Comprehensive Plan Update – Design with Nature
Date for discussion: September 27, 2012

Introduction

In Portland's urban environment attaining healthy watersheds cannot be achieved solely by protecting remaining natural resources. Weaving nature and natural functions into the design of our urban development will also be needed to preserve and improve watershed health.

Although the City has established a number of programs intended to weave nature into development, including buildings, sites, streets and infrastructure projects, the current Comprehensive Plan does not recognize the importance of built landscapes in maintaining clean air and water, reducing natural hazard risks, providing habitat and safe passage for fish and wildlife. However, the importance of a well-designed built environment is featured in the more recent City plans such the Portland Watershed Management Plan, Climate Action Plan, and Urban Forestry Management Plan.

Portland's updated Comprehensive Plan goals and policies should highlight the environmentally sensitive development design as a necessary component of healthy watersheds. Staff have produced an initial set of goals and policies which are presented in this paper and in the draft Watershed Health/Environment policies under the heading "Design with Nature". The Watershed Health/Environment PEG will be invited to discuss and provide feedback on these policies and potential future implementation options.

What do we mean by "Design with Nature" in the Context of the Comprehensive Plan Update?

The term *"Design with Nature"* was chosen to head this new Comprehensive Plan section as a tribute to Ian McHarg who wrote the widely celebrated landscape architecture and planning book *Design with Nature* in 1969. McHarg pioneered the concept of ecological planning using specific methods of landscape scale and site analysis. His professional philosophy was that development ought to be designed to function in concert with nature rather than degrading nature.

In *Design with* Nature McHarg combined layers of map information for sensitive natural resources hazard areas, and key infrastructure to provide a basis for planning and designing development sites. This "overlay method" is intended identify where specific land uses and new development will work best for people, the setting, the climate, and the natural environment. This approach formed the foundation for spatial analyses performed today using Geographic Information Systems (GIS).

Other leaders in this field and have brought additional dimensions and terminology to the discussion. To name just a couple, Timothy Beatley (University of Virginia, Environmental Planning, School of Architecture), a contemporary and enthusiastic champion of sustainable cities, has published widely on the integration of nature and development to create "biophilic cities" (or cities that support the innate human love of life, the living world, and other life forms). Beatley is also a proponent of resilient cities as integral to human health, well-being, and the ability to withstand and bounce back from the impacts of peak oil, climate change, and natural hazards. Beatley suggests that a "Minimum Daily Requirement of Nature" is needed to support human health and well-being. Stephen Kellert (Yale University School of Forestry and Environmental Studies, an award-winning educator and author has teamed with numerous colleagues to produce publications on biophilic building design, the value of biodiversity, and the deep need of humans to interact with nature.

The draft goals and policies under the heading "Design with Nature" will support the integration of natural functions into city plans, development sites, buildings, streets and other infrastructure projects. These goals and policies are intended to foster design approaches and practices that will protect and improve human health, watershed health, and community livability by:

- Reducing stormwater runoff
- Cleaning and cooling stormwater runoff and improve water quality in rivers and streams
- Cleaning and cooling the air and reduce urban heat island effect
- Improving energy efficiency

- Increasing resiliency to natural hazards and climate change
- Providing habitat and safe crossings/passage for fish and wildlife
- Reducing risks to wildlife (e.g., bird/building collisions)
- Improving access to nature for all Portlanders

Discussion:

Designing with nature presents an opportunity to achieve healthier, more vibrant, and more equitable communities over time, and to address some of the impacts of urbanization (e.g., urban heat island) on vulnerable populations. The draft policy proposal below incorporates direction provided in City plans adopted within the last decade, including the *Portland Watershed Management Plan*, *Climate Action Plan, Urban Forestry Management Plan*, *Natural Hazard Mitigation Plan*, and *Portland Plan*. Each of these plans identifies goals, strategies and actions that directly or indirectly call for weaving natural functions into the built environment.

The draft policies would also support existing City programs promoting ecoroofs, green streets, culvert replacement, and tree planting. These programs address key watershed plan goals for hydrology, water quality, fish and wildlife habitat, and biological communities, as well as public health and safety and neighborhood livability. These programs improve the City's resiliency to natural hazards and climate change by reducing urban heat island, sequestering carbon, and improving fish and wildlife mobility. These programs also contribute toward the City's compliance with multiple regulatory requirements including Metro Title 13, Clean Water Act, and Endangered Species Act.

The City also supports habitat-friendly development through regulations such as zoning, stormwater management requirements, and non-regulatory tools. For example, the City recently partnered with the Audubon Society of Portland, with funding from the U.S. Fish and Wildlife Service, to produce a voluntary Resource Guide for Bird-Friendly Building Design. City plans and programs that promote designing with nature are summarized in Attachments A and B.

The draft policies below are also intended to improve access to nature, which can only be accomplished by weaving nature into development across the city. Policies calling for convenient and equitable access to nature for all Portlanders and an accessible system of habitat corridors, neighborhood greenways and civic corridors will inform Park and Transportation planning and investments, The policies recognize the importance of having a well-connected network of parks, natural areas, and active transportation facilities (bicycle, pedestrian, transit) that function at property, neighborhood, citywide, and regional scales.

As we consider potential implementation tools that these "design with nature" policies could support, the City has an opportunity to learn from efforts in other U.S. cities and countries. For example, programs like the "Seattle Green Factor" and similar programs established in Berlin, Germany and Malmo, Sweden use a combination of incentives and regulations to promote multi-objective landscaping and stormwater management approaches on development sites. Each program is specifically designed to help meet particular goals. Here is a link to the Seattle Green Factor website. http://www.seattle.gov/dpd/permits/greenfactor/Overview/. The Bureau of Environmental Services is currently looking into how this type of approach might work in Portland.

The draft policies could also inform future infrastructure and partnership-based investments in projects that enhance public health, watershed health and community livability by incorporating natural functions into design and operations.

Proposal

The following draft goals and policies have been excerpted from the draft goals and policies provided to the PEG on September 7, 2012. A few additional refinements have been made as well.

POLICIES—Design with Nature

Policy 4.4. Integrate low-impact development, habitat-friendly development, bird-friendly building design, and green infrastructure principles and techniques into land use, transportation, and parks/natural area plans, and the design and maintenance of infrastructure facilities and development.

Policy 4.5. Plan and design development and infrastructure to avoid further impacts to natural hydrology in areas with poorly infiltrating soils and limited public stormwater discharge points.

Policy 4.6. Encourage the incorporation of bird and pollinator habitat into landscaping and sustainable stormwater facilities.

Policy 4.7. Ensure that development avoids negative impacts on people, natural resources, ecological functions and ecosystem services, and wildlife when practicable, and ensure that impacts that can not be avoided are minimized and fully mitigated.

Policy 4.8. Encourage innovative approaches to mitigation and natural resource enhancement.

Policy 4.9. Encourage development that preserves or enhances hydrologic functions and water quality, protects fish and wildlife, and other ecosystem services.

Policy 4.10. Reduce impervious surfaces where practicable.

Policy 4.11. Ensure that planned densities and associated impervious surfaces can be adequately served by suitable stormwater management systems.

Policy 4.12. Prioritize the efficient use of already developed land; clean up contaminated sites and other disturbed areas and return them to productive use before encroaching on natural resources, where practicable.

Policy 4.13 Encourage development and infrastructure designs that provide safe wildlife crossings and remove barriers to fish and wildlife passage.

New policy Support development design approaches that avoid or reduce impacts of urbanization on environmental justice communities and other vulnerable populations.

New policy Encourage the incorporation of trees and other vegetation in development and infrastructure designs.

POLICIES—Access to Nature.

Policy 4.14. Ensure that all Portlanders have convenient access to parks, natural areas, and recreational opportunities in their daily lives.

Policy 4.15. Create an accessible system of habitat corridors, neighborhood greenways and civic corridors throughout the city.

Policy 4.16. Identify natural resource areas where human access and activities are discouraged to protect public safety, ecological functions, and sensitive fish and wildlife.

Policy 4.17. Ensure that parks and natural area systems include diverse native landscape and habitat types.

POLICIES—Urban Forest.

Policy 4.18. Protect and improve the health, diversity and total coverage of tree canopy.

Policy 4.19. Protect healthy large trees, native trees, and native tree groves.

Policy 4.20. Support an equitable distribution of the urban forest.

POTENTIAL POLICIES FOR OTHER PEGS

The Networks, Infrastructure, and Neighborhood PEGS could incorporate policies that call for:

- weaving nature and natural functions into Portland's parks, natural areas transportation, stormwater and other infrastructure systems
- safe wildlife crossings
- Support rights-of-way designs that will accommodate large street trees.

POTENTIAL FOLLOW UP ACTIONS (examples)

The proposed goals and policies could inform and support the following types of refinement projects and investments once the Comprehensive Plan is adopted:

- Explore application of performance-based standards in the Zoning Code or other City codes or administrative rules (e.g., Stormwater Management Manual) to improve the functions and benefits provided by landscaping and other development site design elements (e.g., "green factor" approach).
- Seek opportunities to incorporate bird-friendly building design and other habitat-friendly development in City and community programs and projects, such as updated Central City Plan Design Guidelines and Ecodistricts.
- Continue partnership-based investments in projects that weave together active transportation routes, access to parks/nature, stormwater management, reduced impervious area, and wildlife habitat (e.g., Holman Street/Park project).
- Take proactive steps to develop stable funding for watershed health oriented programs and to develop a capitalization strategy for street trees and other green infrastructure assets.
- Seek opportunities to encourage bird-friendly building design showcase projects and partnerships (e.g., Portland Water Bureau Fulton Pumphouse project).

PEG Discussion Questions

1. Will the draft policy proposal improve the integration of natural functions into Portland's urban development? Is there anything missing from the proposed policies?
2. How can the policies best address redevelopment in existing built areas?
3, Will the proposed policies contribute positively or negatively to environmental justice and social equity?

Attachment A - City Plans that Support "Designing with Nature"

Urban Forestry Management Plan (2004)

The City's Urban Forestry Management Plan goals call for preserving and enhancing Portland's urban forest, promote stewardship of the urban forest, and providing equitable benefits of the urban forest for all Portlanders.

The plan states: "The urban forest is the complex system of trees and smaller plants, wildlife, associated organisms, soil, water, air and people in and around our city. The urban forest surrounds us and contributes to the quality of our daily lives. It provides environmental, psychological, and economic benefits ranging from improved air and water quality to savings from decreased heating and cooling costs to aesthetically pleasing neighborhoods and increased resale values. It is vital to our efforts to restore fish and wildlife habitat and it provides countless opportunities for recreation and refreshment."

The plan establishes an urban forest "vision" for 2020, which states in part, "Coordinated management of the urban forest occurs because city agencies, businesses, civic organizations and residents have formed partnerships to make a place for trees in the city. Portlanders recognize trees as a vital, functioning part of the city's infrastructure and ecosystem and provide adequate, stable funding to maintain and enhance the urban forest.

The plan also establishes tree canopy targets for different types of land uses or "urban land environments". Some of the plan recommendations include improving tree canopy in highly developed areas, improving distribution of street trees across the city, and designing rights-of-way to accommodate street trees. The plan also calls for improving tree canopy in public parks and natural areas, recreation areas, and parking lots. The City recently updated its tree codes to help meet the tree canopy targets and more effectively encourage designing development projects to incorporate preservation of large healthy trees, native trees and tree groves.

Portland Watershed Management Plan (2005)

The Portland Watershed Management Plan states:

> *"A healthy urban watershed has hydrologic, habitat, and water quality conditions suitable to protect human health and maintain viable ecological functions and processes, including self-sustaining populations of native fish and wildlife species whose natural ranges include the Portland area"*
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> The PWMP strategies focus on stormwater management, revegetation, aquatic and terrestrial enhancement, protection and policy, operation and maintenance, and education, involvement and stewardship. Each of these strategies addresses Portland's built and natural environments. For example, the stormwater management strategy states:
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> *"Stormwater management policies that reduce impervious areas will also reduce stormwater volume and velocity, which protects streams and aquatic habitat. Land use and development policies can reduce habitat fragmentation and landslide risk."*

The Aquatic and Terrestrial Enhancement Strategy states:

> *"Aquatic and terrestrial enhancement improves habitat and protects and biodiversity. Restoring connectivity by removing or retrofitting impassable culverts, installing road undercrossings for wildlife, or planting vegetated wildlife corridors promotes the natural movement of aquatic and terrestrial species. These pathways restore critical areas for feeding, nesting, roosting and migrating. Restoring native vegetation, managing invasive plant and animal species and removing development from the riparian and floodplain area also increase connectivity between stream corridors and their associated uplands."*

As a follow up to the Portland Watershed Management Plan, the City published the Terrestrial Ecology Enhancement Strategy (TEES) in 2011. The TEES recognizes habitat potential in the urban features, calling for protection of natural non-vegetation-based urban habitat features important for wildlife (e.g., rock outcrops, snags), and key human-made urban habitat features important for wildlife (e.g., bridges, street trees).The TEES also calls for creating additional urban habitat features where appropriate (e.g., ecoroofs, bird boxes). An appendix to the TEES includes the Portland Bird Agenda, which calls for continued development of information and approaches to encourage bird-friendly building and lighting design and practices.

Climate Action Plan (2009)

The Climate Action Plan calls for designing with nature both directly and indirectly. It includes ambitious goals and strategies for building energy efficiency, and also to enhance tree canopy and natural systems. The Plan recognizes that these approaches will help reduce greenhouse gas emissions and improve the City's ability to adapt to potential climate impacts including changes in temperature, weather, and streamflow.

Natural Hazard Mitigation Plan (2010)

The City's Natural Hazard Mitigation Plan supports designing with nature recognizing the power of natural phenomena such as flooding, wildfire, and earthquake, and by proposing approaches that will reduce the impacts of natural hazards on people, property and natural resources. Such approaches include directing development away from hazard-prone areas, applying regulatory protections to natural resources, and buy-out programs to move people out of harms way. An example is the City's existing Willing-seller Land Acquisition to acquire properties in the Johnson Creek floodplain and restore natural floodplain functions.

The plan also recommends strategies to make development more resilient to natural hazards. Examples provided in the Executive Summary include:

- Updating earthquake vulnerability information for water supply and treatment facilities
- Insulating buildings from severe weather events for at-risk populations
- Ensuring that buildings below base flood elevation aren't converted to habitable space
- Bolstering water supply facilities to withstand landslide hazards
- Developing information and projects to use plants to reduce erosion
- Considering adopting nationally recognized codes to strengthen building standards in wildfire risk areas.
- Initiating a process to ensure the Erosion Control Manual is consistent with City goals to control and eradicate invasive plants.

Portland Plan (2012)

The Portland Plan calls for improved watershed health by 2035, and supports designing with nature at a systems level. Policies and actions to achieve a "healthy, connected city" call for integrated networks of habitat corridors, neighborhood greenways and civic corridors, and stating: "The network will expand on Portland's existing network of greenspaces, regional trails, bikeways, green streets and high-capacity transit by identifying and prioritizing a special set of corridors for integrated multi-objective design."

The plan also highlights the role of "green infrastructure" as "natural systems, such as trees and natural areas, and engineered features like green streets and ecoroofs. The plan notes that "green infrastructure can manage stormwater, improve water quality, reduce flooding risk and provide wildlife and pollinator habitat and areas for human recreation and respite while mitigating and improving resiliency."

The plan also recognizes that "greenspaces" are found in Portland's urban parks, natural areas, and developed areas, and that "green infrastructure such as urban forest canopy, stormwater features (e.g. bioswales), rain gardens, and eco-roofs can be components of a broader greenspace system." The plan

also establishes a policy to “plan, fund and manage green infrastructure as part of the City’s capital systems.”

Attachment B – Examples of City Programs that Promote "Designing with Nature"

Willing Seller Land Acquisition
City land acquisition programs preserve the functions and values of significant riparian corridors and upland habitats in perpetuity. In 1997, the Bureau of Environmental Services (BES) launched the *Johnson Creek Willing Seller Land Acquisition Program*. The program helps move people and development out of frequently flooded areas, reducing risk to life and property, and creating opportunities to increase flood storage capacity, improve fish and wildlife habitat, restore wetlands, and create passive recreation opportunities. The City has acquired 261 acres through the program.

In 2006 the City Council adopted a citywide *Natural Area Acquisition Strategy*. The protected system of natural areas will consist of green ribbons along major waterways and feature large natural area parks and preserves, adding to and connecting habitats, and providing access to nature from neighborhoods and trails. The Bureaus of Environmental Services and Portland Parks and Recreation, with local partners, have purchased 289 acres. Planning is underway for a second phase of CIP-funded land acquisition beyond 2016.

Tree Planting in Built Environment
The City has periodically implemented programs to plant trees. Since 2008 when the Grey to Green Initiative enabled increased investment, the program, in partnership with Friends of Trees planted more than 37,000 trees along city streets and highways, on school grounds, and in residential yards. The program will continue to focus on planting in underserved neighborhoods, planting large, native trees, and supporting stormwater management.

Green Streets
Green streets are facilities such as curb extensions, planters or rain gardens that naturally manage stormwater runoff, using vegetation and soil to filter pollutants and either allowing the water to soak into the ground or slowing it before it flows to other stormwater management facilities. Approximately 1,200 green street facilities are currently in operation. Construction has started on several dozen green streets as part of the Eastside Streetcar and Multnomah Village projects.

Culvert Replacement

Between 2007 and 2011, the City retrofitted or removed several culverts to improve fish passage, hydrology and/or water quality along Errol Creek, Tryon Creek, Forest Park and the Columbia Slough. Recently, BES has partnered with other agencies and community partners to replace one culvert (SE 28th Ave.) on Crystal Springs Creek in southeast Portland (tributary to Johnson Creek) and will replace the remaining eight over the next two years. BES CIP funding is planned through 2016 to leverage partnerships to replace other high-priority culverts.

Portland Ecoroof Program
The Portland Ecoroof Program has been in existence since 1996. Since the program was bolstered by the Grey to Green initiative in 2008, Portland has added 330 ecoroofs covering more than 14 acres. Program components include both direct incentives and resources and technical assistance to property owners, businesses, and professionals interested in getting involved in the ecoroof industry. Ecoroof Program funding is currently forecasted through 2016 as part of the Grey to Green initiative, and budget planning is underway for future years.

Subwatershed and Stormwater System Planning
BES works with local citizens and community partners to recommend actions to improve watershed health in Portland subwatersheds. Actions include building green streets, ecoroofs, and rain gardens; planting trees; removing invasive plants and replanting native vegetation; and protecting and restoring river, stream, wetland, and upland habitats. BES has completed subwatershed reports for six of the Willamette watershed's SW Portland subwatersheds. Projects are implemented in collaboration and

partnership with willing landowners, neighborhood groups, non-profits, other city bureaus and local agencies.

Tabor to the River

The Tabor to the River-Brooklyn Creek Basin Program began in 2009, and is a key example of Portland's evolution from conventional infrastructure solutions to multi-objective projects that incorporate green infrastructure and natural systems to meet multiple goals and regulatory mandates. The program improves sewer system reliability and promotes natural watershed functions in SE Portland, from Mt. Tabor to the Willamette River. Resolving these problems with pipe-only solutions would cost an estimated $144 million; the alternative stormwater management systems used by the program reduces the estimated cost to $86 million, translating to 40% (about $58 million) in lower costs. The City is partnering with multiple organizations in the Tabor to the River project.

Incentives

In 2006 the Bureau of Environmental Services (BES) launched a stormwater utility discount program called ***Clean River Rewards.*** The program gives ratepayers a discount on the stormwater portion of their utility bill for managing some or all of their on-site stormwater.

Trees intercept and capture stormwater that would otherwise head to the wastewater treatment plant for costly processing, or require other management facilities. The ***Treebate*** program gives ratepayers a rebate on their sewer bills for trees planted on residential properties. The rebate amount ranges from $15 to $50 and depends on the size of the tree at maturity and associated stormwater management potential.

BES offers building owners and developers an ***ecoroof incentive*** of up to $5 per square foot for an approved ecoroof project to offset some or all of the costs for construction. This incentive has helped spur utilization of ecoroofs on both new and existing development in Portland as part of the overall Ecoroof Program discussed above.

Habitat-Friendly Development

Portland's existing regulations allow, encourage, or require many of the approaches that make development more habitat-friendly. For example, Portland's allows paving alternatives for driveways. City standards for new public streets are intended to minimize paving. Land division regulations allow alternative private streets with reduced paving. There are maximum roadway and right-of-way widths for streets in environmental zones. In 2006, the Infill Design Code Amendments allowed narrower walkways, shared driveways and shared courts designed to accommodate pedestrian and vehicles within the same space. The City has reduced the minimum parking space requirements in multi-dwelling and commercial zones and waives minimum parking requirements for sites close to frequent transit service. And within the Central City Plan District (33.510) there are generally no minimum parking requirements and there are limits on the size and use of surface parking lots.

The City regulates stream crossings primarily through environmental land use reviews which require the least environmental damaging alternatives. The recently adopted Portland International Airport Plan District limits future crossings of the Columbia Slough to bridges only. The City has required the installation of underpasses to facilitate safe crossing for native turtles and other wildlife species in the Columbia Slough. The City is also pursuing culvert replacement to improve fish passage as described above. The City's land division regulations were amended through the Citywide Tree Project to strengthen the consideration of natural features, such as streams, wetlands and tree groves, when locating new streets.

Bird-Friendly Building Design

Recently the City partnered with the Audubon Society of Portland, with funding from the U.S. Fish and Wildlife Service, to produce a voluntary Resource Guide for Bird-Friendly Building Design. The resource guide provides practical tips to reduce the risk of bird collisions with buildings, particularly windows. The guide recommends window treatments and lighting practices that can also help reduce energy demand

and associated carbon emissions. The resource guide provides practical tips to reduce the risk of bird collisions with buildings, particularly windows. The guide recommends window treatments and lighting practices that can also help reduce energy demand and associated carbon emissions. The Planning and Sustainability Commission passed a motion to support the further integration of bird-friendly building design into City programs, including the Comprehensive Plan Update.