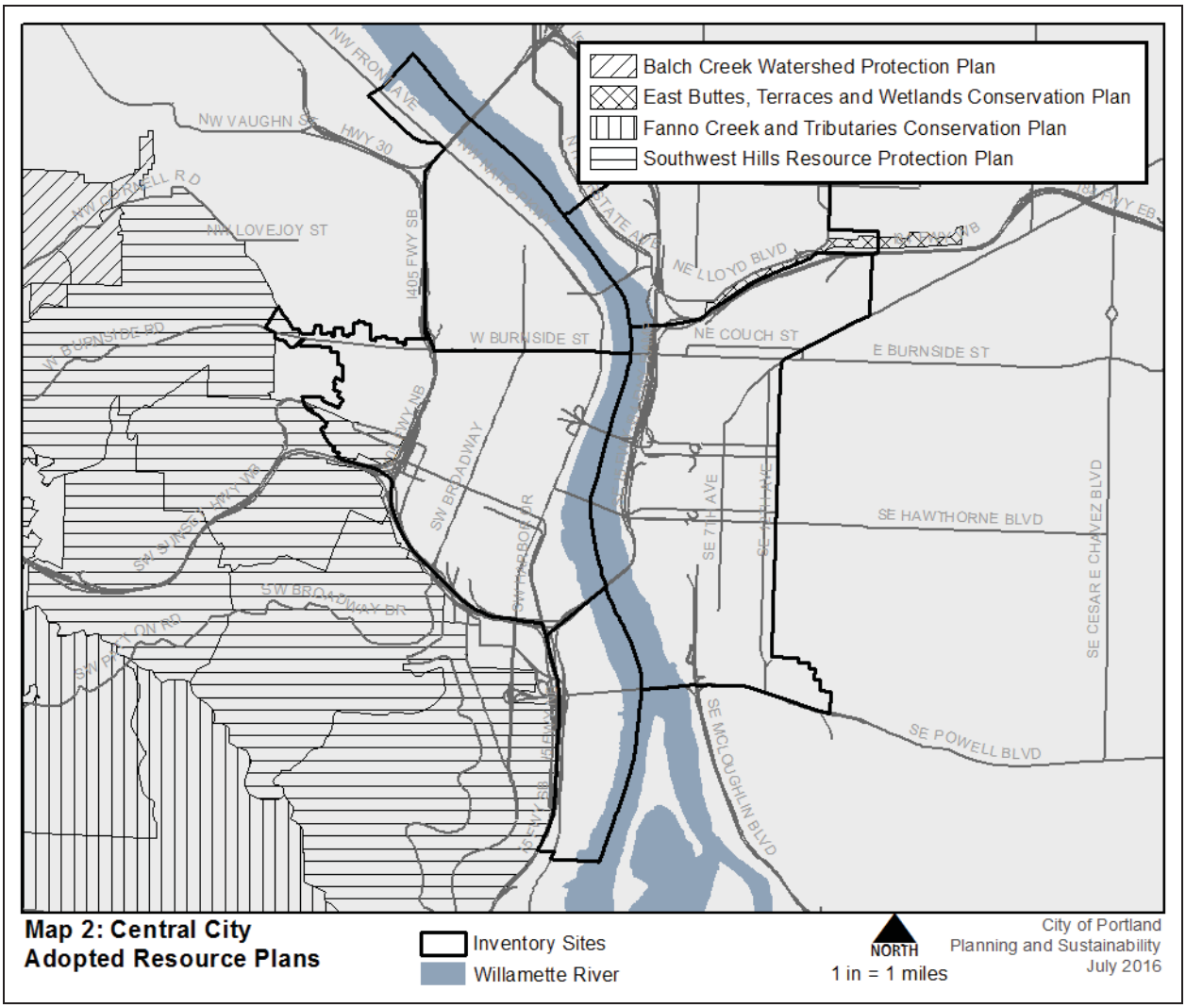
More than 30 years ago, the City began developing natural resource inventories to support natural resources planning and management decisions. The first Willamette River inventory was completed in 1975 for the Lower Willamette River Management Plan. The inventory provided generalized information about relative wildlife habitat values. It was the first of 10 inventories the City completed for different areas in Portland to meet state land-use planning goals.

The second Willamette River inventory was adopted by the City in 1986. It provided more detailed information about specific habitat sites along the river, including information about existing conditions and potential restoration options. A Wildlife Habitat Assessment (WHA) methodology was used to document and rank existing conditions and identify potential opportunities for habitat improvement. The inventory was divided into 24 segments or zones along the Willamette River in Portland. Each zone included anywhere from two to 14 habitat sites, depending on the complexity of the zone. Highly ranked habitat sites were identified as Rank I, with lesser value habitat sites identified as Rank II, III, IV or V.

Both the 1975 and the 1986 Willamette River inventories were developed for the City's Willamette Greenway program. The Greenway program was established primarily to meet requirements of the Oregon State Land Use Goal 15: Willamette River Greenway. The program includes policies, design guidelines, overlay zone maps and regulations to meet multiple objectives along the Willamette River.

Between 1991 and 2002, the City adopted several other natural resource inventories as part of a program to comply with Oregon State Land Use Goal 5. The following inventories address resources within, or adjacent to, the Central City Planning Area (Map 2):

- Balch Creek Watershed Protection Plan (1991)
- East Buttes, Terraces and Wetlands Conservation Plan (1993)
- Fanno Creek and Tributaries Conservation Plan (1993)
- Southwest Hills Resource Protection Plan (1992)



Resource values identified in the existing inventories were determined based on a number of factors, including quality, quantity, diversity, interspersion and uniqueness. These inventories informed required Economic, Social, Environmental and Energy (ESEE) Analyses and the application of environmental overlay zones (maps and regulations) to protect important resources in these areas.

This Central City inventory represents additional honing of a recently developed citywide natural resource inventory to focus on conditions in the Central City and Willamette River Central Reach. Portland's citywide inventory information refines Metro's inventory of regionally significant fish and wildlife habitat. Metro adopted the regional inventory in September 2005 as part of the Title 13, Nature in Neighborhoods program. The citywide inventory reflects more current and higher resolution data, as well as information from additional scientific literature.

The information presented in this report updates the existing inventories based on current natural resource data, recent field assessments and resource evaluations. The work is also consistent with, and advances the goals outlined in, the Portland Watershed Management Plan and the Framework for Integrated Watershed Management, both of which were adopted by the City Council in 2005. These documents establish key ecological principles, restoration priorities and recommended strategies to protect and restore watershed health. Portland's watershed goals and objectives are provided in Appendix A.

CHAPTER 2. REGULATORY CONTEXT

The purpose of this chapter is to summarize regulations, policies and goals that relate to natural resources protection and management within the Willamette River Central Reach and on adjacent lands.

The chapter is organized starting with the three programs that most directly relate to natural resource management in Portland: Oregon State Land Use Planning Program, Metro Urban Growth Management Functional Plan and City of Portland Comprehensive Plan. The recommendations made in Chapter 5, Results, and Chapter 6, Implementation Tools, must comply with all three programs.

Following those explanations are summaries of other local, state and federal regulations, policies and goals related to natural resources. This is not an exhaustive list but is intended to set the context for protection of natural resources in the Willamette River Central Reach.

1. State, Regional and Local Land Use Planning Programs

Cities and counties in Oregon are required to comply with the State Land Use Planning Program and those jurisdictions in the Metro region are also required to comply with the Urban Growth Management Functional Plan. These two bodies of regulations set the framework for planning for natural resources in Portland. Portland complies with both programs by maintaining a Comprehensive Plan. All three programs are described below.

A. State Land Use Planning Program

Comprehensive land use planning was mandated by the 1973 Oregon Legislature, primarily in response to population growth pressures on valuable farm and forest land. Since 1975, cities and counties in Oregon have been required to comply with Statewide Planning Goals. Today there are 19 goals that Oregon cities and counties must comply with through the adoption and maintenance of local comprehensive plans. Portland adopted its first comprehensive plan in 1981 to satisfy the requirements of the state planning program. Portland's Comprehensive Plan was updated in June 2016. See below for more about the Comprehensive Plan.

The Willamette River Central Reach is directly addressed in Goal 15: Willamette River Greenway. Other goals that also relate to natural resources are Goals 5, 6 and 7.

- **Goal 15: Willamette River Greenway** – Goal 15 sets forth procedures for protecting the diverse qualities of the 300 miles of land along the Willamette River. Multiple uses and functions are to be conserved, enhanced and maintained, including significant habitat and economic and recreational uses. This NRPP, once adopted, will maintain compliance with Goal 15.

- **Goal 5: Natural Resources, Scenic and Historic Areas, and Open Spaces** – Goal 5 addresses many types of resources. It establishes a process in which resources are inventoried and evaluated for significance. If a resource or site is found to be significant, the local government must evaluate the consequences of three policy choices: protecting the resource, allowing proposed uses that conflict with the resource, or establishing a balance between protecting and allowing uses that conflict with the resource. The local government must then adopt a program based on the results of this evaluation. Goal 5 does not apply to the area within the Goal 15 Willamette Greenway Boundary. However, local jurisdictions may use tools and approaches provided by Goal 5 to inform natural resources management within the Willamette Greenway Boundary.

- **Goal 6: Air, Water and Land Resources Quality** – This goal requires local comprehensive plans and implementation measures to be consistent with state and federal regulations on

matters such as stream quality and groundwater pollution. Goal 6 provides guidelines for local jurisdictions, including buffering and separating those land uses which create impacts on air, water and other resources. Further, plans should consider the carrying capacity of the air, land and water resources within the planning area.

- **Goal 7: Areas Subject to Natural Hazards** – Goal 7 deals with development in places subject to natural hazards such as flooding, landslides or wildfire. It requires that jurisdictions apply "appropriate safeguards" (e.g., flood plain zoning) when planning for development.

The Willamette River Central Reach Natural Resources Protection Plan (NRPP) is part of Central City 2035 (CC2035). CC2035 is a comprehensive, multi-objective plan for the Central City and the Willamette River waterfront. CC2035 will update and replace the 1987 Willamette Greenway Plan for the Central Reach, zoning code and design guidelines, which currently serve as Portland's compliance with State Planning Goal 15: Willamette River Greenway. Once adopted and acknowledged, CC2035 will serve as compliance with Goal 15 for the Central Reach.

The intent of Goal 15 is to determine which lands are suitable or necessary for inclusion within the Willamette Greenway Boundary, and to develop the greenway management plan and acquisition program. Local jurisdictions must inventory the existing natural resources in the Willamette Greenway Boundary and consider uses that compete or conflict with natural resources when determining management and protection options.

Goal 15 requires that the following resources and land uses be inventoried:

- Fish and wildlife habitats
- Hydrological conditions
- Ecologically fragile areas
- Significant natural and scenic areas and vegetative cover
- Areas of annual flooding and flood plains
- All current public recreation sites, including public access points to the river and hunting and fishing areas
- Recreational needs as set forth in Goal 8
- Historical and archaeological sites
- All current aggregate excavation and processing sites, and all known extractable aggregate sources
- Land currently committed to industrial, commercial and residential uses
- The ownership of property, including riparian rights
- Other uses of land and water in or near the Greenway
- Acquisition areas, which includes identifying areas suitable for protection or preservation through public acquisition of lands or an interest in land

Goal 15 does not specify an approach for considering competing or conflicting uses. The Goal 5 Administrative Rule provides direction regarding a "conflicting use" analysis (also known as the Economic, Social, Environmental and Energy Analysis) to understand how development and other uses (e.g. clearing land) impact natural resources. While local jurisdictions do not need to comply with Goal 5 within the Willamette Greenway Boundary, this NRPP uses the conflicting use analysis approach of Goal 5 to understand the trade-offs associated with protecting natural resources.

Because the Goal 15 inventory requires identification and consideration of water and land resources and flood plains, this NRPP can also be used to maintain comply with portions of Goal 6 and 7.

B. Metro's Urban Growth Management Functional Plan and Titles 3 and 13

The 1973 Legislature granted expanded powers for the Columbia Region Association of Governments (now called Metro) to "coordinate regional planning in metropolitan areas" and to "establish a representative regional planning agency to prepare and administer a regional plan." During the 1990s,

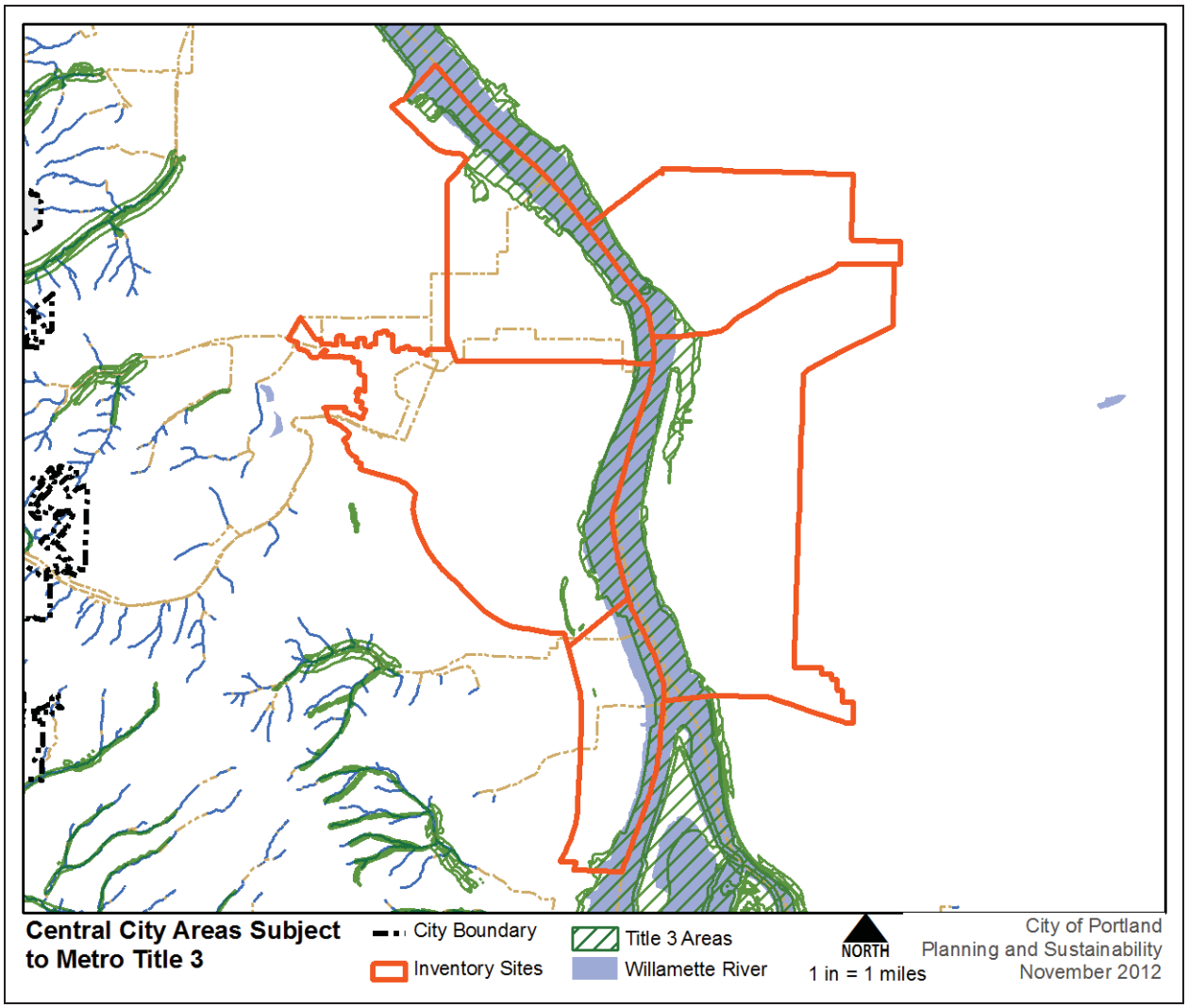
Metro worked with local jurisdictions to develop Regional Urban Growth Goals and Objectives (RUGGOs) and the Urban Growth Management Functional Plan.

The Urban Growth Management Functional Plan provides a regional approach to growth management by tailoring several key Statewide Planning Goals, described above, to meet regional population growth expectations. This approach recognizes the interrelationship between housing, employment, clean air and water, natural resource protection, and transportation networks across jurisdictional boundaries. Metro developed the plan with input from the 24 cities and three counties within the Urban Growth Boundary at that time. The Urban Growth Boundary is one tool used to protect farms and forests from urban sprawl and promote efficient use of lands within the boundary. Uses of land within an Urban Growth Boundary support and are supported by urban services such as roads, water and sewer systems.

The 1987 Willamette Greenway Plan, which serves as compliance with Statewide Planning Goals, has not been updated to address the Urban Growth Management Functional Plan. CC2035, along with this NRPP, will replace the Willamette Greenway Plan for the Central Reach and will serve as compliance with the Urban Growth Management Functional Plan.

Nine titles in the Urban Growth Management Functional Plan are derived from or relate to Statewide Planning Goals and the rest are procedural. Title 3 and Title 13 pertain most directly to natural resources.

> **Title 3** is derived from portions of Oregon Statewide Land Use Goals 6 and 7, and establishes regional requirements relating to water quality, erosion control and flood hazard management. In September 2002, the City of Portland completed the Title 3 Water Quality Compliance Report. The report explains how the City complies with Title 3 requirements through the existing Environmental Overlay Zoning program and newer regulations established by the Willamette River Title 3 Water Quality Compliance Project (adopted by the City Council in August 2002). Metro found the City in substantial compliance with Title 3 in December 2002.



Title 13, adopted by the Metro Council in September 2005, establishes the Nature in Neighborhoods program. The purpose of the program is to protect, conserve, and restore important riparian corridors and wildlife habitat areas in the region. Title 13 also serves as a supplement to Title 3 requirements relating to water quality, flood hazard and erosion control. Title 13 establishes provisions intended to prevent impacts or ensure mitigation of unavoidable impacts on identified Habitat Conservation Areas within the region.

In January 2007, the Oregon Department of Land Conservation and Development acknowledged the new Title 13 program, finding it in compliance with Goals 5 and 6. This acknowledgement established new Goal 5 and 6 requirements for cities and counties in the Metro area. Metro did include the Willamette River and areas in the Willamette Greenway Boundary within the Title 13 program.

In October 2012, the Portland City Council adopted the citywide Natural Resources Inventory methodology and maps as part of the factual basis to inform the City's Comprehensive Plan update. In November 2012, the City Council approved the City's *Request for Metro Determination of Substantial Compliance with Title 13* for submittal to Metro. In December 2012, Metro staff determined that the City is in substantial compliance with Title 13 and the Metro Council accepted this determination in February 2013. The City and Metro entered into a voluntary Intergovernmental Agreement (IGA) that states the City's intent to complete a number of planning projects that will involve the development of area-specific inventory updates and evaluation of environmental program refinements based on the

inventory findings and other new information. The Willamette River Central Reach is referenced in the IGA.

C. City of Portland Comprehensive Plan

All cities and counties in Oregon are required to have a Comprehensive Plan. The Comprehensive Plan addresses future development and land use in Portland. Portland adopted its first Comprehensive Plan in 1981 and recently updated it in 2016. The Comprehensive Plan includes goals and policies that guide Portland as it grows and evolves. The Central City 2035 Plan (CC2035), of which this NRPP is a part, is an amendment to the Comprehensive Plan.

Natural resources associated with the Willamette River Central Reach are addressed in multiple sections of the Comprehensive Plan. This NRPP and implementing tools in Central City 2035 must comply, on balance, with these goals and policies. There are multiple goals and policies in all sections of the Comprehensive Plan that address natural resources including designing with nature, integrating green infrastructure, protecting and enhancing habitat corridors and providing access to nature.

The Comprehensive Plan directs the City to "Weave nature into the city and foster a healthy environment that sustains people, neighborhoods, and fish and wildlife. Recognize the intrinsic value of nature and sustain the ecosystem services of Portland's air, water and land."

The specific environmental and watershed health are addressed by goals 7.A through 7.E and policies contained under those goals. The policies address environmental quality and quantity, ecosystem services, climate change, natural hazards, and habitat diversity and connectivity. The policies also direct the city to maintain inventories of natural resources and develop plans to protect and mitigate for unavoidable impacts to significant resources. Willamette River specific policies are summarized below:

Policy 7.33: Fish habitat. Provide adequate intervals of ecologically-functional shallow water habitat for native fish along the entire length of the Willamette River within the city, and at the confluences of its tributaries.

Policy 7.34: Stream connectivity. Improve stream connectivity between the Willamette River and its tributaries.

Policy 7.35: River bank conditions. Preserve existing river bank habitat and encourage the rehabilitation of river bank sections that have been significantly altered due to development with more fish and wildlife friendly riverbank conditions.

Policy 7.37: Contaminated sites. Promote and support programs that facilitate the cleanup, reuse and restoration of the Portland Harbor Superfund site and other contaminated upland sites.

Policy 7.38: Sensitive habitat. Protect and enhance grasslands, beaches, floodplains, wetlands, remnant native oak, bottomland hardwood forest, and other key habitat for native wildlife including shorebirds, waterfowl and species that migrate along the Pacific Flyway and Willamette River corridor.

Policy 7.39: Riparian corridors. Increase the width and quality of vegetated riparian buffers along the Willamette River.

Policy 7.40: Connected upland and river habitats. Enhance habitat quality and connectivity between the Willamette riverfront, the Willamette's floodplain and upland natural resource areas.

Policy 7.41: River-dependent and river-related uses. Develop and maintain plans and regulations that recognize the needs of river-dependent and river-related uses, while also supporting ecologically-sensitive site design and practices.

2. Local Environmental Regulations, Policies, Goals and Procedures

In addition to the City of Portland Comprehensive Plan, there are other local regulations, policies and goals that relate to natural resource management.

A. City of Portland Title 11: Trees

The Title 11 tree code went into effect in January 2015. The rules apply to trees that are not addressed through the environmental overlay zone regulations found in Title 33 of the zoning code. The tree rules encourage preservation of large healthy trees and replacement of trees that are removed, and ensure that trees are routinely planted as new development takes place.

http://www.portlandonline.com/bps/index.cfm?a=350786&c=54923

B. City of Portland Streamlining Agreement

The City of Portland has a signed agreement with federal agencies that agrees to a shared and cooperative streamlining process for federal ESA consultations. This streamlining agreement process was extended to state and local agencies in 2006 to ensure better coordination and communication between all permitting and consulting agencies.

A Streamlining Team consisting of all participating federal, state and local agencies was created along with standard operating protocols with the purpose of sharing information needed by the agencies for their review and approval of the proposed activity. In addition to assisting City project teams, the procedures are designed to improve coordination and communication among the agencies. Through this approach, the hoped for outcomes are consistent decisions between the agencies and that agency decisions will occur within the same time period whenever possible.

The streamlining agreement was originally designed to facilitate the permitting of city sponsored projects. The process can be extended to private and other public entities whenever it is determined that the City has a strong interest or connection with a proposed development.

Projects that participate in the streamlining process must present a purpose and need statement and a range of alternatives to meet the project's goals, including looking at the practicable alternative with the least impacts to natural resources. If the selected option has unavoidable impacts to natural resources, mitigation requirements can also be identified early in the process.

C. City of Portland Stormwater Management Manual

The Stormwater Management Manual (SWMM) is a technical document originally adopted in 1999 that outlines the City's stormwater management requirements to comply with the National Pollution Discharge Elimination System (NPDES) permit and Safe Drinking Water Act. The SWMM was recently updated in 2010. The requirements defined in the manual apply to all development and redevelopment projects within the City of Portland on both private and public property. The SWMM applies to the following:

- Properties that propose new offsite discharges or new connections to the public system; or
- Projects that develop or redevelop over 500 square feet of impervious area.

The City's approach to stormwater management emphasizes the use of vegetated surface facilities to treat and infiltrate stormwater on the property where the stormwater is created. This approach provides a number of benefits related to protecting stormwater infrastructure and improving watershed health, including pollutant reduction, volume and peak flow reduction, and groundwater recharge. If an entity cannot meet the requirement for managing stormwater onsite to the maximum extent feasible, the City

may allow the entity to either construct an offsite facility or compensate the City for the future development of offsite facilities through payment of a fee. In this case, a filing of "special circumstances" must be done by the applicant, which will be reviewed and approved by the City before an alternative approach would be allowed.

http://www.portlandonline.com/bes/index.cfm?c=47954

D. Portland Watershed Management Plan

The Portland Watershed Management Plan, adopted by City Council in 2005, describes the approach that will be used to evaluate conditions in the City's urban watersheds and implement projects to protect and improve watershed health. The approach is used by the Bureau of Environmental Services, other City bureaus, agencies, and citizens' groups that all share a common goal to protect Portland's natural resources, restore critical ecosystems, and implement stormwater management solutions that integrate the urban area with the natural environment. Its overarching theme is to improve watershed health through new watershed friendly (more sustainable) development and redevelopment, installation of new stormwater infrastructure, maintenance and retrofitting of existing infrastructure in new ways that will improve watershed health, and extensive restoration and rehabilitation of key habitats.

The Watershed Management Plan presents an integrated City response to local, state, and federal environmental requirements, providing the flexibility to respond to regulatory requirements in a manner that addresses the root causes of problems rather than the more traditional mandate-by-mandate approach that only addresses the symptoms. The Watershed Management Plan includes a description of a management system that is used to track City progress toward well-defined watershed health goals, and to help the City adapt their strategies as needed to maximize effectiveness. An annual report is developed that tracks the progress toward achievement of the watershed health goals.

http://www.portlandonline.com/bes/index.cfm?c=38965

E. Urban Forestry Management Plan

The Urban Forestry Management Plan (UFMP, last updated in 2004) provides direction for the maintenance and improvement of Portland's urban forest and makes recommendations to enhance and improve the urban forest now and for the future. Its three main goals are:

- Protect, preserve, restore and expand Portland's urban forest;
- Develop and maintain support for the urban forest; and
- Manage the urban forest to maximize benefits for all residents.

Specifically, it responds to recent environmental mandates, clarifies resource management and authority, better coordinates the roles of different agencies and bureaus, and provides canopy targets. It divides Portland's urban forest into five basic categories called Urban Land Environments (ULEs). Each ULE has particular physical characteristics and issues, provides various benefits and serves different needs. Each ULE is managed by different bureaus, agencies or individuals to achieve different results. The UFMP provides a description of each ULE, management goals, information about property owners/managers, and an analysis of the strengths, weaknesses, opportunities, threats and issues for the ULE. This is followed by specific objectives, recommended actions, and performance measures for assessing progress. An implementing document for the UFMP, the Urban Forest Action Plan, was developed by an interbureau committee and accepted by City Council in 2007 to ensure attainment of the goals and recommendations of the UFMP. The Action Plan describes the full array of benefits and services that trees provide across the urban landscape. The prioritized actions are those that can be done by City of Portland bureaus; achieving all of the UFMP's goals will require participation from private organizations, individuals, and other public agencies.

http://www.portlandonline.com/parks/index.cfm?a=226238&c=38294

F. Terrestrial Ecology Enhancement Strategy (TEES)

The purpose of the TEES is to have a common body of information and agreed-upon priorities for conservation and restoration of terrestrial plant and animal species and habitats in Portland, within a regional and state context. The TEES is designed to help achieve the watershed health goals and objectives in the Portland Watershed Management Plan (PWMP).

The information assembled during the development of the TEES (updated June 2011) is available to BES watershed teams to supplement existing watershed characterizations, inform the selection and prioritization of actions, add value to projects and other actions, determine monitoring priorities, and support and inform the Grey to Green (G2G) project. The TEES work also supports and informs an array of other City programs, plans, activities, projects, and decision-making processes, including the Portland Plan update, environmental regulatory improvement, parks and natural area management, and local bond share land acquisition.

In addition, the TEES supports efforts of Metro (e.g., Nature in Neighborhoods, Intertwine and the Regional Conservation Strategy), the U.S. Fish and Wildlife Service, the Oregon Department of Fish and Wildlife (e.g., the Oregon Conservation Strategy), the Oregon Watershed Enhancement Board, and the Northwest Power and Conservation Council's sub-basin planning.

The main elements of the TEES include:

- Identification of plant and animal species and terrestrial habitats needing protection, conservation, and/or restoration (Special Status Species and Habitats)
- Identification of key management issues (e.g., invasive species)
- Articulation of watershed-specific objectives for terrestrial habitats and biological communities
- Identification and implementation of priorities and actions for the next 2 to 5 years, as well as identification of long-term actions
- Guidance to City bureaus and citizens for improving habitat and addressing plant and wildlife management issues
- Selection of species and habitats to be monitored over time to determine the health of biological communities in Portland's urban watersheds

http://www.portlandonline.com/bes/fish/index.cfm?c=51052

3. State Environmental Regulations, Policies and Goals

In addition to the State Land Use Planning Program, there are other regulations, policies and goals that relate to natural resource management.

A. Oregon Department of State Lands Removal-Fill Permit

In Oregon, a state permit issued by the Department of State Lands (DSL) is required if activities involve filling or removing more than 50 cubic yards of material in waters of the state. In areas determined to be Essential Salmonid Habitat or a State Scenic Waterway a permit is required for any amount of fill or removal. DSL regulates all wetlands, including isolated or ephemeral wetlands.

Currently, DSL and the U.S. Army Corps of Engineers (USACE) use a joint permit application form, so that in many cases applicants need to prepare only one application to obtain both permits. However, all projects require separate authorizations (or permits) from DSL and the USACE, and each agency may request information in addition to the application.

The analysis for the permit must include a purpose and need statement and each alternative must meet the purpose and need. If the alternative chosen includes unavoidable impacts to natural resources, then the analysis includes an evaluation of how impacts can be minimized and if compensatory mitigation is necessary. Compensatory mitigation means activities conducted to restore, create or enhance wetland and

waterway impacts (tidal and non-tidal) to compensate for the adverse effects of the project. The ecological functions (biotic and abiotic) that are impacted by the project must be replaced. In addition to determining which ecological functions should be replaced, DSL uses ratios for spatial considerations; ratios are specific to the restoration, creation, or enhancement types of compensatory mitigation.
DSL prefers mitigation within the same watershed; payment in lieu of mitigation or acquiring mitigation credits from a DSL approved mitigation bank may also be possible.

http://www.oregon.gov/DSL/PERMITS/r-fintro.shtml

B. National Pollutant Discharge Elimination System (NPDES)

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In Oregon, the NPDES permit program is administered by Oregon Department of Environmental Quality (DEQ).

The NPDES 1200-C, 1200-CN and 1200-CA general permits apply to construction activities including clearing, grading, excavation, materials or equipment staging and stockpiling that will disturb one or more acres of land. These permits also apply to construction activities that will disturb less than one acre that are part of a common plan of development or sale, if the larger common plan of development or sale will ultimately disturb one acre or more. In addition, DEQ may require registration for any other construction activity based on the potential for contribution to an excursion of a water quality standard or potential for significant contribution of pollutants to waters of the state.

DEQ issues stormwater discharge permits to industries that discharge stormwater into rivers, lakes and streams from pipes, outfalls or other point sources at a site. Based on federal regulations, NPDES permit coverage is required for industrial facilities that discharge stormwater from their industrial areas to surface waters of the state, or to storm drains that discharge to surface waters. Examples of industrial activities that require a permit include manufacturing, transportation, mining, and steam electric power industries, as well as scrap yards, landfills, certain sewage treatment plants, and hazardous waste management facilities.

A municipal separate storm sewer system (MS4) is a conveyance or system of conveyances (e.g., roads with drainage systems, municipal streets, catch basins, curbs, gutters, manmade channels or storm drains) owned or operated by a governmental entity that discharges to waters of the state. Sources that need to obtain an MS4 permit are classified as either "Phase I" or "Phase II." Phase I MS4s are those with populations greater than 100,000, while regulated Phase II (or "small") MS4s serve populations less than 100,000 located within Census Bureau-defined Urbanized Areas.

http://www.deq.state.or.us/wq/stormwater/stormwater.htm

C. Oregon Waterway Authorization Program

The Oregon Department of State Lands (DSL) is responsible for establishing rules controlling public use of submerged and submersible land underlying state-owned waterways. State-owned waterways are navigable waterways below ordinary high water. Many uses of and structures occupying state-owned waterways require DSL's written approval. Types of uses that require authorization include but are not limited to:

1. Waterway Lease for commercial and non-commercial marina/moorages, industrial, non-marine uses, floating homes, and large (more than 2,500 square feet) non-commercial docks, and boathouses.
2. Waterway Structure Registration for non-commercial docks, and boathouses under 2,500 square feet.

3. Waterway Registration of a structure that is actively and exclusively used to accommodate ships, boats, or vessels engaged exclusively in the receipt and discharge of goods or merchandise, or in the performance of active government functions on the waterway.
4. Public Facility License for public agency owned, operated, and maintained docks/floats, boat ramps, boat landings, floating restrooms, navigational aids, and viewing structures with no, or a nominal, fee.

http://oregonstatelands.us/DSL/NAV/index.shtml

D. Oregon Department of Fish and Wildlife – Fish Passage

In Oregon, providing fish passage over man-made dams and diversions has been required since before statehood in 1859. Fish passage statutes have evolved over the past 150 years. In 2001, House Bill 3002 (HB 3002), which addresses fish passage at artificial obstructions, was signed into law.

As a state policy, upstream and downstream passage is required at all artificial obstructions in Oregon waters where migratory native fish are currently or have historically been present, except under certain clearly defined circumstances. Overwater structures, such as a dock or pier, would be evaluated under this rule.

HB 3002 requires the Oregon Department of Fish and Wildlife (ODFW) to complete and maintain a statewide inventory of artificial obstructions, which will be used to prioritize artificial barriers. The primary method for implementing this policy should be through active collaboration and cooperation between the ODFW and owners or operators of artificial obstructions. HB 3002 provides the Fish and Wildlife Commission with emergency authority to require installation of fish passage at the owner/operator's expense if a population of native migratory fish is adversely impacted.

The ODFW will review fish passage in consultation to the DSL permit. ODFW also establishes the in-water work windows.

http://www.dfw.state.or.us/fish/passage/

E. The Oregon Conservation Strategy

The Oregon Conservation Strategy (the Strategy) is a non-regulatory, statewide approach to species and habitat conservation. The Strategy provides a framework for limited conservation resources, to leverage investments in a more efficient and effective manner. The Strategy was developed by the Oregon Department of Fish and Wildlife (ODFW) in conjunction with a broad base of stakeholders, including, federal, state, and local agency personnel, biologists, citizens, and elected officials. A primary goal of the Strategy is to help recover currently listed species and prevent additional species listings. The approach taken by ODFW in the Strategy is to identify “Strategy Species” which include those most in need of conservation, and “Strategy Habitats” which benefit a broad suite of species and map Conservation Opportunity Areas (COAs) for those habitat areas where conservation activities would have the greatest benefit.

Actions recommended in the Strategy include protect and maintain priority habitats where they remain, restore and expand to improve conditions and value to fish and wildlife, protect and restore river floodplain interactions, and control invasive species.

http://www.dfw.state.or.us/conservationstrategy/

4. Federal Environmental Regulations, Policies and Goals

There are a number of federal regulations, policies and goals that relate to natural resource management.

A. Clean Water Act (CWA) Section 404 Permit

CWA Section 404 establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Responsibility for administering and enforcing Section 404 is shared by the US Army Corps of Engineers (USACE) and Environmental Protection Agency (EPA).

Permit review and issuance follow a sequential process that encourages avoidance of impacts first, followed by minimizing impacts and, finally, requiring mitigation for unavoidable impacts to the aquatic environment. This sequence is described in CWA Section 404(b)(1). Only after avoidance and minimization criteria are satisfied can the USACE consider compensatory mitigation. The USACE or EPA has the right to require the developer to mitigate any unavoidable impacts on waters of the United States as a condition of an individual 404 permit. The developer can be required to enhance, restore, or create wetlands or aquatic habitat on or near the development site. In establishing mitigation requirements, the USACE must strive to achieve a goal of no overall net loss of functional values and functions, meaning a minimum of one-for-one functional replacement with an adequate margin of safety to reflect scientific uncertainty. Mitigation banking, using a mitigation bank that has been approved by EPA and the USACE for this purpose, is encouraged.

Common activities that take place in waters of the US and require a federal permit include:

- Excavation or dredging in waters of the US
- Channel changes, realignments or relocations;
- Construction of a dock, pier, wharf, seawall, boat ramp, intake or outfall structure;
- Placement of fill, riprap or similar material;
- Placing fill to construct levees, roadways and bridges; and
- Bank or shore stabilization projects including jetties and revetments.

A federal permit is required regardless of the amount of area affected by the activity and amount of fill used. Under the CWA, the EPA and USACE follow the mitigation framework set out in the Section 404(b)(1) guidelines to evaluate applications for Section 404 dredge and fill permits.

The issuance of this permit is a federal action that triggers consultation with National Marine Fisheries Services (NMFS) under the Endangered Species Act, tribal governments, US Fish and Wildlife Services (USFWS) and historic preservation delegated to the State Historic Preservation Office (SHPO). (See also Oregon Department of State Lands Removal-Fill Permit).

http://water.epa.gov/lawsregs/guidance/wetlands/sec404.cfm

B. National Environmental Policy Act (NEPA)

In enacting NEPA, Congress recognized that nearly all federal activities affect the environment in some way and mandated that before federal agencies make decisions, they must consider the effects of their actions on the quality of the human environment. Under NEPA, the Council on Environmental Quality (CEQ) was established to work with agencies to balance environmental, economic, and social objectives in pursuit of NEPA's goal of "productive harmony" between humans and the human environment (42 U.S.C. §4331(a)). NEPA assigns CEQ the task of ensuring that federal agencies meet their obligations under the Act. CEQ NEPA regulations require an analysis of environmental impacts and, if necessary, identification of mitigation alternatives.

CEQs regulations (40 C.F.R. Parts 1500-1508) set the standard for NEPA compliance. They also require agencies to create their own NEPA implementing procedures. These procedures must meet the CEQ standard while reflecting each agency's mandate and mission. The NEPA analysis bears similarities with other federal agencies' review requirements and can be used to inform review under the Endangered Species Act and National Historic Preservation Act, Executive Orders on Environmental Justice, and other Federal, State, tribal, and local laws and regulations.

The NEPA process begins when a federal agency proposes to take an action, which may include rule making, regulations, plans, funding or specific projects (40 C.F.R. § 1508.18). For example, Department of Transportation funding for a bridge or rail improvement is an action that would trigger the NEPA process. The NEPA process is initiated when an action or project is at 10% design. A concept plan, which may not be the preferred design by which permits are acquired, is not considered a 10% design and the NEPA process would not start.

Under NEPA, the agency determines whether the action is a Categorical Exclusion (CE) or if additional analysis is necessary. To perform an analysis, the applicant must identify the purpose and need of the action and alternatives that meet the purpose and need. Through an Environmental Assessment (EA) or Environmental Impact Statement (EIS), the applicant identifies measures that will be taken to mitigate (avoid, minimize or compensate for) environmental impacts.

The EIS process includes a statement of purpose/need, identification of alternative solutions (including no action), and impacts of the preferred alternative. The Draft EIS is published for public review and comment for a minimum of 45 days. The agency must consider all substantive comments, conduct further analysis if necessary, and prepare a Final EIS, which is available for public review for 30 days. This review period must be completed before the agency makes a decision on the proposed action. The EIS process ends with the completion of a Record of Decision (ROD). The ROD explains the agency's decision, describes the alternatives the agency considered (including the environmentally preferred alternative), and discusses plans for mitigating potential environmental effects and monitoring those commitments.

http://www.epa.gov/compliance/nepa/index.html

C. Endangered Species Act

NOAA National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) use the Federal Endangered Species Act (ESA) to protect species including many listed species found in the Willamette River. NMFS is responsible for protecting salmon and other ocean-migrating fish, as well as marine animals. USFWS is responsible for protecting wildlife, bird species and inland (primarily freshwater) fish such as bull trout and coastal cutthroat trout. Currently, 17 salmon species and trout are federally listed and present in the Central Reach.

Under Section 7 of the ESA, federal agencies must use their authorities to protect listed species and habitats that are critical to their survival. Section 7 also requires federal agencies to ensure that their actions, including any actions they authorize, fund or carry out, do not jeopardize listed species or destroy or adversely modify their critical habitat.

NMFS and USFWS designate "critical habitat" for species that are listed under the ESA. "Critical habitat" is the "specific areas within the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological considerations or protection." NMFS has designated critical habitat for most of their species that are listed under the ESA that may be found in the Central Reach. For several species, critical habitat extends 300' from the top of bank, for others to top of bank.

Section 7 requires all federal agencies, including the US Army Corps of Engineers (USACE), to assess whether federally listed threatened or endangered species and/or critical habitat may be affected by a project under their jurisdiction. The USACE requires the applicant to prepare a Biological Assessment to evaluate if such an effect is possible and, if it is, the applicant is required to consult with USFWS and/or NMFS before approving a permit that might affect species in these ways. This process is called "consultation." This serves as consultation for the Magnuson-Stevens Act on Essential Fish Habitat (see E below).

If no impacts on federally listed threatened or endangered species and/or critical habitat are found to be associated with the proposed project, the USACE will be able to issue a permit without consultation.

If there will be adverse effects to listed species or critical habitat, consultation with NMFS is required. NMFS evaluates the project as proposed for its impacts to ESA listed species. If NMFS determines that the project will not result in jeopardy to the species it will issue an "Incidental Take Statement" that includes reasonable and prudent measures with terms and conditions to minimize incidental take. If NMFS finds that the project will result in jeopardy to the species it will provide a "reasonable and prudent alternative" that would not result in jeopardy.

If the project design and implementation plan are deemed adequate, the USACE issues a permit to the applicant. The permit may include conditions to avoid, minimize, and compensate for expected impacts of the project. Conditions are designed to protect water quality, fish and wildlife and their habitats, and adjacent properties.

Section 9 of the ESA states that no one may "take" an animal that is listed as endangered. "Take" includes the harassment, harm, pursuit, hunting, shooting, wounding, killing, trapping, capture, or collection of any threatened or endangered species. "Harm" may include habitat modification that results in the death or injury of a listed species. This is referred to as a "take prohibition." For species listed as threatened, Section 4(d) of the ESA requires NMFS to issue rules that citizens, organizations and governments must follow in order to protect the species (referred to as the "4(d) rules"). The rules may include any or all of the general take prohibitions that apply to endangered species. By regulation, NMFS applies take prohibitions to all threatened species (except plants) at the time of listing or later. The ESA provides some exceptions to general take prohibitions and 4(d) rules, and under section 10 landowners can obtain permits for work that incidentally affects listed species (Incidental Take Permit). These permits can only be issued for:

- Scientific work;
- Projects designed to enhance the survival of the species; or
- Activities that may only incrementally take or harm species during the course of the work.

Incidental Take Permits require development of a Habitat Conservation Plan (HCP) that specifies how impacts to a listed species and its habitat will be minimized. In issuing Incidental Take Permits, USFWS and NMFS must comply with NEPA as well as state and local environmental laws. For these reasons, HCPs also require an Environmental Assessment or Environmental Impact Statement for the proposed activity.

http://www.mrsc.org/Subjects/Environment/esa/esa-bioass.aspx
http://www.nmfs.noaa.gov/pr/laws/esa/

D. Federal Emergency Management Agency Flood Plain Management

The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP) which includes floodplain mapping and mandates for floodplain development regulations meeting established criteria to qualify for federally-subsidized flood insurance. The NFIP floodplain management regulations (44 CFR 60) are implemented through local jurisdictions. The City of Portland's local floodplain ordinance is found in Portland City Code 24.50. FEMA identifies the Nation's floodplains and publishes Flood Insurance Rate Maps (FIRMs), which depict the floodplain data. FEMA maps the area that has a 1% chance of being flooded in any given year. This establishes the 100-year floodplain, which is the standard used by the NFIP and most federal and state agencies for floodplain management and to determine the need for flood insurance. FEMA most recently updated the FIRMs for the Willamette River in 2009.

The principal regulatory requirements for development in the 100-year floodplain include, but are not limited to, the following:

- Development within the Floodway is prohibited unless hydraulic engineering analysis demonstrates the development will result in no increase in 100-year flood elevations.
- Occupied or inhabited structures must be built at least one foot above the 100-year flood elevation. This is often achieved by placing fill within the 100-year floodplain to raise the ground elevation and allow development in that area. Other site improvements, such as parking or exterior storage, may be below the base flood elevation.

- Fill material placed below the 100-year flood elevation must be balanced with an equal or greater volume of excavation below the 100-year flood elevation such that the flood storage capacity of the floodplain in maintained; this is often referred to as flood storage compensation or "balanced cut and fill." (See also Metro Title 3.)

NMFS recently released a biological opinion about the impacts of NFIP on listed species in the Willamette River. FEMA will provide direction to local jurisdictions regarding the implementation of the reasonable and prudent alternatives identified in the biological opinion to avoid harm to listed species. FEMA's implementation of the biological opinion will likely require updates to local floodplain regulations. As a part of this effort, FEMA will update the FIRM of all streams containing listed species.

http://www.fema.gov/plan/prevent/floodplain/nfipkeywords/permit.shtm

E. Rivers and Harbors Act of 1899

The Rivers and Harbors Act addresses projects and activities in navigable waters and harbor and river improvements. The USACE administers Section 9 and Section 10 of the Rivers and Harbors Act.

Section 9 of the Rivers and Harbors Act (33 U.S.C. 401) prohibits the construction of any dam or dike across any navigable water of the United States in the absence of Congressional consent and approval of the plans by the Chief of Engineers and the Secretary of the USACE. Section 9 also pertains to bridges and causeways; however, the authority of the USACE is transferred to the Secretary of Transportation under the Department of Transportation Act.

Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters, is unlawful unless the work has been recommended and authorized by USACE. This work includes excavation or fill, which could contain contaminated sediments. (See also NPDES permits.)

http://el.erdc.usace.army.mil/emrrp/emris/emrishelp5/rivers_and_harbors_acts_legal_matters.htm

F. Marine Mammal Protection Act, 1972

The Marine Mammal Protection Act (MMPA) is intended to conserve marine mammals. All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

The implementation of the MMPA is divided between two federal departments. The Department of Commerce, which NMFS is part of, is charged with protection of cetaceans and pinnipeds other than walrus. The Department of the Interior, USFWS, is responsible for all other marine mammals, including sea otter, walrus, polar bear, dugong and manatee.

http://www.nmfs.noaa.gov/pr/laws/mmpa/

G. The Migratory Bird Treaty Act and the Urban Conservation Treaty for Migratory Birds Program

The Migratory Bird Treaty Act (MBTA), passed in 1918, established the United States' commitment to implement four bilateral treaties, or conventions, for the protection of a shared migratory bird resource. The MBTA protects over 800 species of birds. Over 200 migratory bird species migrate through Portland every year, and Portland provides critical resting, feeding and nesting habitat for numerous types of migratory and resident birds.

The MBTA uses very broad language to prohibit at any time or in any manner the pursuit, hunting, taking, capturing or killing of any migratory bird. It does not have an incidental take permit or its equivalent. The unauthorized killing of any of approximately 800 identified migratory birds constitutes a violation of the MBTA. The MBTA has no specific mitigation requirements. It is enforced by USFWS, although its enforcement is viewed as somewhat selective because of MBTA's expansive scope. The MTBA's applicability to habitat modification and destruction is unclear; the definition of "take" in the MBTA does not include "harm" or "harass," unlike the ESA. Due diligence with MTBA requirements is typically done by providing baseline studies and preconstruction surveys that document site characteristics and development of a protection plan for species known to be present.

Portland joined four other U.S. cities in 2003 in establishing a local commitment to help migratory birds and enhance their habitats within urban environments by participating in the Urban Conservation Treaty for Migratory Birds program. USFWS selected Portland as a pilot project city due to its location along the Pacific Flyway. The program was designed by USFWS in 1999 to help municipal governments conserve migratory birds that nest or fly through their cities. The Treaty sponsors public education and outreach projects to help increase public understanding of the importance of migratory bird conservation. It also helps finance the creation and restoration of city parks and greenways. Portland has developed guidelines for protecting migratory birds during construction activities.

http://www.fws.gov/pacific/migratorybirds/mbta.htm
http://www.portlandonline.com/bes/index.cfm?c=51502&

CHAPTER 4. ANALYSIS OF PROTECTION OPTIONS AND GENERAL RECOMMENDATIONS

The purpose of this analysis is to evaluate the trade-offs associated with different choices for protecting and managing natural resources in the Willamette River Central Reach Natural Resources Protection Plan (NRPP) study area.

1. Analysis Approach

The analysis of options for protecting natural resources is qualitative and relies on existing data and information. The analysis is done in three steps:

Step 1 – Identifying conflicting uses. These are uses that are allowed within the NRPP study area and which could have a negative impact on the natural resources. For example, clearing and grading a site in preparation for development of a structure is a use of the land that would conflict with, or have negative impacts on, the natural resources.

Step 2 – Understanding consequences of the protection options. Any choice to protect or not protect the natural resources will have consequences for both the conflicting uses and the resources themselves. For example, prohibiting development within the riparian area has positive consequences for the resources but could have negative consequences for development, including reducing job capacity or housing options. The consequences are described under the topics of environmental, economic and social. Each section has a general analysis of the consequences followed by a summary. The summaries are balanced to make a general recommendation.

Step 3 – Making general recommendations. Based on the analysis of conflicting uses and the consequences of natural resource protection options, recommendations are made for broad categories of natural resources. These general recommendations are intended to set the policy direction for inventory site-specific decisions regarding the protection of natural resources. The site-specific decisions are presented in Chapter 5, Results.

2. Conflicting Uses

Within the NRPP study area there are uses, such as development of structures, that if allowed would negatively impact natural resources. These are called *conflicting uses*. Conflicting uses are identified by looking at what is allowed, outright or conditionally, by the base zones applied to the Central City. Below are descriptions of the conflicting uses allowed in the Central City and how those uses may negatively impact natural resources.

A. Common Impacts of Conflicting Uses

Development and disturbance activities can adversely affect natural resources occurring within each of the City's base zones; however, the degree or intensity of the impacts may vary depending on the intensity of the land use, the form, layout or design of the development, construction protocols or ongoing operation and maintenance activities. Below is a description of activities associated with the conflicting uses, and their related impacts on natural resources.

The following impacts are generally site specific and cumulative with respect to other impacts and conditions in the watershed.

Clearing vegetation
Rainwater is intercepted and taken up by vegetation. This function is impaired when vegetation is cleared, resulting in increased overland runoff. In turn this increases runoff volume and flows into receiving water bodies following storm events. Increased streamflow volume and rate can cause bank erosion, undercutting, slumping, and flooding. Vegetation also filters surface stormwater flows removing pollutants and sediment. Vegetation removal can affect these functions in streams that are far from the development site as stormwater is often piped great distances within the city.

Tree canopy and associated understory vegetation create shade and local microclimate effects that cool the air and water, and maintain humidity and soil moisture. Trees and vegetation also help capture carbon dioxide; carbon dioxide is a contributing factor to global warming. All of these functions are affected when the vegetation is removed.

Clearing vegetation also removes important structural features of the forest such as multiple canopy layers, snags and downed logs, large trees, and root systems that hold soils in place. This can result in soil erosion and impaired habitat for native wildlife. Vegetation removal reduces food, nesting opportunities, cover, and perching and roosting opportunities for wildlife. Removing streamside or shoreline vegetation also eliminates sources of leaf litter, which provide food and nutrients for aquatic organisms, and woody debris, which provides river habitat structure and food resources for fish. Wildlife affected by vegetation removal includes mammals, birds, reptiles, amphibians, fish and insects. Removal of vegetation can fragment riparian and upland wildlife movement corridors, isolate remaining vegetation patches, and limit wildlife access to water. These impacts impede wildlife migration and can limit recruitment from other areas, making wildlife populations more vulnerable to disease, predation and extirpation.

Some vegetation types have been declining in the Portland area due to clearing and grading for development and the use of ornamental vegetation in landscaping (not replacing cleared vegetation with like native species). Certain assemblages, such as native bottomland hardwood forests and native oak stands, require specific soil, water and sun exposure to survive and are slow growing, taking many years to become established. These vegetation assemblages still exist including bottomland forest along the Lower Willamette River. Removal not only reduces habitat functions as discussed previously, but also contributes to the decline in these unique vegetation types and potentially extirpation within the city.

Grading, excavation, filling and soil compaction
Grading activities and soil compaction can reduce the capacity of soil to support vegetation by disturbing the soil structure, accelerating erosion, and decreasing soil fertility, microorganisms, seeds and rootstocks. Soil porosity and stormwater infiltration can be reduced by grading, excavating, filling and soil compaction. This in turn can reduce groundwater recharge and in-stream summer and fall low flows, which adversely affects aquatic species. Grading, excavation, filling and compaction also affect wildlife habitat for some species. For example, long-toed salamanders require forest leaf litter and downed logs for thermal protection and foraging areas.

Adding impervious surface (e.g. buildings, parking areas, roads, sidewalks, driveways)
Impervious surfaces alter the hydrologic cycle by preventing stormwater infiltration and concentrating overland flow. This results in increased stormwater runoff and decreased groundwater recharge. Increased stormwater runoff can result in increased volume and flows into receiving water bodies (see vegetation clearing). Decreased groundwater recharge can reduce in-stream summer low flows (see grading, excavation, filling and soil compaction). Impervious surfaces also contribute to urban heat island effect, which affects local air quality. Increased impervious surfaces can also cause wildlife habitat fragmentation and create hazards or barriers to wildlife movement (see vegetation clearing).

Modifying rivers and floodplains (e.g. filling, bank armoring)
Altering the natural configuration, geomorphology, and structure of river banks and the floodplain results in:

- increased in-stream flow velocity, which can cause bank erosion, undercutting and slumping on-site or at upstream or downstream locations
- a decrease in aquatic habitat area and simplified remaining habitat when side channels, wetlands and oxbows are disconnected from the main river channel
- a decrease in areas of wood deposition where side channels and wetlands are filled in
- reduced flood storage capacity and other benefits associated with active flood areas (e.g., nutrient transport, off-channel habitat)
- reduction in vegetation that attenuates flows and provides important fish habitat during flood events

Generating pollution
Oil, gas, tar, antifreeze, dissolved metals, pesticides, herbicides, fertilizers and other contaminants degrade habitat and water quality. These pollutants are transported to water bodies in stormwater via runoff from streets, driveways, parking lots, farms, parks, golf courses and buildings. Dirt and sediments from eroded areas or deposited from vehicles can also be transported via stormwater to water bodies and degrade aquatic habitat. Pesticides, herbicides and fertilizers used in landscaping can pollute ground and surface waters, degrade habitat, and harm fish and wildlife.

Landscaping with non-native and/or invasive vegetation (e.g., ornamental trees)
The removal of native vegetation and establishment of cultivated landscapes can change or reduce food, cover and nesting opportunities for native wildlife. Manicured landscaped areas generally lack complex vertical structure – little if any multi-layered canopy, large trees, snags, thick understory vegetation, and downed logs are retained in landscaped areas. The reduction in vertical structure impairs wildlife habitat and alters microclimate effects and hydrology. Some non-native plants used in landscaping are invasive (e.g. ivy, morning glory, holly and laurel) and can out-compete native plants reducing biodiversity. Non-native landscapes may also require irrigation and may be treated with chemical fertilizers and pesticides, which can run-off into local waterways and wetlands, or may be ingested by wildlife.

Building fences and other wildlife barriers
Barriers to wildlife movement can include buildings, roads, rail lines, fences and other manmade features. These barriers fragment connectivity between wildlife habitats and reduce the ability of native wildlife species to thrive (see clearing vegetation). Some barriers, such as roads and rail lines, may create hazards that increase the risk of wildlife mortality.

Other impacts: pets, light, noise, litter, etc.
Human activities that create outdoor noise and light can disrupt the competition, communication, reproduction, and predation habits of wildlife (Brown, 1987). For example, night-time lighting can interrupt the navigation of migrating birds and bats. Domestic pets can kill or injure native wildlife or compete for limited space. For example, allowing dogs to run freely in a grassland area can disrupt grassland-associated wildlife that build nests on the ground. Domestic pet waste, litter and garbage can degrade natural resources including soil and water quality.

B. Impacts of Specific Conflicting Uses

The previous section outlines the impacts generally associated with conflicting uses like clearing and grading. This section evaluates the impacts associated with specific land uses such as residential or industrial.

Commercial, Employment and Residential Uses
Retail office, commercial parking lots, event facilities, daycare facilities, churches, apartments, condos and single family housing are examples of uses that are allowed in the Central City. Development of new uses would involve vegetation clearing, grading, filling and soil compaction, as well as addition of impervious surfaces and landscaping with non-native plants, with associated impacts on natural resources. In the Central City most development is allowed to fully cover sites with no required setbacks. Replacement of existing uses could forgo opportunities to restore natural resources.

Industrial Uses

Industrial uses have similar negative impacts as other uses including vegetation clearing, grading, filling and soil compaction, impervious surfaces and landscaping with non-native plants.

Some industrial activities require the use of water in the manufacturing processes (e.g. cooling equipment) and draw substantial amounts of water from wells and public water sources. The resulting effluent, which is typically warm, may be discharged to receiving waters, such as a river, and influence in-water temperature. Cool water temperature is a fundamental requirement for many native aquatic species in this region, particularly federal Endangered Species Act-listed fishes. Industries that discharge effluent into water bodies are generally required to obtain a discharge permit through the Oregon Department of Environmental Quality.

Industrial areas can contribute high quantities of heavy metals and other toxic material to the soil, water and air, but are typically regulated to manage the impacts. In addition, the use, storage and transport of hazardous materials, waste storage and recycling and similar activities often occurs in industrial areas and can require special permitting.

Open Space

Undeveloped open space has the least amount of disturbance of all urban uses; however, in the Central City all open spaces are formally developed with trails, lawns, landscaping and other uses. Trails can create different levels of impact on natural resources depending on trail design and location. An example of a trail related impact is fragmenting habitats and creating opportunities for invasive plant intrusion into a habitat area. Landscaping with non-native plants and use of irrigation, herbicides, pesticides and fertilizers can have a detrimental effect on natural resources.

Impacts associated with more active open space uses can be similar to residential or commercial development. For example, sports fields generally require significant grading and vegetation management. Some open space uses require development of parking lots, which can generate stormwater runoff. Areas used for large-scale events often experience significant soil compaction, resulting in nearly impervious surfaces.

Basic Utilities

Basic utilities are infrastructure services such as water and sewer pump stations, electrical substations, and power line corridors that need to be located in or near areas where the utility service is provided. Construction and maintenance of utilities can have negative impacts on natural resources. Corridors cleared of vegetation can increase wind and light penetration into adjacent habitat areas and can provide opportunities for intrusion of invasive, non-native plant species. Construction of basic utility facilities often fragments wildlife habitat. Operation of existing facilities has few adverse impacts on natural resources, except in the case of overhead electrical lines, which must be cleared of high structure vegetation.

Mining

Mining is allowed as a conditional use in the Open Space (OS) base zone and is prohibited in all other zones. Mining has the most severe environmental impacts of all uses allowed in the OS zone as it generally eliminates all natural resources from the area being mined and often results in long-term water quality degradation. Once the mining operation is closed, enhancement of soil and vegetation is possible, but natural resources often cannot be fully restored.

Radio and Television Broadcast Facilities

Most low powered transmitters, such as cordless telephones and citizen band radios are allowed in the Central City. More powerful and larger radio, television and cell phone broadcast facilities are allowed in all zones subject to limitations or as conditional uses. The impacts of these facilities are minimal as compared to other uses, except open space. Certain of these facilities can pose hazards to migratory birds. During bad weather birds fly lower and may be disoriented by the lights of the towers and may run into towers or guy wires. There may be a greater visual impact from these broadcast facilities.

Rail Lines and Utility Corridors
Construction of rail lines often requires substantial quantities of excavation and fill to meet the 0-3 percent slope standards. Generally, additional grading results in natural resource disturbance and degradation of soil, vegetation and wildlife habitat. Most rail corridors are maintained by extensive chemical vegetation treatment with a potential for ground and surface water impacts. Rail corridors can also create wildlife hazards or barriers to wildlife movement.

Rail and utility corridors can pose additional risk of wildfire. Rail lines can cause sparks that can ignite dry vegetation. Utility corridors typically must be kept clear of tall vegetation that could harm overhead facilities. Topping or removal of trees is a common practice in utility corridors. Topped trees are more susceptible to disease and are less inhabitable by wildlife.

Other Land Use and Enabling Procedures
There are certain allowed uses and enabling procedures that are not assigned to a single category by the City zoning code. These include infrastructure, nonconforming situations, land divisions, partitions and property line adjustments.

Infrastructure – Infrastructure uses are accessory to urban development and include roads, water, sewer, electric, television lines and other public and private utilities not described by the zoning code category "basic utilities." Infrastructure is allowed in all city zones. Some of these uses are regulated by city public works and building codes. The uses generally have similar impacts as other development activities like vegetation clearing, soil grading, piping streams, etc.

Land Divisions, Partitions and Property Line Adjustments – These are procedures that establish lots or relocate property lines within a zone. While the act of adjusting or creating lot lines does not directly impact resources, the new or modified lots may allow more conflicting uses or a greater intensity of development than the original lots. Often the outcome of adjusting lot lines or creating lots is to increase development opportunities thus increasing impacts on natural resources.

3. Environmental Consequences

This portion of the analysis summarizes the environmental consequences of protecting natural resource areas. The natural environment in urban areas is altered and disturbed by human activities. However, human welfare depends in part on vital ecosystem services provided by natural resources such as fresh air, clean water, slope stability, food supply, shade, and access to nature. Fish and wildlife also depend on having adequate quantity and quality of habitat, especially in urban areas where habitat is limited.

A. Environmental Analysis

Natural resources provide multiple services to associated development; these are called *ecosystem services*. Examples of the ecosystem services provided by natural resources include air purification, maintenance of water quality and quantity, flood storage, cooling, aesthetics, screening and buffering, and employee benefits such as opportunities for recreation and exercise. Some of these services, when displaced by development, must be replaced using infrastructure. For example, when a site is converted from a natural area to a parking lot, the hydrologic and water quality functions provided by the natural area must be replaced in the form of stormwater management and/or vegetation and landscaping. Another example is flood storage. When the floodplain is filled to allow for development the change in hydrology can increase the risk of flooding off-site and may require mitigation by creating flood storage elsewhere.

Development can have many negative impacts on natural resources. Development reduces the overall size and complexity of existing natural resources features. Often mitigation for these impacts is required

through federal, state or local regulations; however, mitigation actions rarely can replace all impacted features or functions in full (ECONorthwest, 2012).

Development also has negative impacts to adjacent remaining habitat. Reducing the size of the habitat increases the edge to interior habitat ratio. Reducing the riparian area around a river, stream or wetland has negative impacts on the water body. Noise, light, dust and vibration from the development penetrate into the edge of the remaining habitat. Impacts from actions like construction can last long-after the action is completed. Physical pollution, such as chronic noise, light and movement, have negative environmental impacts, including significant changes in migration, foraging, predator-avoidance behaviors, reproductive success, and community structure of many fish and wildlife species (Barber et.al., 2009). Light pollution can affect salmon migration (Tabor, 2011) and noise pollution can have impacts on bats. Chemical pollution from industrial accidents, effluent discharge, and particulate releases also disrupts similar behavior and life history strategies of fish and wildlife. Some species can adapt to such changes to their environment; however, many others cannot.

Fragmentation of natural resources by trails and maintenance roads creates places where invasive plants can intrude into the habitat. People using these facilities can also have a negative impact on the resources. For example, people hiking on trails cause noise that can disturb wildlife, particularly if people bring their dogs on the hike. Leaving behind trash, pet waste, and trampled vegetation, and the act of plant/animal harvesting are common impacts of human use of natural areas.

Climate change impacts are already evident, both globally and in Oregon, and more impacts are inevitable, if uncertain. To adapt, the region must understand and prepare for change. Portland's Climate Action Plan calls for a comprehensive review to better understand the possible and the likely impacts of climate change. The purpose is to assess climate-related vulnerabilities, and the strengths and resiliency of: local food, water and energy supplies, infrastructure, transportation and freight movement, floodplains, watersheds, public health, public safety, social services and emergency preparedness.

Decision-making in the face of uncertainties in climate change projections, especially in regional downscaling of global climate change models, remains a challenge. Climate projections work well for some variables and poorly for others. For example, currently available model projections for the Pacific Northwest have a higher degree of certainty related to expected changes in precipitation patterns and temperature increases, but are inconclusive about what should be expected for total annual precipitation or extreme weather events.

That being said, it is fairly certain that the Portland region will experience the following changes:

- Increased temperatures overall, including average, maximum and minimum temperatures in the summer and winter months (projected 0.5 ^{0}F increase per decade).
- Changes in precipitation patterns, with more precipitation falling in mid-winter and less precipitation in the summer.
    - More precipitation falling as rain rather than as snow in lower elevation watersheds.
- Continued influence of ocean-driven weather patterns (e.g. La Niña/El Niño and the Pacific Decadal Oscillation) and swings between hot/dry and cold/wet (Oregon Climate Change Research Institute, 2010).

In addition, the Portland region may also experience:

- Changes in total annual precipitation amounts (increases or decreases).
- A change in the frequency, magnitude or duration of extreme weather events (intense rainfall, wind storms, ice and snow).

Non-developed areas that provide multiple natural resource functions can play an important role in adapting to climate change in the region. Flood storage provided by active floodplains may become even more important to accommodate potential changes in flows and flood regimes. Maintaining diverse habitats and habitat corridors will be critical for resident and migratory wildlife that may be required to adapt their behaviors and life cycles to changes in air and water temperature, weather patterns, habitat ranges, and food sources.

B. Environmental Consequences

Habitat and biological communities – Protecting natural resources will have positive consequence for habitat and biological communities. These consequences are more pronounced in the Central Reach due to the historic removal of the extent and diversity of natural resources, making the remaining resource areas even more valuable. Limited impacts to existing habitat and biological communities could be offset by mitigation.

Climate change – Protecting natural resources will have positive consequences for the city with regards to climate change. Maintaining areas that can flood will reduce the risk of flooding to properties and people. Maintaining vegetation and open water will reduce the impacts of increased air temperature on human health. And maintaining habitat areas will allow fish and wildlife to move through the urban environment to adapt to climate change.

Avoided replacement of functions – Protecting natural resources reduces the need for development to replace the functions provided by the resources including flood mitigation, stormwater management and heating/cooling.

4. Economic Consequences

This portion of the analysis summarizes the economic consequences of protecting natural resource areas. The economic consequences are expressed as the qualitative and relative costs, benefits, and impacts on conflicting uses and natural resources.

A. Economic Analysis

Central City Economy and Employment
The Central City is the economic center of Portland and a hub for the regional economy. The Central City is home to professional service industries that support the entire Metro region, as well as a growing number of colleges and universities. The Central City has maintained a manufacturing base and hosts a number of emerging business sectors that diversify the economy, support regional prosperity and increase Portland's exposure on the global stage. To keep the Central City the economic center of the region, there is a need to support the growth of office based industries, entrepreneurship and business innovation, small and start-up firms, educational institutions and industrial and employment districts.

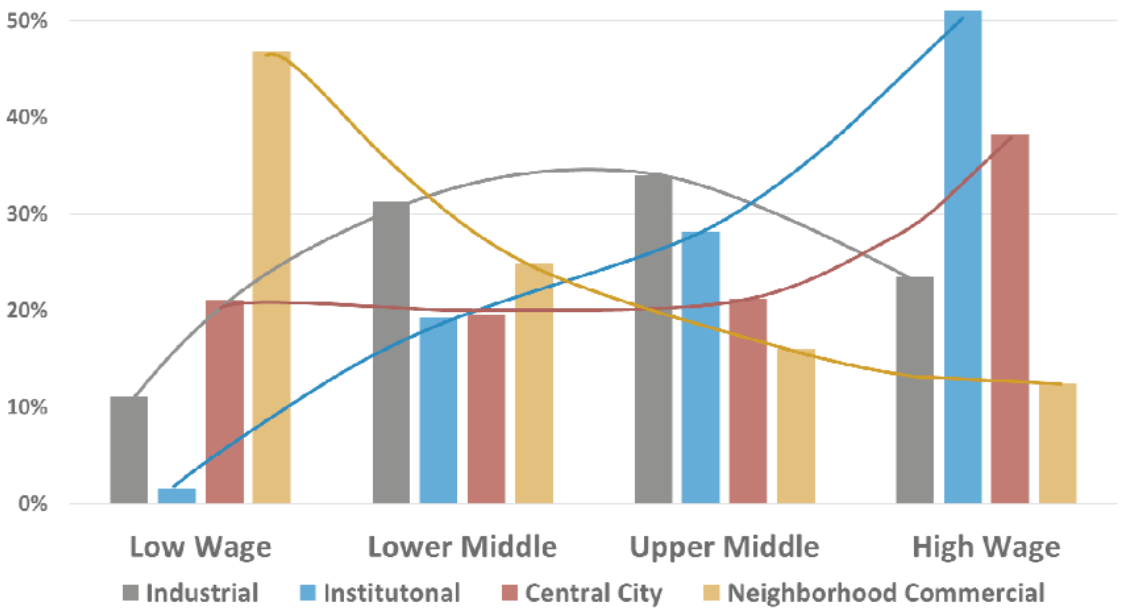
There are a number of unique attributes of the Central City that make it the largest employment center in the Portland region. The Central City is the Class A office core of the region. There are physical and infrastructure attributes that businesses utilize to grow our economy that cannot be replicated elsewhere. Location benefits of the Central City include proximity to a number of major institutions (e.g., Oregon Health and Science University, Portland State University), ease of access to the regional and west coast highway transportation systems, and access to the regional transit system that serves the Central City. Additionally, agglomeration benefits exist for business development in the Central City. Agglomeration benefits are described as firms from a range of industries that are able to benefit from the concentration of shared resources, competitors and clients. Shared resources of agglomeration include physical infrastructure, centers of research, and labor pools, which all increase economic productivity.

The Central City has attributes and benefits that cannot be realized elsewhere in the region. Growth that would occur in the Central City is unlikely to occur outside of the Central City due to the physical, infrastructure, and human capital benefits that exist only within the Central City.

The *Economic Opportunity Analysis* (June 2016) provides information about the recent history and trends of economic development and employment in the Central City. In 2013, there were 393,742 jobs in Portland, the equivalent of 38% of the 1.02 million employment base of the Portland-Metro Service Area. In 2010, Central City commercial areas (not including Central Eastside or Lower Albina districts) accounted for 28% of the city's employment base. In addition, the Central City has supported 28 newly constructed four-plus story buildings over the past 20 years and the renovation of an additional 43 buildings.

Multnomah County's long-term linear job growth pattern predicts 184,000 new jobs countywide will be added between 2010 and 2035. The projections for 2035 include 45,000 additional jobs in the Central City, one third of the total jobs projected for the City of Portland.[1] The categories of employment in the Central City are very diverse and include industries including: software and technology; professional services such as design and architecture, finance, insurance, food services, education and medical; warehousing and distribution; and manufacturing.

The mix of businesses and employment geographies in the local economy shapes the income distribution and economic equity of the population. As shown in Figure 2, employment in the Central City and institutional geographies is concentrated in high-wage occupations that primarily require a college education. Within the Lower Albina and the Central Eastside Industrial Districts, employment is concentrated in middle-wage occupations. There are also lower wage jobs in the Central City, primarily in the retail and service sectors.



Source: Bureau of Planning and Sustainability. The wage distribution of covered employment in Portland's EOA employment geographies is grouped by citywide wage quartiles. The Low Wage quartile is less than $26,400 annually; Lower Middle is $26,400-46,400; Upper Middle is $46,400-67,600; and High Wage is more than $67,600.

Figure 2: Portland Wage Distribution

Since 1980, the wage distribution of the economy has been changing, and job growth has become increasingly polarized in low- and high-wage occupations with shrinking middle-wage job opportunities. This national trend is mirrored in the state and the region. For the majority of the workforce that doesn't have a 4-year college degree, middle-wage job opportunities are primarily in industrial occupations, as seen in the Lower Albina and Central Eastside Districts, and administrative-support occupations that are

[1] https://www.portlandoregon.gov/bps/59297

prevalent in all of the Central City districts. Portland has been less affected by the trend of losing middle-wage jobs than other regions throughout the country and has a relatively balanced economy that supports a predominantly middle-class population.

The economic benefits derived from this development and job growth include:

- Employment
- Personal income to residents of the region
- Earnings

Ecosystem Services provided by Natural Resources

Natural resources provide ecosystem goods and services, which in turn provide economic and social value. Ecosystem services include water conveyance, purification, and flood control, air cooling and purification, carbon sequestration, soil fertilization and pollination. Ecosystem goods include commodities like food, fuel, fisheries, timber, minerals, etc. Ecosystem goods also include supporting recreation and tourism.

Riparian Forests and Woodlands

Riparian forests provide several different types of ecosystem services. One way to estimate the values of these ecosystem services is to evaluate the avoided cost of preserving the functions provided by natural resources. The City of Portland for example, avoided purchasing a $200 million filtration treatment system for its water supply by protecting 102 square miles of its watershed. Similarly, Clean Water Services, a water-resource management utility in northwestern Oregon avoided investing in a chiller for a water treatment plant on the Tualatin River by planting riparian vegetation to shade and cool the river, for a savings of $50 million.

Forests and woodlands also provide air quality benefits from purification and pollutant removal. The annual kilograms of pollutant removal by acres of forestland per year ranges from 2.03 kg to 14.57 kg and the economic value of those pollutants in avoided health care costs ranges from $3 per acre per year to $144 per acre per year (EcoNorthwest, 2012).

Shrubland and Grassland

One estimate of shrubland value, based on the net primary productivity of various landscapes in the U.S. National Wildlife Refuge System, suggests that the ecosystem service value may be about $600–$800 per acre per year. The same study estimated the value of grasslands, and suggests that the ecosystem service values of grassland, generally, may be about $30–$140 per acre per year.

Shrublands provide air quality benefits from purification and pollutant removal. The annual per acre pollutant removal by shrubland and grassland range from 0.79 kg to 6.05 kg per year and a range of economic values of removal of those pollutants in terms of avoided health care costs is $1 per acre per year to $60 per acre per year (EcoNorthwest, 2012).

Value of Wildlife

Economic research has shown that people place a considerable value on the continued survival of sensitive species, such as those listed as threatened or endangered. Such studies also suggest that the value associated with protecting threatened, endangered, and rare species similar to those found in Portland ranges from an annual payment of $11 per household to a one-time payment of nearly $400 per household (EcoNorthwest, 2012).

It is important to note that willingness to pay is a different measure than estimating the economic value associated with maintaining individual species and biodiversity. For example, the courts have interpreted Congress to say that the value of threatened and endangered species is incalculable (TVA v. Hill).

Development related threats to sensitive species also may lead to higher future costs for governments, firms, and households engaging in activities that affect the species. Such costs might be associated

with required or voluntary species monitoring, as well as measures to ensure their protection. Avoiding such costs could be supported by pre-emptive efforts to protect sensitive species and prevent future threatened and endangered species listings.

Flood Area
Dams along the Willamette and Columbia rivers are managed, in part, to control flooding the Lower Willamette River. Flood storage capacity in the Central Reach is small relative to the size of the Willamette River, which means the potential value derived from flood regulation is likely small. Similarly, due to the size of the basin and the volume of water that runs through it, the marginal impacts on water quality and water temperature are likely small.

However, localized flooding and changes in flood risk associated with Climate Change will have economic impacts on the Central City. The economic value of the floodplain to minimize localized flood impacts has not been determined.

B. Economic Consequences

Development – Protecting natural resources would have a negative consequence on future development by limiting the extent of development to avoid the resources. Avoiding the natural resources could add cost to the development or reduce the size or extent of the development. Limiting impacts and requiring mitigation could also add to the cost of development.

Employment – Protecting natural resources would likely have a negligible, but slightly negative consequence for employment. The Central City is a large employment district and limiting future development to avoid natural resources could reduce employment opportunities, although those opportunities could likely be made up elsewhere in the Central City.

Ecosystem services – Protecting natural resources would have positive consequences on ecosystem services, properties and people. This results in economic benefits both in maintaining the services and avoiding replacement costs when a service is removed through development.

5. Social Consequences

This section examines the social consequences of protecting natural resource areas. The social analysis focuses on the following topics:

- Human Health and Welfare
- Historic, Heritage and Cultural Values
- Regulatory Compliance

A. Social Analysis

Human Health and Welfare
One of the most important factors in determining human health and welfare is household income, which is dependent on employment. The reason that income has such a strong influence on health is that it determines whether people are able to make healthy choices such as living in safe, healthy homes and neighborhoods, eating nutritious food, fully participating in family and community life and obtaining timely and appropriate health care. Many studies have shown that people with health insurance are healthier than those without (Mult. Co. Health Department, 2012). In the United States the risk for mortality, morbidity, unhealthy behaviors, reduced access to health care and poor quality of health care increases with decreasing socioeconomic circumstances (CDC, 2011). Research has linked unemployment to stress, depression, obesity and increases in cardiovascular risk factors such as high blood pressure (Mult. Co. Health Department, 2012).

Having a good job does more than supply the means to meet physical needs, it also provides opportunities to be creative, promotes self-esteem, and provides avenues for achievement and self-realization. Research indicates that the effects of unemployment include impacts on psychological function, including anxiety and depression, and correlate with impacts on physical function as measured by increased utilization of health services. Research also points to financial strain as a strong mechanism through which unemployment contributes to ill health. In addition it has been found that unemployment "compounds the effects of unrelated (stressful) life events" (Mult. Co. Health Department, 2012).

Access to natural areas and open spaces also has an impact on human behavior and psyche. Access can mean a range of things from viewing vegetation to bird watching to hiking or boating. Dr. Roger Ulrich of Texas A&M's Center for Health Systems and Design found that passive scenic values, such as looking at trees, reduce stress, lower blood pressure and enhance medical recovery (Ulrich et al. 1991). The presence of trees and grass can lower the incidence of aggression and violent behavior (Kuo and Sullivan, 2001b). A study of residents in public housing in Chicago found that compared with apartment buildings that had little or no vegetation, buildings with high levels of greenery had 52% fewer total crimes, including 48% fewer property crimes and 56% fewer violent crimes (Kuo and Sullivan, 2001a). Common green areas in neighborhoods can also increase community ties and support networks. Studies have shown that exposure to the natural environment enhances children's cognitive development by improving their awareness, attention, reasoning and observational skills (Louv, 2005).

Recreation has multiple health benefits. For people who are inactive, even small increases in physical activity can yield numerous health benefits (Mult. Co. Health Department, 2012). Exercise improves overall health, which reduces public and private health care costs, improves quality of life, and may help people live longer (Nieman, 1998). Activities such as walking in forested areas help boost the immune system (Sachs and Segal, 1994). In addition, the Centers for Disease Control and Prevention strongly recommends improving access to places for physical activities such as biking or hiking trails to reduce the risk of cardiovascular disease, diabetes, obesity, selected cancers and musculoskeletal conditions.

Open spaces and natural areas not only provide space to recreate, but also provide an opportunity for Portlanders to learn about environmental science, natural history, and cultural history of the Willamette River and the Pacific Northwest. Natural areas and open spaces provide "living laboratories" for active educational programs. Many schools use natural areas as a focal point of interdisciplinary studies. This model of learning has been shown to improve critical thinking skills, achievement on standardized tests and student attitudes about learning and civility toward others (Leiberman and Hoody, 1998).

Vegetated landscapes, parks and scenic views each contribute a "sense of place" and personal attachment to particular locations. People are socially connected to the entirety of the built and natural environmental by walking, biking and driving through areas with street trees, gardens, parks and other open spaces. Natural resources and open spaces create a sense of identity and visual variety in the city. Trees, open spaces and water bodies help define the visual appeal of the Portland area. People also identify with urban landscapes including river harbors and marinas, airports, new and old structures, workplaces, museums, restaurants and stores, parks and golf courses, and other gathering spaces. Portland is often identified by pictures of the cityscape, Mt. Hood and the Willamette River. This identification with nature has been demonstrated to improve mental health (Mult. Co. Health Department, 2012).

Historic, Heritage and Cultural Value

The first Europeans to explore the Columbia and Willamette Rivers arrived in the late 18th century. Prior to that, the area was populated by various aboriginal tribes who settled along sections of these rivers for 6,000 to 9,000 years. Native American settlements were located in Portland with populations in the early 19th century of several thousand. Settlements were documented by the first explorers of this area in the late 18th century, by Lewis and Clark in their exploration of the Lower Willamette River in 1804-06, and since that time by historians throughout the 19th and 20th centuries. Tribes that likely lived in the Portland area include a number of Chinook tribes, Clatsop, Clatskanie, Cascades, Kalapuya, and Cathlamet. The creation stories of these tribes held that the people were created in these places. The rivers provided a travel route for trade of goods among tribes, and also provided a rich diversity of food that was fairly

obtainable for most of the year. Besides fish that could be caught over a period of several months a year, and game and fowl that could be hunted, Native peoples also gathered plants that were available much of the year in the temperate climate. Among the most common and well-known was the wapato, a bulb that was gathered and also traded as European traders and settlers arrived.

As Portland has developed over the past 200 years, the Willamette and Columbia Rivers have played a key role. Beginning in the early 1800s, European settlement occurred at the confluence of the Willamette and Columbia rivers due to the abundant natural resources and opportunities for trade. The development of the railroad in the early 1900s continued to spur development. And World War II's jobs drew people to Portland. The Willamette River was a focus of industrial use and commerce throughout all of Portland's history. However, that development removed many of the natural resources that existed historically.

Portlanders place a high value on the environment and quality of life. The Oregon state symbols reflect this value. The Oregon state bird is the Western Meadowlark, which is currently a state-listed Species of Concern and has been early extirpated from the city due to loss of native grasslands. Portland's City Bird, the Great Blue Heron, is found in the Central Reach. The state fish, the Chinook salmon, use the Willamette River and are federally listed as Threatened or Endangered. The beaver is Oregon's state animal and still resides in many of Portland's waterways.

Portland's identification with nature and wildlife is reflected in many ways. The Audubon Society of Portland is over 100 years old and is the largest chapter of the national Audubon Society. Many Portlanders are avid bird-watchers.

Metro has recognized the importance of fish and wildlife and their habitats by adopting the regional "Nature in Neighborhoods" program in 2005. This program establishes regional baseline requirements to protect fish and wildlife habitat and water quality. The requirements focus on protecting, conserving and restoring natural resource functions and values in riparian corridors. Establishing this program reflects the importance of environmental quality to the residents of the Metro region, including Portlanders.

Regulatory Compliance

Regulatory compliance is important for the City of Portland to avoid cost and liability, and because Portland values its role as a leader in sustainability and environmental management. There are multiple regulations described in Chapter 2 for which Portland must maintain compliance. Below are summaries of three regulations for which Portland has specific programs.

ESA Preventing Harm and Supporting Recovery of At-risk Species

After the 1998 listing of steelhead trout in the Lower Columbia River, the City of Portland began developing a comprehensive, coordinated citywide response to threated and endangered species for City Council adoption (Resolution No. 35715). The City Council established an intent to avoid "take" of a listed species (i.e., harming individuals or populations or their habitat), and to assist with recovery of listed fishes. The City has since taken actions such as identifying and prioritizing City programs that could affect listed species, providing technical support to bureaus, providing oversight for activities involving federal permitting or funding, and developing a watershed management plan to help guide city actions. The protection and enhancement of habitats critical to threatened and endangered species are important actions to aid in the recovery of listed species.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP) which includes regulatory components for floodplain management, floodplain mapping and flood insurance. The NFIP floodplain management regulations (44 CFR 60) are implemented through local jurisdictions. The City of Portland's local floodplain ordinance is found in Portland City Code 24.50. The National Marine Fisheries Service (NMFS) recently released a biological opinion about the impacts of NFIP on listed species in the Willamette River. FEMA will provide direction to local jurisdictions regarding the implementation of reasonable and prudent alternatives to avoid harm to listed species. The outcomes of this consultation will likely result in required changes to the local regulations related to implementation of NFIP.

Title 13
Metro Title 13: Nature in Neighborhoods is the regional program that complies with portions of State Land Use Goals 5 Natural Resources, Scenic and Historic Areas, and Open Spaces and 6 Air, Water and Land Resources Quality. By complying with Title 13, local jurisdictions are complying with Goals 5 and 6 as well. Title 13 calls for programs to avoid adversely affecting significant natural resources and mitigating for unavoidable impacts on those resources. The Willamette River and its riparian areas are identified in Title 13.

B. Social Consequences

Human health and welfare – Protecting natural resources would have positive consequences for human health and welfare. There could be some negative consequences associated with the reduction of employment opportunities, although those consequences would be negligible overall.

Historic, heritage and culture values – Protecting natural resources would have positive consequences for historic, heritage and cultural values by maintaining the river and riparian areas that form the basis of those values.

Regulatory compliance - Protecting natural resources would have positive consequences by helping Portland maintain compliance with local, regional, state and federal regulations associated with the resources.

6. General Protection Recommendations

The Willamette River Central Reach and associated floodplain and riparian areas have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the Central City is an important and unique area for employment, commerce, transportation, housing, education and civic engagement. Portland's Central City serves the region with jobs, recreation, entertainment and social services.

The general recommendation balances the environmental, economic and social consequences of protecting natural resources. The Central City is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

The general recommendation is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked natural resources, including land and water located below the top of bank of the Willamette River, tributaries to the river and land within the undeveloped floodplain.
2. Provide a moderate level of protection by limiting conflicting uses within medium ranked natural resources, including undeveloped riparian areas.
3. Provide a minimal level of protection by limiting conflicting uses within the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

CHAPTER 5. RESULTS

1. Introduction

Chapter 4 begins with an overview of the Willamette River Central Reach. The overview describes the general conditions of the Central Reach including hydrology, water quality and fish and wildlife habitat. Following the overview are results for the inventory sites. Each inventory site includes:

- An inventory (description and maps) of the existing natural resources features
- Identification and ranking of the riparian corridor and wildlife habitat functions provided by the inventoried features
- Recommended protection of the natural resources

2. Willamette River Central Reach Overview

The Willamette River Central Reach planning area (Map 9) is largely developed, and includes Portland's downtown core, industrial and commercial land, and various other land uses. The banks of the Lower Willamette River have been altered over time; approximately 85 percent of the river banks in the Central City are armored with seawalls, pilings, rock/fill or riprap (Table 6). In the Central City, the flood area has been largely filled and developed. The existing flood area is generally confined to the Willamette River itself; however, there are a few locations of developed flood area. The largest flood area is in South Waterfront, which is partially developed. Throughout the reach, wharves and piers extend into the river channel, and bulkheads and riprap armor the riverbank. Active dredging has produced a uniform channel with little diversity.

The following paragraphs are added to the end of the narrative for each inventory site. A new map, Map 7, is added for each inventory site that depicts the recommendations.

Natural Resource Protection Recommendation

The Willamette River and associated floodplain and riparian areas in resource site WR14-WR18 have been significantly reduced in extent, simplified and degraded over time. The remaining natural resource areas are fragmented and impacted by adjacent development. However, the natural resource areas also provide the remaining habitat for fish and wildlife that reside in and migrate through this highly urbanized environment. The importance of the remaining natural resource areas is underscored by the relationship to the regional ecosystem and migration corridors.

In addition to being a significant area for fish and wildlife; the district is an important and unique area for employment, commerce, transportation, housing, entertainment and recreation.

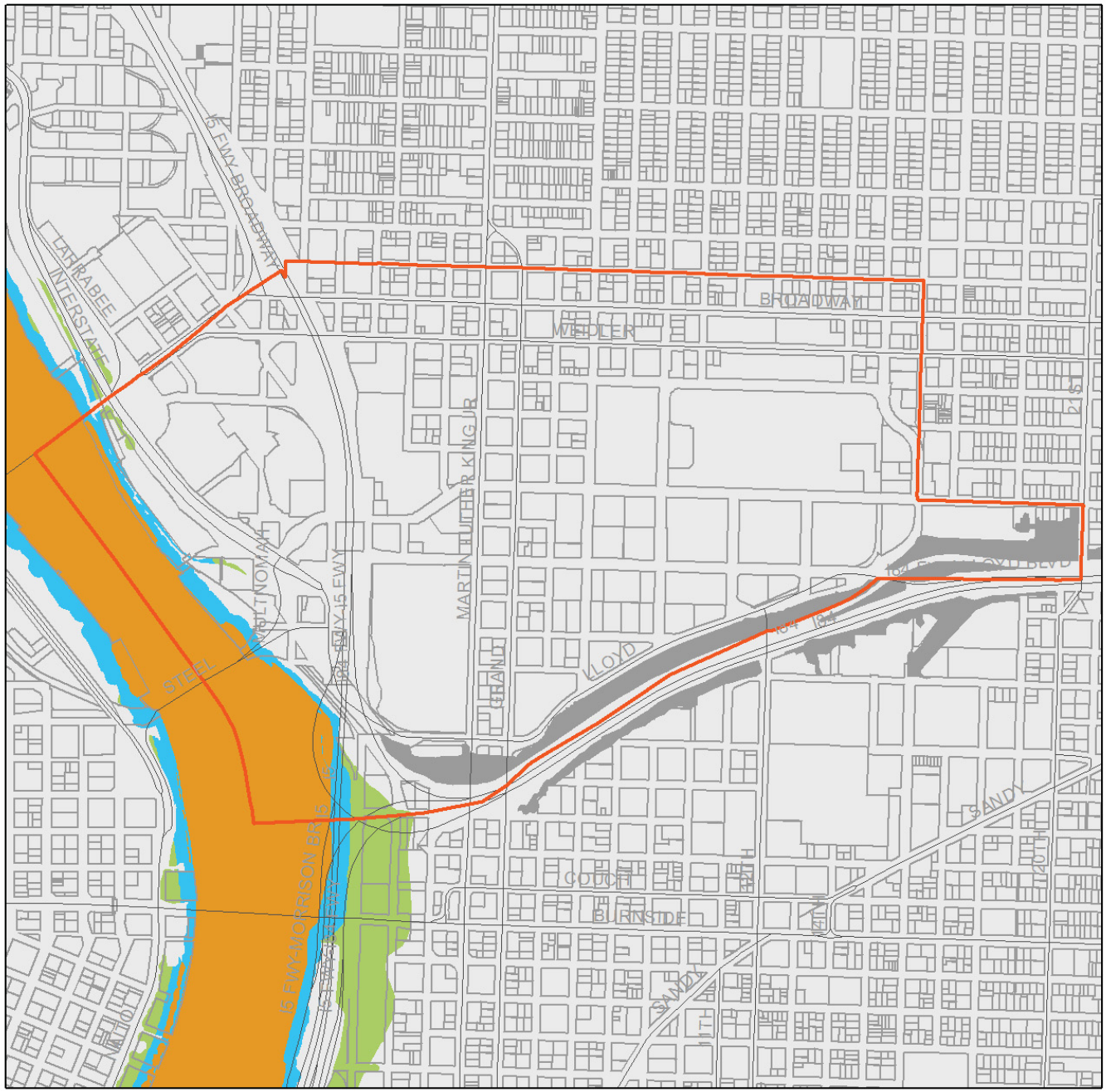
The general recommendation, shown on Map 7, balances the environmental, economic and social consequences of protecting natural resources. The resource site is a highly developed area and impacts from conflicting uses cannot be fully avoided. Allowing some future development in natural resource area is inevitable, particularly development associated with utilities and public infrastructure. However, conflicting uses should be limited overall.

The recommendation for riparian areas is to:

1. Provide the highest level of protection by strictly limiting conflicting uses within areas of high ranked natural resources, including land and water located below the top of bank of the Willamette River, tributaries o the river and land within the undeveloped floodplain.
2. Provide a moderate level of protection by limiting conflicting uses within medium ranked riparian areas.
3. Provide a minimum level of protection by limiting conflicting uses with the developed floodplain, which typically receives a low rank.
4. Allow conflicting uses within low ranked natural resource areas outside of the floodplain.

The recommendation for wildlife habitat areas outside of riparian areas is to:

1. Maintain the current level of protections applied by previously adopted natural resources protection and management plans or through Title 11, Trees.



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WR14 - Lloyd District

Map 7: Recommend Natural Resources Protection

Legend

- Inventory Sites

Limits on Conflicting Uses

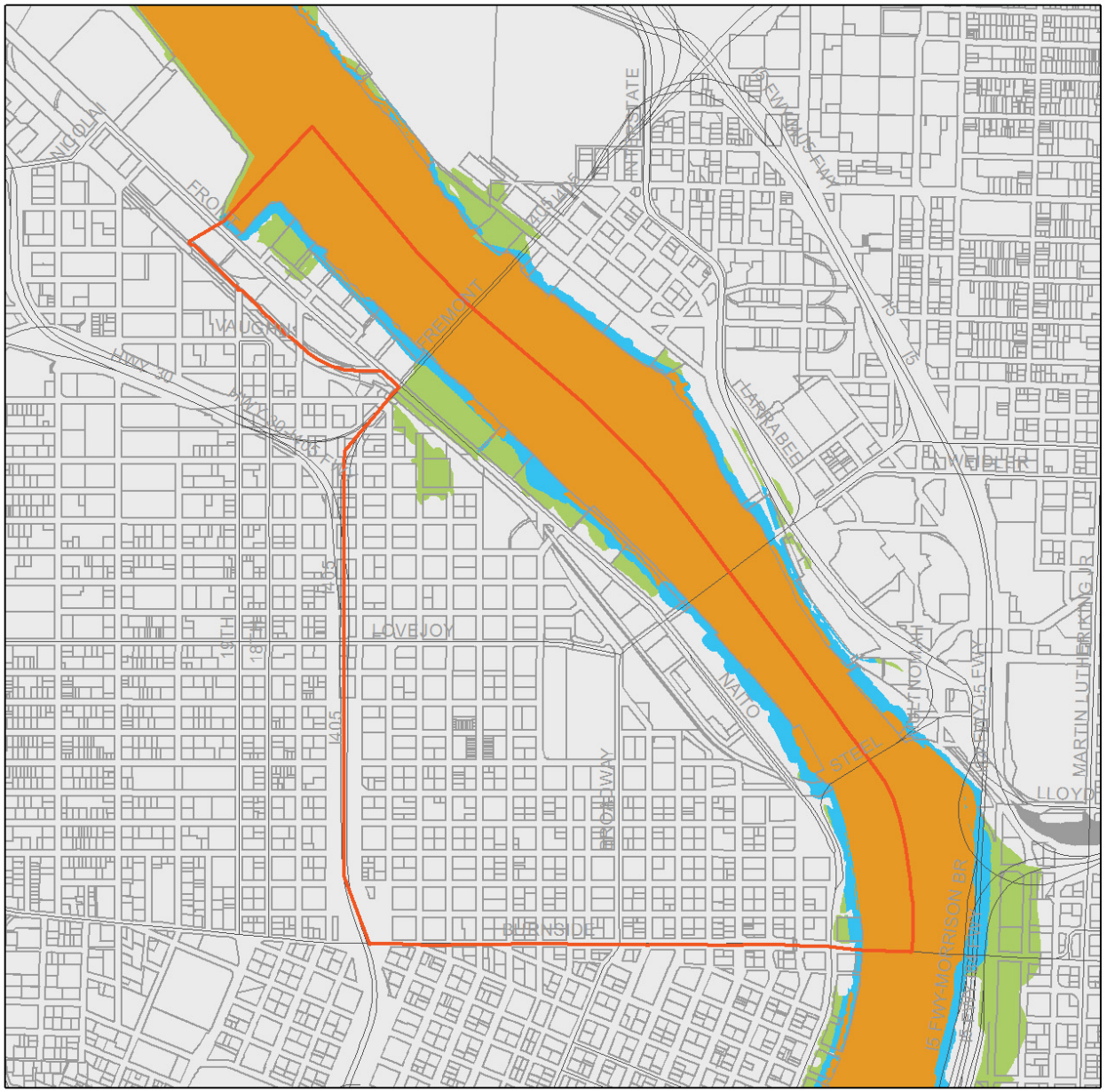
- strictly limit
- moderately limit
- minimally limit
- maintain previous protections

DRAFT

Updated February 2016

0 0.095 0.19 Miles

NORTH



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WR15 - RiverDistrict

Map 7: Recommend Natural Resources Protection

Legend

- Inventory Sites

Limits on Conflicting Uses

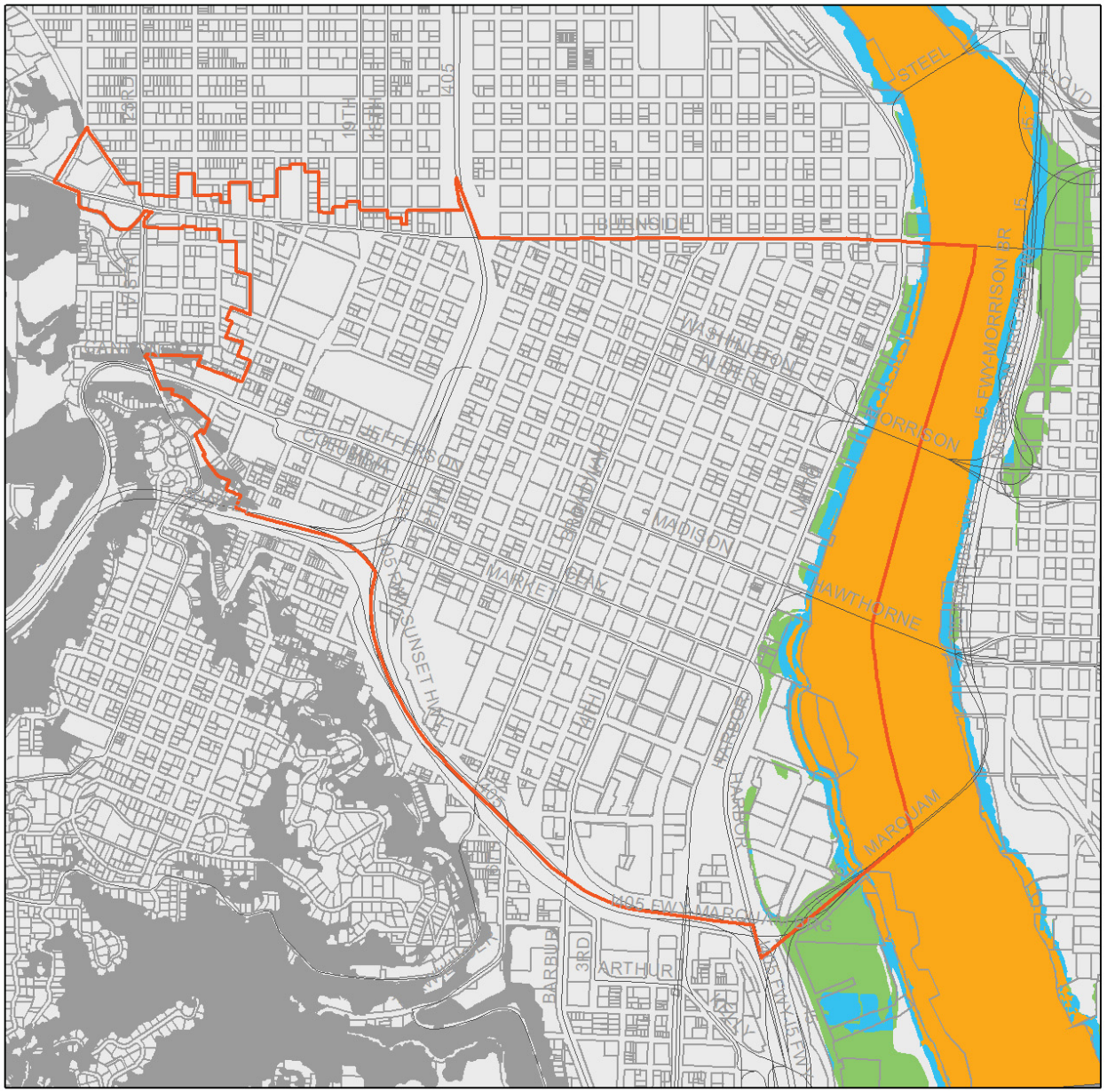
- strictly limit
- moderately limit
- minimally limit
- maintain previous protections

DRAFT

Updated February 2016

0 0.1 0.2 Miles

NORTH



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WR16 - Downtown

Map 7: Recommend Natural Resources Protection

Legend

- Inventory Sites

Limits on Conflicting Uses

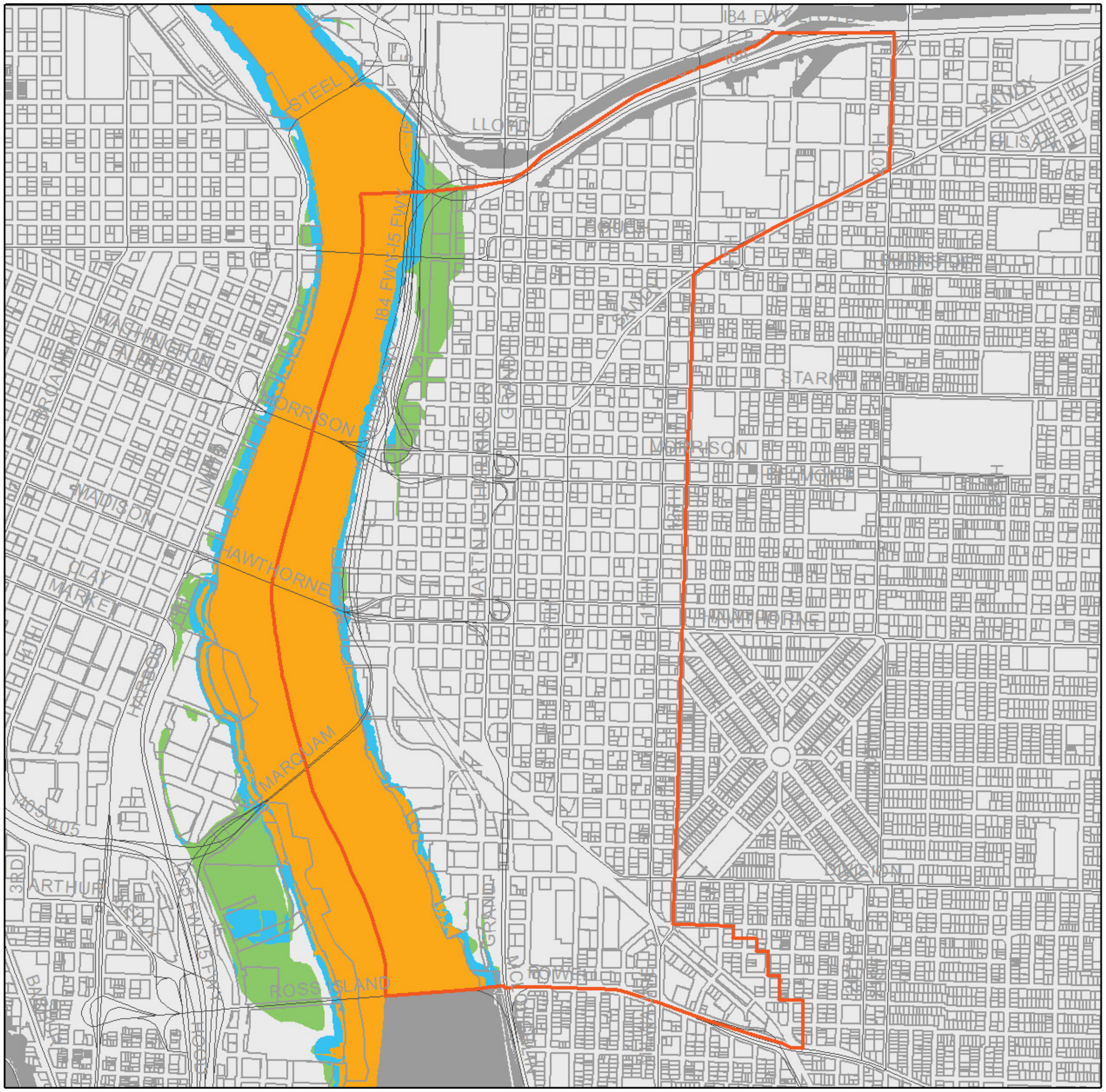
- strictly limit
- moderately limit
- minimally limit
- maintain previous protections

DRAFT

Updated February 2016

0 0.1 0.2 Miles

NORTH



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WR17 - Central Eastside

Map 7: Recommend Natural Resources Protection

Legend

Inventory Sites

Limits on Conflicting Uses

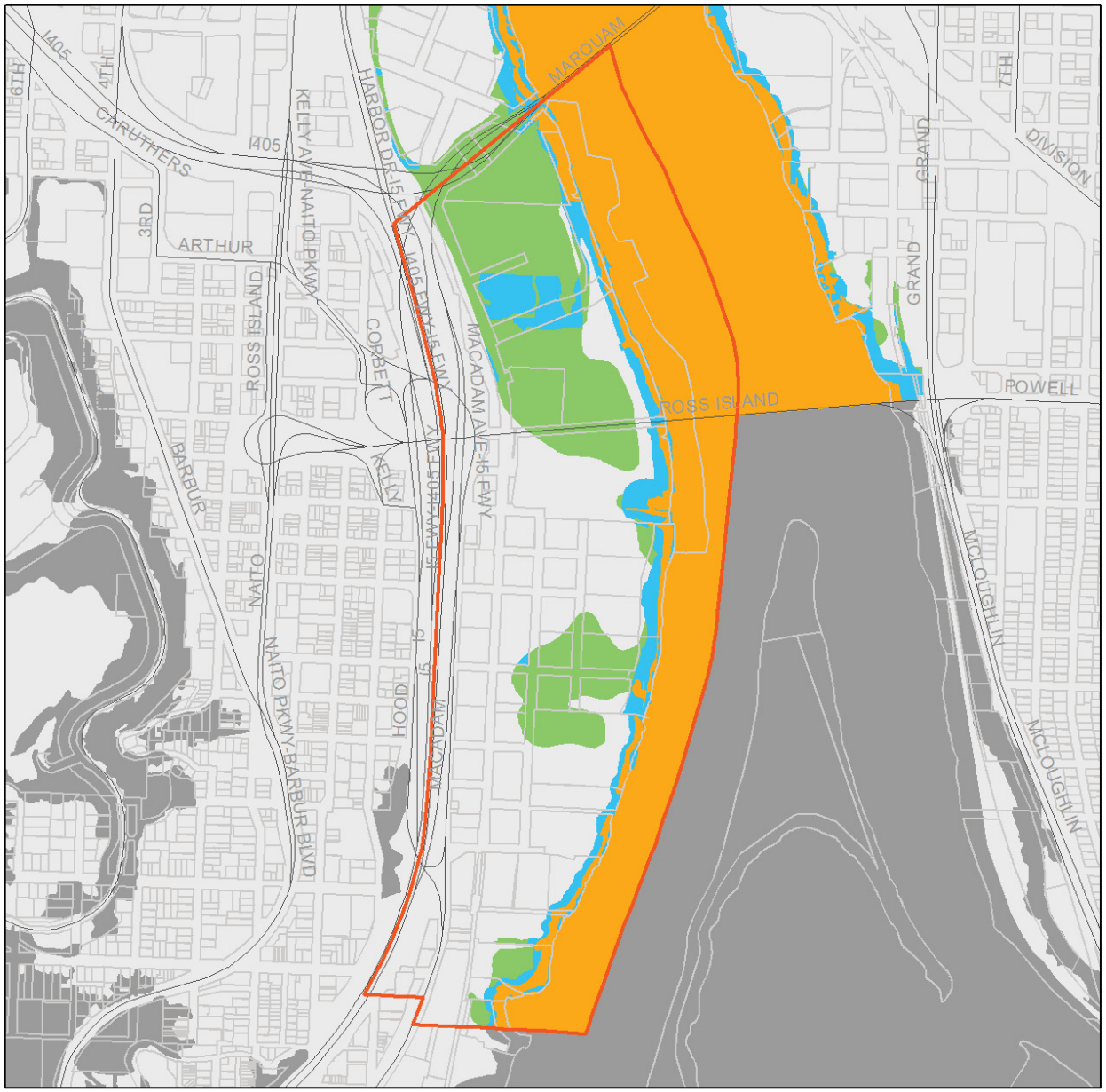
- strictly limit
- moderately limit
- minimally limit
- maintain previous protections

DRAFT
Updated February 2016

The information on the map was derived from digital databases on the City of Portland, Bureau of Planning GIS. Care was taken in the creation of this map but it is provided "as is". The City of Portland cannot accept any responsibility for error, omissions, or positional accuracy, and therefore, there are no warranties which accompany this product. However, notification of any errors will be appreciated.

0 0.1 0.2 Miles

NORTH



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WR18 - South Waterfront

Map 7: Recommend Natural Resources Protection

Legend

- Inventory Sites

Limits on Conflicting Uses

- strictly limit
- moderately limit
- minimally limit
- maintain previous protections

DRAFT

Updated February 2016

0 0.085 0.17 Miles

NORTH

CHAPTER 6. IMPLEMENTATION TOOLS

The recommendations for each inventory site should be implemented through the updates to existing zoning code regulations and maps in the following ways:

1. Where there is a *strictly* or *moderately limit* decision, except in inventory site WR18 – South Waterfront floodplain, it is recommended that conflicting uses be restricted to a narrow set of environmentally appropriate uses such as natural resource enhancement, major public trails, and river-dependent and river-related uses; as well as public utilities and infrastructure such as bridges. The code should require negative impacts to natural resource features and functions be avoided and minimized to the maximum extent practicable and unavoidable impacts be fully mitigated. Mitigation for unavoidable impacts should result in no net loss of features or functions and account for:
    - location of the mitigation site,
    - timing of the mitigation action in relation to the timing of impacts,
    - time to achieve desired future condition of the mitigation actions,
    - relationship between the mitigation site and adjacent habitats and land uses, and
    - monitoring needed to ensure the mitigation is successful.

2. Where there is a *minimally limit* decision, except in inventory site WR18 – South Waterfront floodplain, it is recommended that impacts to the natural resources be minimized but not avoided; mitigation for unavoidable impacts should be mitigated.

3. The zoning code should provide exemptions and/or a non-discretionary review track for conflicting uses with minimal and definable impacts on natural resource feature and functions; and a discretionary review track for other proposed conflicting uses. Under either review track, mitigation for unavoidable impacts to features and function should be required.

Within inventory site WR18 – South Waterfront, some land is within the 1996 flood inundation area. During the Metro Title 3, water quality, erosion control and flood hazard management process, Metro exempted South Waterfront from the regional requirements. Therefore, the area is exempt from the balanced cut and fill requirements that would typically be recommended to implement a limit decision for the floodplain.

While this NRPP recommends maintaining that earlier exemption, it may be necessary to reevaluate this exemption based on the recently released a National Marine Fisheries Service biological opinion about the impacts of National Flood Insurance Program on Endangered Species Act-listed species in the Willamette River Central Reach.

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Attachment G

Ecoroof Documentation for Central City 2035 – Costs

July 18, 2016

Narrative

The actual costs of ecoroofs differ considerably depending on the type of system that is used, the design needs of the building, the logistics required to construct the roof, and the vendor.

All development in Portland must meet the requirements of the Stormwater Management Manual (SWMM). The requirements call for managing stormwater on site whenever possible, and offsetting the impacts of stormwater runoff on the public stormwater and combined sanitary system when onsite management isn't possible. Again, the costs of stormwater management facilities differ considerably depending on site conditions and the design goals of the development. The cost to BES of constructing offsite stormwater management facilities is $7.40 per square foot of impervious area.

First Source – An Analysis of Costs from Projects Completed in Portland

***Cost Analysis for the Portland Ecoroof Incentive, 2014*; a BES-funded report by the EcoMetrix Solutions Group.** https://www.portlandoregon.gov/bes/article/522380.

- The analysis broke out costs by land use, with 36 projects having a land use type of commercial/multi-family/mixed use.
- The projects were completed between 2008 and 2012.
- The analysis was for costs above the cost of a conventional roof.
- The median cost for the group of 36 was $9.79/square foot, with a cost range of $5.86-$16.17/square foot for the middle 50% of the values.
- Roughly 20 percent of the ecoroofs in the group of 36 were 10,000 square feet or more; presumably the median value is higher than it would be if all of the projects were larger than 10,000 square feet due to economies of scale.

Second Source – a National Estimate

***The Benefits and Challenges of Green Roofs on Public and Commercial Buildings,* 2011. US General Services Administration.** http://www.gsa.gov/portal/mediaId/158783/fileName/The_Benefits_and_Challenges_of_Green_Roofs_on_Public_and_Commercial_Buildings.action.

- The analysis was for costs above the cost of a conventional roof.
- The report provided an estimated average of $11.40/square foot.

Third Source – Internal BES Briefing

Incentive Ecoroof Cost Comparison, 2013. **Stormwater System Division.**

- The seven completed ecoroof projects were selected to represent a range of roof types and building characteristics in the core of the Portland – five of the seven examples are in the Central City area.
- Costs for these projects were documented in the EcoMetrix analysis of costs for projects which were part of the City's Ecoroof Incentive Program (2008-2012).
- The average cost was $7.83/square foot ($5.70/square foot for "core" costs not including irrigation, edging, and other accessory costs).

Comparison of Applying the Proposed Zoning Code vs. the SWMM

The following table compares estimated costs for application of the proposed zoning code and SWMM requirements to a roof area of 20,000 square feet.

	Proposed Zoning Code	SWMM
Total roof size (1/2 a city block)	20,000 sq. ft.	20,000 sq. ft.
Ecoroof coverage. Roof percent to be covered by the ecoroof.	70% excluding mechanical and solar fixtures.	100% excluding mechanical fixtures.
Ecoroof area. Assumes mechanical and/or solar fixtures cover 25% of the total roof area.	10,500 sq. ft.	15,000 sq. ft.
Ecoroof cost above the cost of a conventional roof. (Ecoroof area*$9.79/sf) Based on the median value from the 2014 EcoMetrix study.	$102,795	$146,850
Additional stormwater costs. Based on a cost of $7.40/square foot for managing runoff from the roof area not covered by ecoroof (the entire site must must meet stormwater requirements as per SWMM)	Up to $70,300	Up to $37,000
Total Costs to meet Stormwater Requirements	$173,095	$183,850

Ecoroof Documentation for Central City 2035 – General Benefits

March 23, 2016

Hydraulic/Hydrologic Performance

Carpenter, D., and P. Kaluvakonlanu, 2010. ***Effect of Roof Surface Type on Storm-Water Runoff from Full-Scale Roofs in a Temperate Climate*****. American Society of Civil Engineers, ISSN: 1943-4774.** http://ascelibrary.org/doi/abs/10.1061/%28ASCE%29IR.1943-4774.0000185 A comparative study of runoff from different roof types which concluded that the green roof retained 68% of annual runoff and reduced peak discharge by an average of 89%.

Hutchinson, D., Abrams, P., Retzlaff, R., and Tom Liptan, 2003. ***Stormwater Monitoring Two Ecoroofs in Portland, Oregon, USA*****. Greening Rooftops for Sustainable Communities, Chicago, 2003.** https://www.portlandoregon.gov/bes/article/63098 Flow control and water quality results from two years of data from the Hamilton Building ecoroof, Portland. It was reported that 69% of annual rainfall was retained by the roof, with marked seasonal variation in retention rates but promising flow control results even when the roof was saturated.

City of Portland, Bureau of Environmental Services, Stormwater System Division. ***2013 Stormwater Management Facility Monitoring Report.*** https://www.portlandoregon.gov/bes/article/563749 Performance data is included for three ecoroofs monitored for different periods: Hamilton Apartments (12 years); Multnomah County Green Roof (3 years); Portland Building Ecoroof (5 years). The data indicate excellent peak flow reduction of greater than 80% for intense storm events. For flow volume, annual retentions averaged 50% at Hamilton, -5% at Multnomah County (the negative result was due to irrigation runoff), and 70% at the Portland Building.

Yocum, Ken and Ben Spencer, 2013. ***Greenroof Performance Study: Puget Sound Region.*** https://www.thecela.org/pdfs/lrr-pdf/GREENROOF%20PERFORMANCE%20STUDY.pdf Two professors from the University of Washington Department of Landscape Architecture report findings from hydraulic monitoring of five green roof panels in Seattle.

Thermal Performance/Energy Consumption Benefits

City of Portland, Bureau of Environmental Services, Stormwater System Division, 2013. ***Vegetated Roofs and Energy Conservation.*** https://www.portlandoregon.gov/bes/article/493669 The report summarizes findings from eight different research efforts in settings that most closely match climate and building conditions in Portland. Most of the studies reviewed measured the temperature differential between a vegetated roof, a black roof, and/or a white roof. Several studies measured heat flow through the roof.

Sailor, David, 2010. ***Energy Performance of Green Roofs: the Role of the Roof in Affecting Building Energy and the Urban Atmospheric Environment*****. U.S. EPA, Local Climate and Energy Program Webcast - presentation.** http://www.epa.gov/sites/production/files/2014-07/documents/10june2010-

davidsailor.pdf This presentation by a Portland State University professor lays out engineering concepts concerning the buffering of heat flux by green roofs, and cites results from two related studies.

Bass, Brad, David Sailor, Graig Spolek and Steven Peck. *Introduction to the New Green Roof Energy Calculator*, 2010. Green Roofs for Healthy Cities - Cities Alive/Vancouver, BC. http://greenbuilding.pdx.edu/GR_CALC_v2/CalculatorInfo_v2.php**.** From about 2004-2006 Dr. Sailor and his colleagues at Portland State University developed a physically-based energy balance simulation module for representing green roofs in whole building energy simulation software. In April 2007 this module became part of the standard release of the US Department of Energy's EnergyPlus model (see Sailor, *Energy and Buildings*, 2008). This model incorporates a vegetation canopy and soil transport model that represents green roof physics.

Air Quality, Heat Island

Rowe, D. Bradley, *Green Roofs as a Means of Pollutant Abatement*, 2010. Selected papers from the conference Urban Environmental Pollution; Overcoming Obstacles to Sustainability and Quality of Life (UEP2010). http://www.sciencedirect.com/science/article/pii/S0269749110004859 This review encompasses published research to date on how green roofs can help mitigate pollution, how green roof materials influence the magnitude of these benefits, and suggests future research directions. The discussion concentrates on how green roofs influence air pollution, carbon dioxide emissions, carbon sequestration, longevity of roofing membranes that result in fewer roofing materials in landfills, water quality of stormwater runoff, and noise pollution.

US General Services Administration, 2011. *The Benefits and Challenges of Green Roofs on Public and Commercial Buildings*. http://www.gsa.gov/portal/mediaId/158783/fileName/The_Benefits_and_Challenges_of_Green_Roofs_on_Public_and_Commercial_Buildings.action. The report includes estimates for the value of air quality and heat island benefits provided over time by green roofs.

Gaffin, S. R., Rosenzweig, C., Eichenbaum-Pikser, J., Khanbilvardi, R. and Susca, T. , 2010. *A Temperature and Seasonal Energy Analysis of Green, White, and Black Roofs*. Columbia University, Center for Climate Systems Research. http://www.greengridroofs.com/pdf_docs/Downloads/Columbia_Energy_Analysis.pdf The report summarizes a comparative analysis of heat flux which indicates green roofs provide substantial reductions in heat loss in the winter and heat gain in the summer.

Livability - Aesthetics, Noise Attenuation, Human Health

Peck, Steven, and Hitesh Doshi, 2012. *Methods for Estimating Economic Benefits from Regional Implementation of Green Roof Technology – Work Draft Paper for Review*. Green Roofs for Healthy Cities. http://www.greenroofs.org/resources/Doshi&Peck.pdf This working paper provides guidance for attributing economic values to a range of benefits provided by green roofs. Topics include aesthetics and noise abatement.

Van Renterghem, Timothy, Despriet, Mathias, and Dick Botteldooren, 2014. *Experimental Analysis of the Noise Shielding by a Green Roof in Response to Rainfall*. Inter-noise, 2014. http://www.acoustics.asn.au/conference_proceedings/INTERNOISE2014/papers/p446.pdf. The paper evaluates the effect of moisture content on noise abatement by green roofs, and provides a bibliography of research papers on the topic of noise abatement by green roofs.

Roger S. Ulrich, 2002. *Health Benefits of Gardens in Hospitals*. Paper for Plants for People Conference, International Exhibition Floriade, 2002 http://www.tdhb.org.nz/news/documents/Pulse2013_HealthSettingsUlrich.pdf. The paper reviews scientific research on the influences of gardens and plants in hospitals, in particular the health-related benefits that patients realize by looking at gardens and plants.

Habitat

Gedge, D., G. Kadas, 2005. *Green Roofs and Biodiversity*. Biologist 52, 161-169. http://livingroofs.org/images/stories/pdfs/Biol_52_3_Kadas.pdf. A foundational study of the potential for green roofs to provide varied habitat for birds. It gives an overview of pioneering European greenroof habitat research.

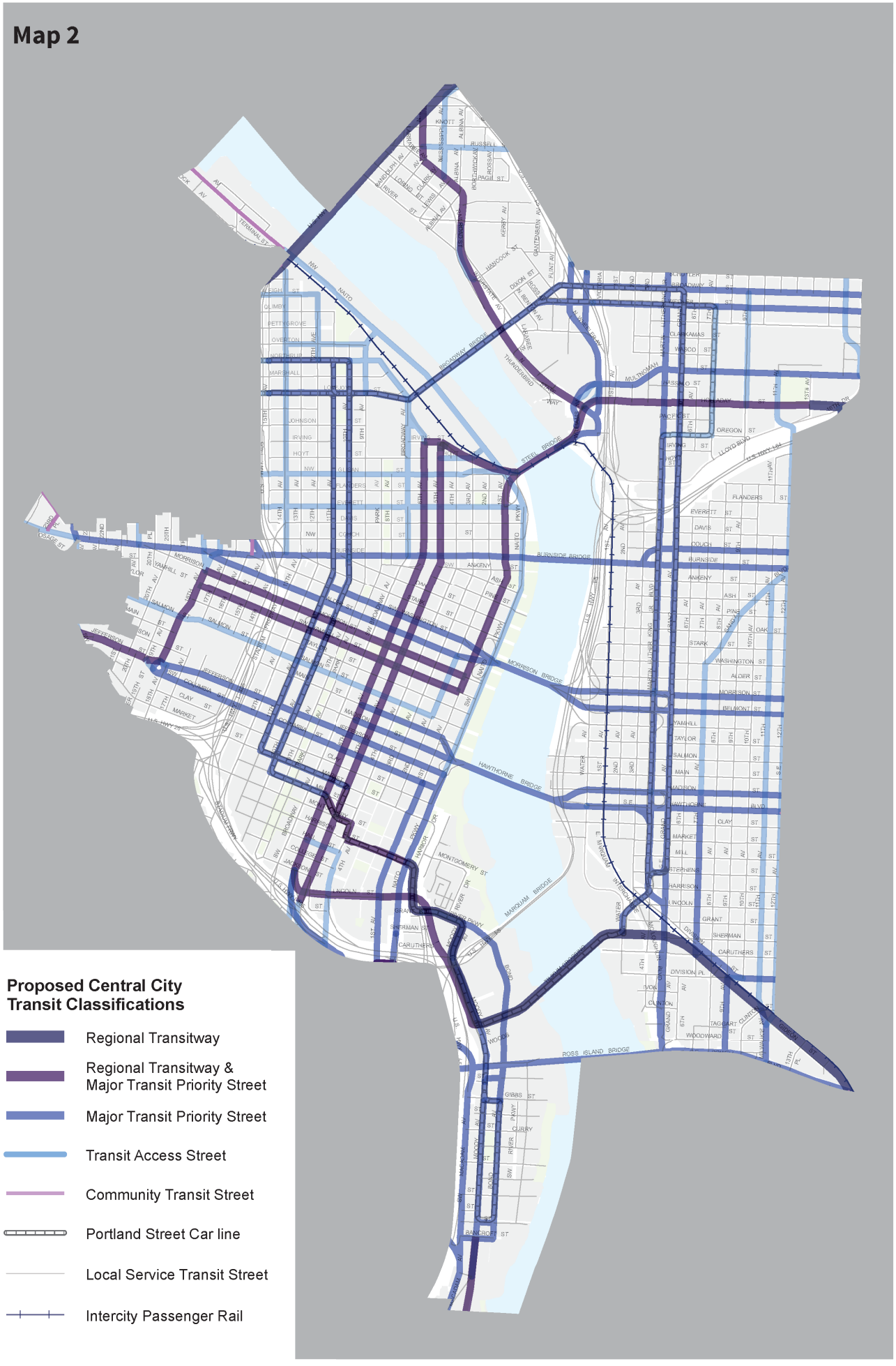
Brenneisen, S. 2006. *Space for Urban Wildlife: Designing Green Roofs as Habitats in Switzerland*. Urban Habitats 4, 27-36. http://www.urbanhabitats.org/v04n01/wildlife_full.html. Basel, Switzerland was among the first cities to mandate greenroofs on new flat roof construction for the purpose of biodiversity conservation. This article summarizes the foundational studies leading up to that decision, and gives design recommendations to maximize invertebrate and bird habitat.

Cunningham, Casey (Bureau of Environmental Services) and Joe Liebezeit (Audubon Society of Portland), 2015. *Portland's Ecoroof Avian Monitoring Project 2012-14, Final Report*. https://www.portlandoregon.gov/bes/article/466018. The study found higher avian abundance and species richness on green roofs than on conventional roofs, but fewer species than on ground-level landscaped sites. The report concluded that green roofs appear to function as an extension of urban habitats such as ground-level parks, and that the absence of ground-level predators may make them particularly beneficial to migratory aerial species, particularly if vegetative cover is provided.

Map 1

Attachment H

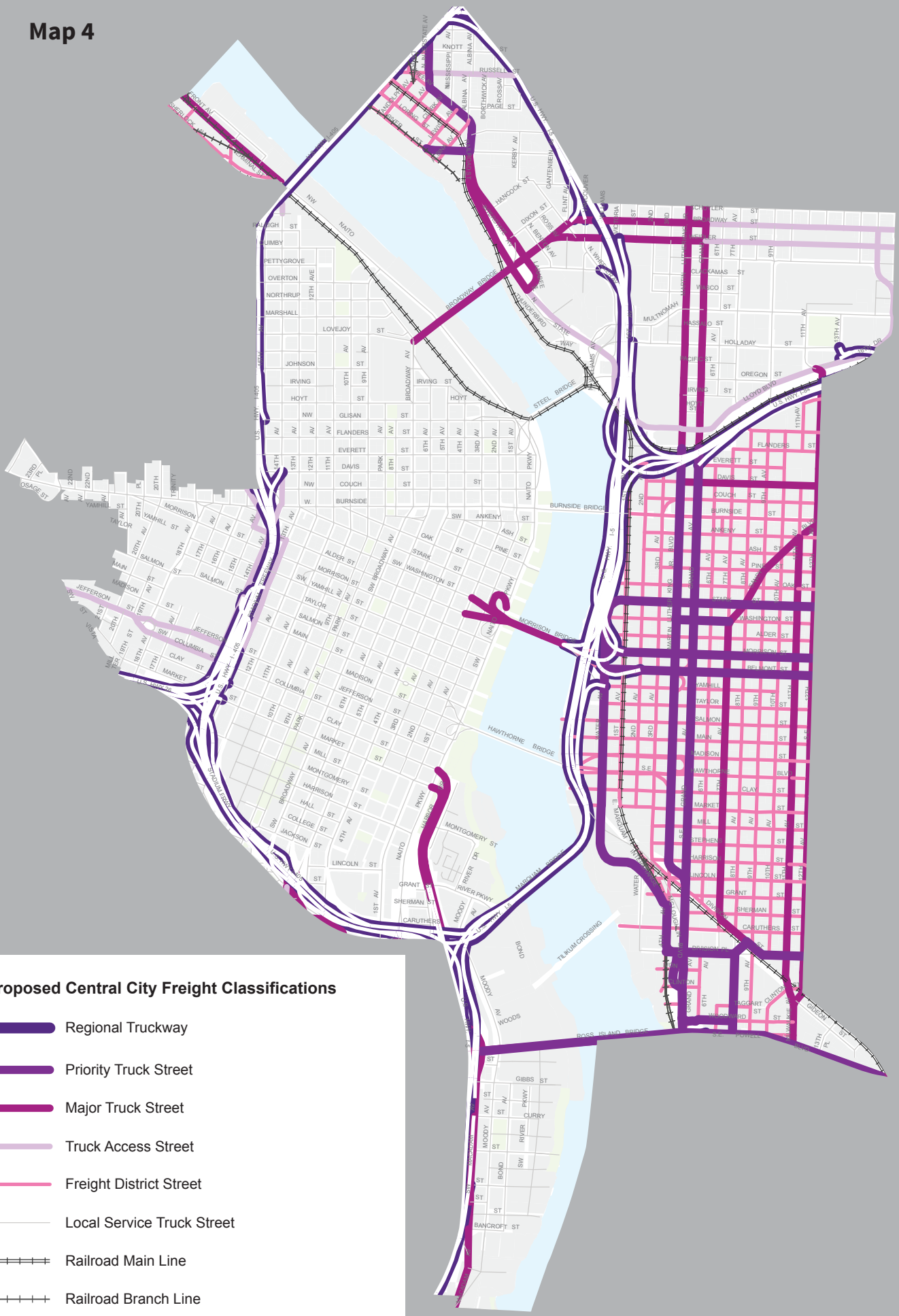
Map 2


Proposed Central City
Transit Classifications
Regional Transitway
Regional Transitway &
Major Transit Priority Street
Major Transit Priority Street
Transit Access Street
Community Transit Street
Portland Street Car line
Local Service Transit Street
Intercity Passenger Rail

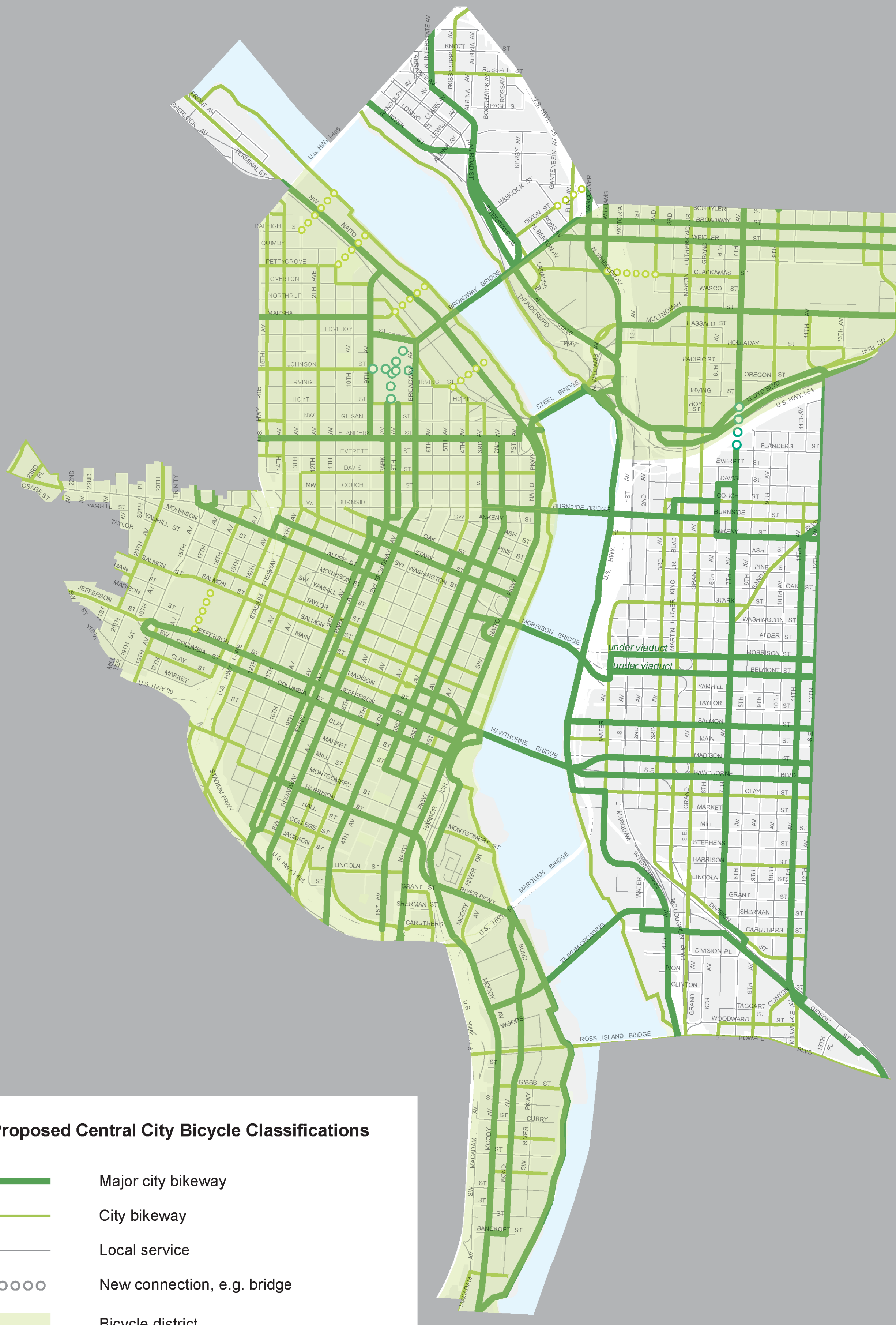
Map 3


Proposed Central City
Emergency Response Classifications
Primary ER route
Secondary ER route
(New classification)
Minor ER route

Map 4


Proposed Central City Freight Classifications
Regional Truckway
Priority Truck Street
Major Truck Street
Truck Access Street
Freight District Street
Local Service Truck Street
Railroad Main Line
Railroad Branch Line

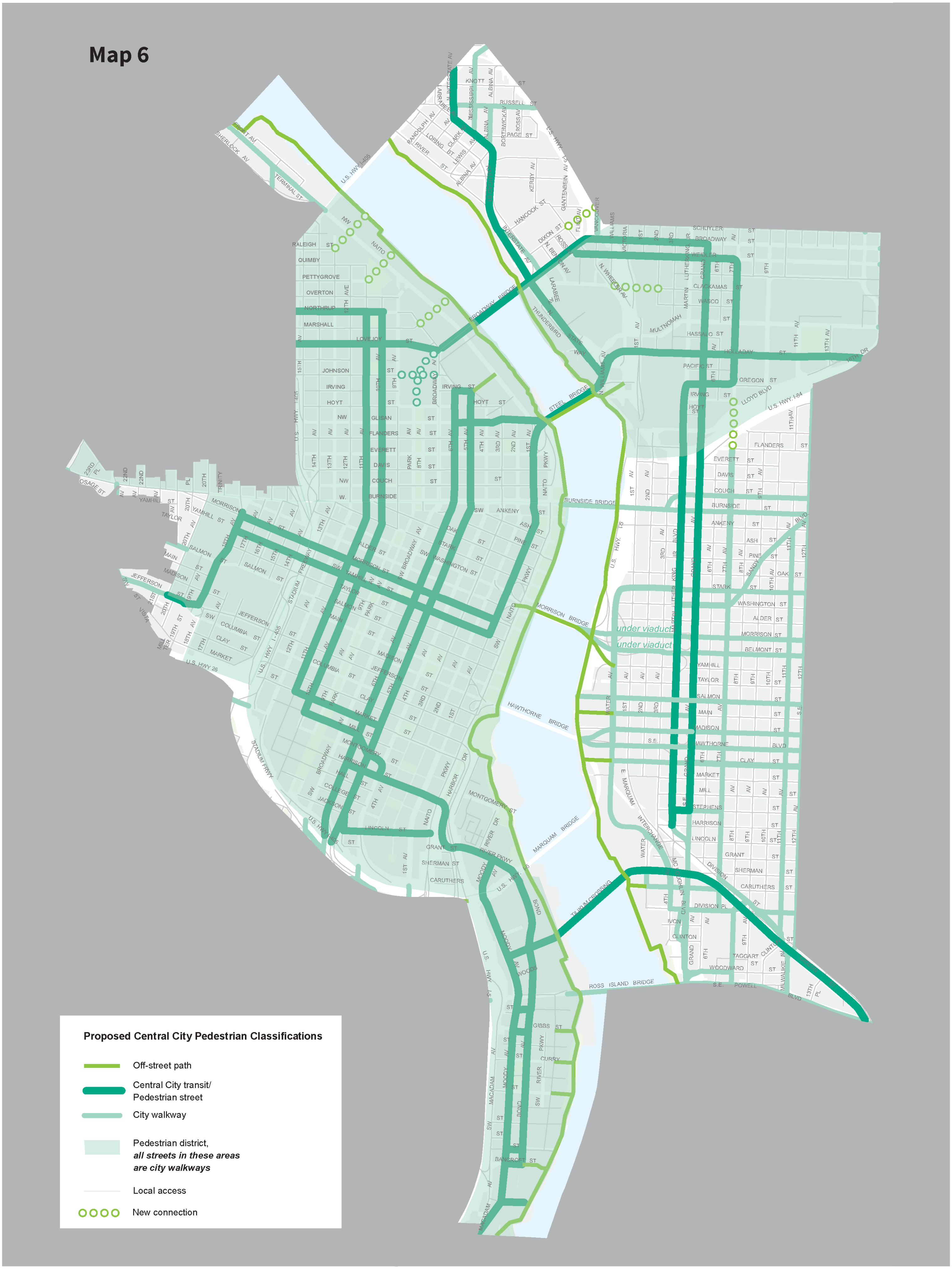
Map 5



Proposed Central City Bicycle Classifications

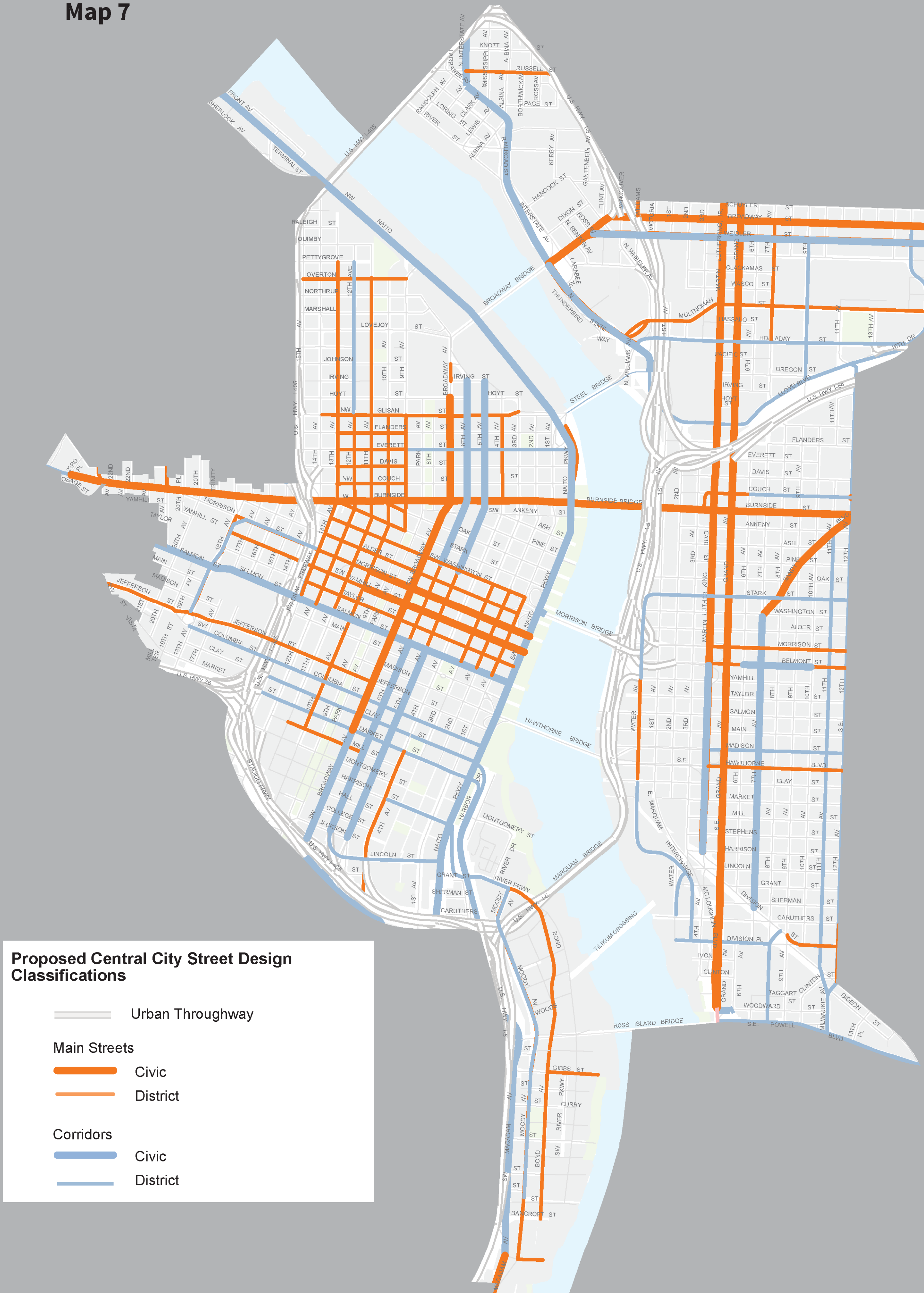
- Major city bikeway
- City bikeway
- Local service
- New connection, e.g. bridge
- Bicycle district

Map 6



Proposed Central City Pedestrian Classifications
Off-street path
Central City transit/ Pedestrian street
City walkway
Pedestrian district, all streets in these areas are city walkways
Local access
New connection

Map 7


Proposed Central City Street Design Classifications
Urban Throughway
Main Streets
Civic
District
Corridors
Civic
District
BROADWAY BRIDGE
STEEL BRIDGE
BURNSIDE BRIDGE
MORRISON BRIDGE
HAWTHORNE BRIDGE
MARQUAM BRIDGE
TILIKUM CROSSING
ROSS ISLAND BRIDGE