

# Bozeman, Montana's Urban Design Manual

## An Opportunity to Incorporate Biophilia



### Bozeman, MT - Code of Ordinances

**Section 38.520.060 - On-site Residential and Commercial Open Space**

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## INTRODUCTION

Biophilia, a love of life and the living world, may be the missing link which, in its absence, has enabled Society, in both physical and philosophical terms, to fall out of sync with the natural environment. The basis for the Biophilic City Framework is the theory that our built environment is critical to people's emotional, intellectual, and spiritual well-being, as well as their level of productivity and ability to concentrate (Zari). This sentiment is supported by research highlighting the human benefits from intentional relationships with nature, including reduced stress and increased immunity, and less sick leave or personal days (Gullone 2000, Ulrich 1984, Ulrich 1986). Though Edward Wilson introduced this framework in 1984, the concept of Biophilia has existed for thousands of years, dating back to the times of the Hanging Gardens of Babylon. Looking through this historic lens at contemporary issues still provides substantial value. In the late 1980s, Rachel and Stephen Kaplan presented the Attention Restoration Theory (ART), which suggested that individuals who are in close proximity to nature have the capacity to focus for longer periods of time and to a deeper degree (Kaplan and Kaplan 1989). Facebook has incorporated these notions, from an economic and efficiency standpoint, into their recently completed Gehry's extension of its Menlo Park campus.

Images: Convene



Facebook's newly completed Gehry's extension



Images: Convene

## RECREATION AND PLAY IN OPEN SPACES

**Section 38.520.060** of Bozeman, Montana’s Unified Development Code documents requirements for the incorporation of residential and commercial spaces with open and green spaces, as they relate to the access and opportunities afforded the general public. Two other Bozeman municipal documents (the Bozeman Community Plan and the Bozeman Strategic Plan), are related and relevant when applying the Biophilic City Framework to Bozeman’s ‘Open Spaces’. One example of where all four of these documents converge is designated recreation areas.

<u>Document</u>	<u>Component</u>	<u>Content</u>
<b>Bozeman Unified Development Code</b>	<b>Section 38.520.060</b> B.2 - Shared Open Space	Shared open space can include landscaped courtyards; gardens and pathways; and children's play areas...provided they are accessible to all residents of the development
<b>Bozeman Community Plan</b>	<b>10.1 - Parks, Recreation, Open Space and Trails:</b> Intent and Background	Promote active and healthy citizenry; and use public spaces to create a sense of community
<b>Bozeman Strategic Plan</b>	<b>3. Safe, Welcoming Community:</b> 3.4 - Active Recreation	Facilitate and promote recreation opportunities
<b>Biophilic City Framework</b>	<b>2. Elements of Nature Activities:</b> 2.2 - Outdoor Activity Centres / Sports Fields	Facilities for outdoor activities, including sports, swimming and 'messy play', enable people to get outside and enjoy the climate and ecology of the city

Similarities of these documents revolve around the provisions for equitable admittance to, and encouragement of, outdoor physical recreation. The goals and strategies noted above attempt to accomplish the goals of a strengthened sense of place while building a bond with other community members. Another key concept evident in each text is the importance given to proximity of recreational areas to their respective residential spaces.

Referencing the table above, it is worth emphasizing that Biophilia does not distinguish between types of ‘play’. Whether it is orchestrated around planned events, or intentionally lacking structure (e.g. “messy play”), children of all ages need nature in various forms. Supportive of this notion, Sarah Church, in her review of the [Handbook of Biophilic City Planning and Design](#), underscores the “*need*” for individuals to engage with the environment in multiple ways, across all possible scales (Church 2018).

Outdoor recreation for children can be as planned and developed as a formal playground...



...or as free-flowing as a designated space with vessels, sticks, and stones.



## BUILDINGS' ROOFTOPS AND ENVELOPS

The following table addresses the exterior surfaces of commercial and residential buildings. Not only do these spaces serve as exterior refuges for people and wildlife, and opportunities to commune with nature, they also serve as techniques to conserve energy. Incorporating plants on a building's envelope can increase its overall thermal performance. The benefits of green walls and roofs on a building's energy consumption are well documented. One study from Australia (the Rural Industries Research and Development Corp.), concluded that the differences between the temperature of the underside of an uninsulated steel roof sheeting and a green roof can range from 10.2°C (50.4°F) in winter to 20.5°C (68.9°F) in summer. The Bozeman Community and Bozeman Strategic plans both acknowledge the need to more efficiently consume energy, while attempting to reduce emission. Adherence to the Biophilic City Framework helps to achieve these goals.

<u>Document</u>	<u>Component</u>	<u>Content</u>
<b>Bozeman Unified Development Code</b>	<b>Section 38.520.060</b> B.5.a - Shared rooftop decks	Space must feature...amenities such as seating areas, landscaping, and/or other features that encourage use
<b>Bozeman Community Plan</b>	<b>Goal LU-4: Sustainability, Natural Environment and Aesthetics:</b> Objective LU-4.8	Promote the efficient use of water, energy, land, human resources, and natural resources
<b>Bozeman Community Plan</b>	<b>Goal C-6: Support Sustainability:</b> Objective C-6.3	Encourage and support energy conservation and efficiency in all aspects of development
<b>Bozeman Strategic Plan</b>	<b>6. Sustainable Environment:</b> 6.3 - Climate Action	Reduce community and municipal Greenhouse Gas (GHG) emissions, increase the supply of clean and renewable energy
<b>Biophilic City Framework</b>	<b>1. Elements of Nature in the City</b> 1.7 - Green roofs / Walls / Rooftop Gardens	Living greens walls bring more nature and biodiversity to built-up areas, and green roofs can lower temperatures inside buildings meaning less energy is used

3,000sqm rooftop garden in Sydney, Australia



Image: Architecture & Design

A building's envelop extends beyond the roof deck



Image: Green Planet Films

## INTERIOR SPACES

Indoor components are given particular consideration in Biophilic Cities to counterbalance the increased urbanization of society, which typically results in ever increasing quantity of time indoors. Cheryl Charles and Richard Louv have addressed this phenomena in their Nature-Deficit Disorder, though it will not be found in any clinical manuals (DSM-5). This disorder is not meant to be a medical diagnosis but rather a description of the impacts on humanity from a lack of exposure to, or a relationship with, the natural world (Charles and Louv 2009). Ultimately, Biophilia is meant to create spaces that are both intentionally designed and seemingly wild, as well as encourage the locals to participate within the local environment.

<u>Document</u>	<u>Component</u>	<u>Content</u>
<b>Bozeman Unified Development Code</b>	<b>Section 38.520.060</b> B.4.a - Indoor Recreations Areas	Space must be located in visible areas..., and must include amenities...that will encourage use by residents.
<b>Biophilic City Framework</b>	<b>3. Elements of Nature of Space and Places</b> 3.(1-6) - Designed Biophilic Buildings and Spaces	All six characteristics of the third element cover some segment of a building's interior (bioclimatic, biomorphic, lighting, heating and cooling)

Designed moss walls of a boardroom...



Image: Planeteria

...and wild university living accommodations



Image: Collegiate AC

Included within the previous table is the focus on natural light. Though only implicitly included in the Bozeman Unified Development Code, the quantity and quality of lighting is detailed in, and an integral part of, Biophilia. It is explicitly encouraged to design these strategies in and around children, the elderly, and the infirm for the calming and healing quality (Wilson 1984).



Image: Gosia Klimowicz



Image: Interface



## MISC: NON-RESIDENTIAL/-COMMERCIAL, AND MONOCHROMATIC

Not all forms of structural Biophilia occur in residential or commercial areas, nor are they all found within the green portion of the color wheel. Examples of repurposed elevated rail lines exist in urban areas, and hues of brown, found in desert or river regions, can be the environmental cue for the people indigenous to those places.

NYC Highline, 1.45 mile long “reconverted” elevated rail line

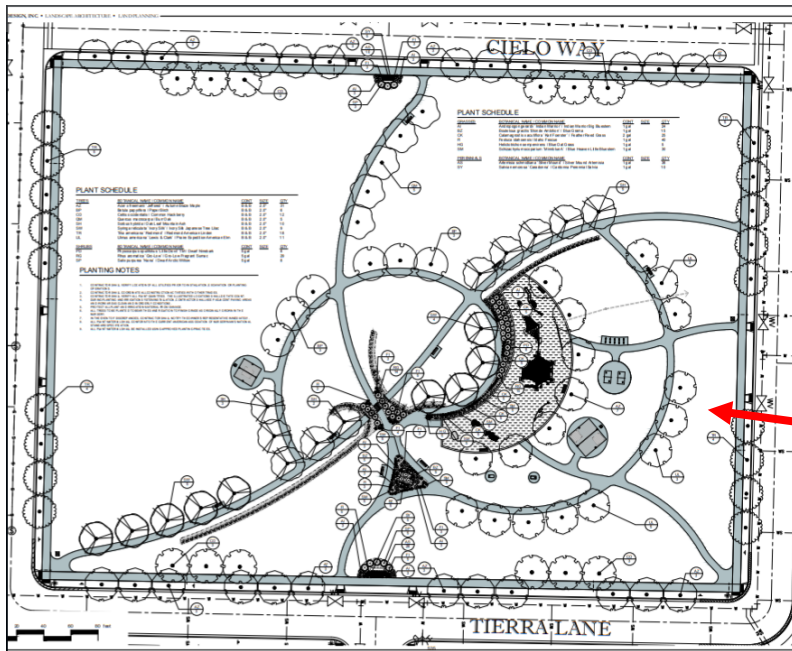


Clif Bar's bakery in Twin Falls, Idaho, is reminiscent of the Snake River Canyon

Biophilia and the Bozeman Unified Development Code are compatible and applicable at local and regional scales, though more difficult to incorporate as the scope of inference broadens. “Urban” planning becomes less relevant, the farther one travels from the Bozeman city proper, but the need for meaningful interactions with nature is boundless. As one travels north towards Bridger Canyon, it becomes evident through the newly implemented bicycle lanes that efforts have been made to link residential clusters with access to trails and other environmental activities. Economically, it may be argued that the frontend cost to modify the roads in this manner will offset the potential future healthcare expense incurred by a less active community. Ecologically, the city of Bozeman and its citizenry will consume less fossil fuels and reduce their carbon footprint.

The Bozeman City Commissioners have recently approved a request for a departure from the original application within the current phase of the Gran Cielo subdivision. At the recent September 29<sup>th</sup> Commissioner's meeting, the developer presented the amendment, which sought the Commission's consent to supplant the initially drafted recreational park (Green) with a 20-36 unit, R-4 zoned (high-density residential) housing development. The figure below is the schematic of the proposed enhancements to the subdivision's existing park (Red). The value these upgrades will provide are to compensate for the lost value to the current phase of development. There was obvious concern for the loss of green space, but it was pragmatically outweighed by the need for additional affordable housing. Bozeman has projected the need for 6,000 more affordable housing units by 2025.

## Gran Cielo subdivision amendment– application #19219



The timing of the application of the Biophilic framework within the building process is not as important as the presence of the will to implement it holistically. Obviously the blank slate of Greenfield development gives the architects the freedoms not necessarily present in infill scenarios, but not all designs require cranes and hardhats. Subtle indoor Biophilic upgrades might include a bank of potted plants or the installation of filters to soften office lighting, though enhanced natural lights are best. Other implementations that avoid structural modifications include the incorporation of living walls (indoor and outdoor), which add air filtration, outdoor water retention, and aesthetics.

## CONCLUSION

Spatiotemporally, Biophilia has persisted and is flourishing. From the ancient Hanging Gardens of Babylon...



...to the contemporary and ubiquitous governmentally mandated green building standards for all new and major retrofitted building across the island of Singapore. This framework may not have a place in Bozeman's near-term plans, but it may be something to consider for the future.

## WORKS CITED

Bozeman, MT. (2009). Bozeman Community Plan. Retrieved from:  
<https://www.bozeman.net/Home/ShowDocument?id=1074>

Bozeman, MT. (2019). Bozeman Strategic Plan. Retrieved from: <http://strategic-plan-bozeman.opendata.arcgis.com/>

Bozeman, MT. (2011). Bozeman Unified Development Code. Retrieved from:  
[https://library.municode.com/mt/bozeman/codes/code\\_of\\_ordinances?nodeId=PTIICOOR\\_CH38UNDECO](https://library.municode.com/mt/bozeman/codes/code_of_ordinances?nodeId=PTIICOOR_CH38UNDECO)

Charles, C. & R. Louv (2009) Children's nature deficit: What we know and don't know. *Children and Nature Network*, 1-32.

Church, S. P. (2018) From street trees to natural areas: retrofitting cities for human connectedness to nature. *Journal of environmental planning and management*, 61, 878-903.

Gullone, E. (2000) The biophilia hypothesis and life in the 21st century: increasing mental health or increasing pathology? *Journal of Happiness Studies*, 1, 293-322.

Kaplan, R. & S. Kaplan. 1989. *The experience of nature: A psychological perspective*. CUP Archive.

Ulrich, R. (1984) 1984| Science. *Science*, 224, 420-421.

Ulrich, R. S. (1986) Human responses to vegetation and landscapes. *Landscape and urban planning*, 13, 29-44.

Wilson, E. O. (1984) *Biophilia* Cambridge. MA: Har.

Zari, M. P. What Makes A City 'Biophilic'?