Steinbrueck Urban strategies LLC
5810 Cowen Place NE #206
Seattle, WA 98105

To the Seattle Design Review Board

RE: Project #30200338, 2939 East Madison Street, Seattle

July 13, 2016 EDG Meeting

From: M. S. Patterson, MSES/MPA, Research Associate Steinbrueck Urban Strategies, LLC

As a Research Associate of Steinbrueck Urban Strategies, LLC, in consultation with the Save Madison Valley group, I have conducted a preliminary analysis of the ecosystem services provided by the City People site and how they will be impacted by the proposed development as presented in the EDG. I offer the results of this initial analysis and my comments to the Review Board below.

Comments on the Current Status of Site

The sloped, canopy rich portion of the City People development site in Madison Valley (facing Dewey Pl E) is best characterized as early successional forest for the Puget Sound lowlands, predominately populated by bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and poplar (*Populus nigra*). Flowering cherries (*Prunus serrulata*) are also present, as well as Western red cedar varietals (*Thuja plicata*). The understory of the site varies along a north-to-south gradient, with the southern end of the slope with a relatively clear understory. As one moves north out of the densely closed canopy of the cedars into a grove of broadleaf maple and cherries, invasive ivy and blackberries begin to be present. The north (quite steep) end of the slope under the more open canopy of poplars and more sparely distributed maples is largely dominated by blackberry canes.

The roughly 14,500 sqft of tree canopy covers approximately 36% of the total parcel area[1] (see figure 1). The vast majority of this canopy is located on the slope behind the nursery proper, with only small contributions from street trees or other plantings. There are also snags (standing dead trees) within the parcel, which is relatively uncommon in Seattle outside of a greenbelt or other large, comparatively unmanaged forested site. Snags provide ecological value as nesting, roosting, caching, and foraging sites in this region for more than three dozen species of birds and a dozen species of small mammals. The presence of snags was not included in the EDG.

[1] Canopy (current and projected future) was estimated by manually digitizing tree canopy using aerial imagery in ESRI ArcMap 10.3, using parcel boundaries provided by the City of Seattle and through georeferencing design materials from the EDG.

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The living trees and understory of the site provide a number of ecological services, both to wildlife and to the community and city. They obviously provide cover, nesting sites, flowers for pollinators, and fruit for both people and animals. In addition, they sequester carbon dioxide, and intercept, absorb, and transpire rainwater on a steep slope. Estimates from an analysis based on the inventory (using the iTree tool suite, see attached tables) conducted by the consulting arborist suggest that the trees on site sequester some 12,600 pounds of CO_2 annually, and will sequester 170,000 pounds of carbon in total over their lifespan. Their canopy intercepts some 40,000 gallons of water annually.

The condition of the trees is generally good, though a number of those nearest to the street and the overhead utility lines have been aggressively pruned by utility workers, and have developed poor growth forms as a result. Others have noticeable lean (particularly the largest poplars on the north end of the slope) due to the slow movement of the unstable slope. One poplar on the site (#1131) is large enough to qualify for "exceptional" tree status, and several others (#1128 and 1137) are within an inch of the required size. All are designated as "future hazards" due to the root damage that they would suffer from the proposed construction, and are thus not listed as exceptional in the EDG inventory. This does not seem to be entirely in the spirit of the ordinances in question.

It is my opinion that the consulting arborists have correctly identified the condition, growth form, and slope-related issues of the trees present on the site. Further, I believe they are correct in that none of these trees will survive the development process with the designs put forward by the developer, even if attempts were made to do so for those few that fall outside of the building footprint or ROW. The current designs will simply create too much disturbance of the root zone. In addition, many trees close to the borders of the parcel (in particular the mature beeches on Madison) may experience significant loss of root volume due to the project. The total estimated replacement value of the trees that would be removed is in excess of two hundred thousand dollars.

Comments on the Preferred Design

The preferred design put forward by the developers in the EDG has a number of features that seem to speak in its favor. The addition of new street trees on Madison, and roughly a doubling of the total number of the trees planted on the site, as well as green roofs. However, a number of issues are readily apparent. Leaving aside issues of scale and whether the building design is appropriate for the neighborhood, the preferred design suffers from a number of serious problems from the perspective of replacing the services provided by the current canopy.

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Firstly, the total canopy cover of their preferred design amounts to roughly 13,000 square feet, a significant reduction from the current canopy. This number includes the trees included on the first level of the green roof, though realistically these may never amount to more than shrubs due to restrictions in root available root volume and what species may be safely planted in a green roof environment or containers in such a space. Including only trees on ground level, the projected canopy is reduced to less than 10,000 sq ft (~25% of the parcel).

Secondly, the design restricts the size of trees that may be planted at street level. Only the Madison street scape and southwestern edge of the structure will allow for medium to large trees to be planted. Only small and some medium sized trees may be planted along the entire eastern face of the building due to its relatively narrow planting space, restricted canopy space and soil volume, and heavy shade from the immediately adjacent structure. Trees in this location are unlikely to be allowed to reach more than 30' in height, due to conflicts with the residential areas above that height, and some may still be subject to utility conflicts.

Thirdly, the species of trees used in these planting are typically non-native ornamentals, especially those that flower in a showy fashion. While these may provide a seasonal resource for pollinators, they provide relatively little else in terms of other ecological services for native birds and mammals. Understory is also likely to be non-native decorative grasses, vines, etc, particularly on the green roof.

In terms of the ecosystem services provided[2], annual CO_2 sequestration by these planting amounts to roughly 2,200 pounds (one sixth of current), total lifetime storage amounts to only 12,102 pounds (an order of magnitude lower than current), and rainwater intercepted amounts to 5,200 gallons (about one eighth that of the current site). In addition, the volume of canopy present—while difficult to estimate—will be radically reduced. Canopy volume represents the actual three dimensional space available to birds, insects, and small mammals that make use of the canopy. The currently existing continuous canopy may be as deep as thirty to forty feet in places on the site, and this depth will not be achieved in the near future by the preferred design, if ever.

[2] Ecosystem services were calculated using iTree Streets and design drawings from the EDG. Trees were assumed to be planted as the following: large broadleaf deciduous trees with 6" diameter-at-breast-height (DBH) for Madison streetscape, medium evergreen coniferous with 4" DBH along the south edge of the building, and a mixture of small broadleaf deciduous (2" DBH) and medium evergreen coniferous trees along the eastern edge. Trees on the green roof were assumed to be 2" DBH broadleaf deciduous trees. These DBH numbers represent a very optimistic scenario, in the author's opinion, and most trees at planting will likely be significantly smaller.

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Recommendations

It should first be noted that even with a large reduction in building footprint, it is unlikely that the largest trees currently on the site can be preserved. The extensive regrade and excavation necessary to construct a building of this scale on this site are likely to do too much root damage for them to survive the process. Nor is the site likely to host an uncommon ecological resource in the form of snags in the future, be they intentionally created or natural.

From an ecological perspective, the preferred design has a building footprint that does not allow for the site to perform in a manner similar to its level of current function, even over long spans of time. The appropriate course of action is thus fairly simple: reduce the building footprint to the greatest extent possible, particularly along the Dewey Pl side of the structure. Roughly mirroring the Madison streetscape style to the Dewey face of the building (with less concrete) would allow for larger planting spaces, uncrowded canopy, and a richly vegetated understory. In addition to providing ecosystems services more similar to the current site, such a design would also provide opportunities for more effective screening of light, noise, and airborne pollution from the parking garage.

At a more granular scale, the selection of native tree and understory species as candidates for planting should be strongly considered. Many of the region's native conifers are very shade tolerant and would do well in the narrow space between buildings on the southern faces of the preferred design. Many local examples exist of making attractive use of native understory species like Oregon grape and salal in landscape designs. While the limitations inherent in the design of a green roof may restrict the vegetation choices available to the developers, no such limitations exist at ground level, and there is little reason not to put in place an ecologically useful and attractive native landscape.

Ecological Services Tables

Table 1. Estimated annual CO2 sequestration for all trees on the City People site. Estimates were calculated using iTree Streets v5.1.5 based on values provided by the consulting arborist.

Species	Sequestered (lb)	Decomposition Release (lb)	Maintenance Release (lb)	Avoided (lb)	Net Total (lb)	% of Total Trees
Bigleaf maple	5071	-273	-185	1,487	6,099	44.7
Lombardy poplar	4238	-296	-133	910	4,719	18.4
Western red cedar	768	-32	-58	519	1,197	13.2
Flowering cherry	1183	-31	-33	154	1,274	10.5
Katsura tree	438	-22	-23	229	622	5.3
Red alder	822	-59	-33	345	1,075	5.3

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English holly	81	-4	-7	33	103	2.6
Current Parcel total	12,602	-716	-473	3,676	15,090	100.0

Table 2. Estimated total carbon sequestration by all trees on the City People site. Estimates were calculated using iTree Streets v5.1.5, based on values provided by the consulting arborist.

Species	Sequestered (lb)
Bigleaf maple	65,041
Lombardy poplar	70,459
Western red cedar	7,602
Flowering cherry	7,297
Katsura tree	5,169
Red alder	14,039
English holly	908
Current Parcel Total	170,515

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Table 3. Estimated volume of storm water interception by all trees on the City People site. Estimates were calculated using iTree Streets v5.1.5, based on values provided by the consulting arborist.

Species	Total rainfall interception (Gal)
Bigleaf maple	14,869
Lombardy poplar	13,279
Western red cedar	7,002
Flowering cherry	997
Katsura tree	2,229
Red alder	3,738
English holly	154
Current Parcel total	42,268

Table 4. Estimated replacement values for all trees on the City People site, by DBH class and species. Estimates were calculated in iTree Streets v5.1.5, based on values provided by the consulting arborist.

	DBH Class (in)							
Species	6-12	12-18	18-24	24-30	30-36	36-42	Total	% of Total
Bigleaf maple	$ 12,934	$ 22,654	$24,862	$ 14,475	$ -	$ -	$ 74,925	36.27
Lombardy poplar	$ -	$ 3,313	$18,934	$ 20,617	$ -	$ 19,738	$ 62,602	30.30
Western red cedar	$ 1,936	$ 17,626	$10,270	$ -	$ -	$ -	$ 29,831	14.44
Flowering cherry	$ -	$ 4,979	$ -	$ 15,860	$ -	$ -	$ 20,839	10.09
Katsura tree	$ -	$ 11,024	$ -	$ -	$ -	$ -	$ 11,024	5.34
Red alder	$ 3,254	$ 2,809	$ -	$ -	$ -	$ -	$ 6,063	2.93
English holly	$ 1,315	$ -	$ -	$ -	$ -	$ -	$ 1,315	0.64
Current Parcel Total	$ 19,439	$ 62,404	$54,065	$ 50,952	$ -	$ 19,738	$206,599	100.00

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Figure 1. Map of current canopy at the City People site in Madison Valley. Canopy cover was estimated using ArcMap 10.3.

BIO

Matthew S Patterson is an urban ecologist and research associate with Steinbrueck Urban Strategies. He is a graduate of the School of Public and Environmental Affairs MSES/MPA program at Indiana University. While at SPEA he assembled a program on Urban Ecology, and has been a part of the Center for the study of Institutions, Populations, and Environmental Change. He is currently pursuing his PhD in the Urban Ecology Research Laboratory at the University of Washington, and was a recipient of the Hall-Ammerer-WRF fellowship at UW.

His research focuses on the interactions between people and urban forest ecosystems, with an emphasis on how management practices on single family residential parcels and institutions impact urban forest structure. He plans to investigate the development of a suite of social-ecological assessment tools for policy makers in urban systems. The aim of this toolkit is provide policy makers with straightforward and cost-effective ways to measure socio-ecological outcomes within the systems they manage, in order to lead to more efficient policy development.