To: Portland Planning and Sustainability Commission
Subject: Comments on the Proposed Central City 2035 Plan
From: Tom Liptan, FASLA
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I would like to commend the city on taking an important step toward a more sustainable future with implementation of a new Ecoroof Code. With my 20 years of ecoroof design, construction, economic analysis, maintenance and research experience, I can assure you that this is the right thing to do for the city and building owners. As a matter of fact an ecoroof requirement makes so much sense that it should be applied citywide and I urge you to do so.

With this letter I want to provide an amendment to the BPS Ecoroof code language In the Central City 2035 document and additional information and recommendations to assist you in your decision-making.

Implementation Code; proposed amendments,

33.510.243 Ecoroofs

A. Purpose. Ecoroofs provide a combination of complementary benefits in urban areas, including stormwater management, reduction of air temperatures, extended durability, and habitat for birds and pollinators.

B. Ecoroof standard. In the CX, EX, RX, and IG1 zones, new buildings with a ~~net building~~ roof area of at least ~~20,000~~ 5,000 square feet must have an ecoroof that meets the following standards:

1. The ecoroof must cover at least ~~60~~ 90 percent of ~~the~~ all roof areas, excluding roof decks and gardens. Other areas exempt from ecoroof coverage are those listed in the Bureau of Environmental Services, Stormwater Management Manual's (SWMM) Ecoroof Facility Design Requirements and include skylights, utilities, and access-ways. ~~does not include areas covered by solar panels, skylights or mechanical equipment, or areas used for fire evacuation routes.~~

2. The ecoroof must be approved by the Bureau of Environmental Services as meeting the Stormwater Management Manual's (SWMM) Ecoroof Facility Design and O&M Requirements ~~Criteria~~..

Rationale for proposed amendments;

1. The existing BPS code language does not comport with the BES City Stormwater Management Manual (SWMM). This will cause confusion and inefficiencies for both the city and the developer.

2. This amendment comports with the SWMM and reduces confusion for Building owners, Designers, BES and BPS.

3. The ecoroof meeting all SWMM requirements will offset the need for alternative stormwater management techniques and the associated costs. Cost saving would be as much as 50% and using the BPS estimate for ecoroof construction of $10.34 sf this would put the ecoroof at just over $5 sf.

4. The SWMM allows a 10% ecoroof exemption for utilities and pathways. It encourages that solar panels are installed on top of the ecoroof. If areas of the roof are to be used as decks then BES will require stormwater management for those areas unless the deck is constructed over the ecoroof.

5. Although BPS is hoping for at least 60% ecoroof coverage as the code is currently written the actual result could be less than 26%. For example, a typical new building in the Pearl Dist. usually has 32,000 sf

roof area and 8,000 sf of lower level courtyard. Assuming solar hot water panels covered 6,000 sf and PV panels cover 9,000 sf these areas would be excluded from the ecoroof requirement. However the Ramona Apartment building in the Pearl has these panels installed on top of the ecoroof. Under the BPS code language, these areas of 15,000 sf would be exempted, exempting another 10% for paths and mechanical 3,000 sf for a total of 18,000 sf. with 14,000 sf remaining at 60% the ecoroof would cover 8,400 sf of the building. Expressed as a percentage the ecoroof would be 26% of the entire roof area.

Figure 1. Ramona Apartments with solar hot water panels and PV panels installed 2011

Figure 2. PV panels on large ecoroof in Basel, Swiss. 2013

Figure 3. Ecoroof and PV panels research project at Portland State University

6. Maximum coverage with ecoroof will provide the most benefit for extending the roof life span. Areas not covered are subject to deterioration and consequent early repair and replacement.

7. Roof decks also cover the roof membrane and help protect the roof from solar and temperature related deterioration.

8. Solar panels have been found to perform as well or better when installed over ecoroofs. The shade provided by solar panels when installed over ecoroofs reduces the need for irrigation in these areas.

9. When the contractor mobilizes for building construction including the ecoroof, adding ecoroof square footage is less costly because of economies of scale.

Additional Information

The Central City 2035 Plan discusses ecoroof benefits, such as stormwater management, urban heat island mitigation, increased building insulation and others. However, there are four benefits that deserve more attention.

1. Durability: The number one benefit of an ecoroof is its durability and extended life span. This will be especially important for building owners, such as affordable housing, schools, or anyone who has to come up with a large sum of money to replace the old conventional roof every 20 years or so. In Portland, an example is the Market Street Building where the roof garden was installed in 1970. This roof has not been replaced in over 44 years. There are buildings in Europe that have ecoroofs over 100 years old.

Figure 4 200 SW Market St Building with roof gardens installed 1970. The roof membrane is still intact.

Figure 5 Ecoroof on water storage building Zurich constructed 1914 still intact.

2. Business: The Central City 2035 Plan mentions costs and associated business but neglects to mention some key points; the cost of ecoroofs will go down as the market matures. During the 5 years of the city's ecoroof financial incentive program construction experience and competition for jobs was developing. With passage of a code the market will increase and construction proficiency will improve.
3. Costs: Clarification of the BES information in the CC 20135 Plan. BES mentions that ecoroofs on average cost $10.34 sf. Although not mentioned by BES, one would assume this is the extra cost associated with the ecoroof component. However, the BES analysis was based on projects that go beyond the proposed CC 2035 requirement. BES incentive Ecoroofs had a wide range of costs. The CC 2035 requirement is more comparative to the simplest ecoroof design, which is closer to $8 sf including the extra cost for structural upgrades. With more volume of ecoroof projects and economies of scale, these costs would level off somewhere below $8 sf. For example; a $20 million building with 30,000 sf roof at 90% ecoroof coverage, 27,000 sf x $8 sf extra cost would equal $216,000 which would be a 1% addition to the

total project cost.

4. Habitat: Ecoroofs provide habitat for insects and birds. Research in Europe and North America on habitat values has shown that ecoroofs provide habitat for a wide range of species, especially pollinators. Ecoroofs also enhance human health by providing open space and simply more green for people.

Figure 6 Walmart ecoroof with nesting Killdeer, Portland 2016

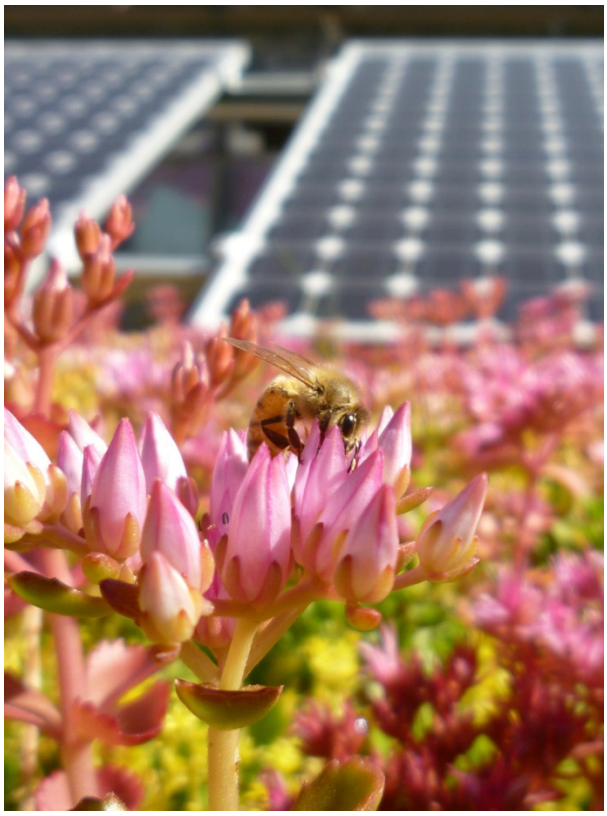

Figure 7 Honeybee on the ecoroof tests at Portland State University research project.

5. Ecoroofs will assist building owners in meeting other city requirements such a 510.244 Low-Carbon

Buildings and LEED criteria.

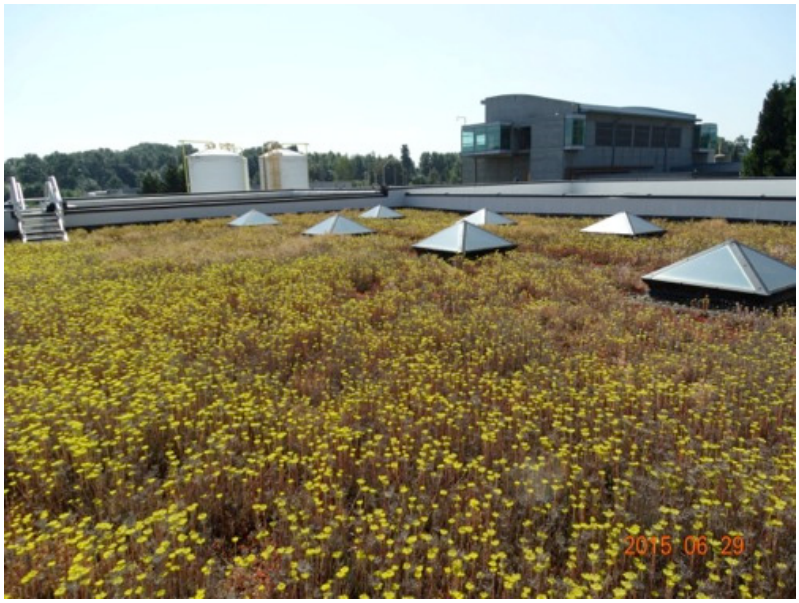

Figure 8 BES simple ecoroof at the Columbia Blvd. Wastewater Treatment Plant. It has no irrigation and the cost was $6 sf in 2011 when it was installed.

Tom Liptan is a landscape infrastructure consultant specializing in ecoroofs and stormwater management. He designed and constructed the first ecoroof in Portland in 1996, which he maintained until 2015. From 1987 to 2012 he worked for the City of Portland, Bureau of Environmental Services where, in 1997, he started and managed the City's Ecoroof Program. After leaving the city's employment in 2012 he has continued work on Ecoroof design, construction and maintenance. He has experience in the greenroof industry in Europe and across the US. At the city of Portland he was the catalyst behind research and development of vegetative systems for sustainable building, site and street designs. He has been instrumental with integration of these approaches in design, construction and maintenance standards, and city code and program modifications. He has contributed to several books and is internationally recognized for his work using vegetated systems in urban design. Currently he is writing a book about landscape infrastructure tentatively titled, Sustainable Stormwater Management, publisher Timber Press. He is the founder and director of research on vegetated systems at the LIVE Center (Landscape Infrastructure and Vegetation Experiments) in Portland. In 2009, the American Society of Landscape Architects recognized Tom's pioneering role in bringing ecoroofs to the USA, and inducted him into the ASLA Council of Fellows. He has also received awards from ACWA and APWA. His first stormwater project using a landscape approach was in Orlando Fl. 1978.