

Regulatory Options for Promoting Green Roofs in British Columbia

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1.0 Introduction

Green roofs are garnering increasing interest in British Columbia, due to their building and community environmental benefits. The technology is not new, with green roofs now accounting for 15% of all flat roofs in Germany, thanks to green roof policies dating back to the 1985. Leading North American cities in the field of green roof policies and programs include Chicago, Portland, and Toronto.

In British Columbia intensive or garden roofs have been popular for many years, in the high-density residential and office sectors. Many podium-tower projects throughout the Lower Mainland include a garden roof over the podium townhouse, commercial, or parking development, providing a pleasant view or garden space for tower residents.

Planners and policy-makers are now looking at extensive green roofs as a potential environmental enhancement tool. Extensive green roofs are generally not designed for public use, so are much thinner and structurally lighter. Their purpose is primarily environmental, with benefits including intercepting and reducing stormwater run-off, improving building thermal performance and energy consumption, increasing habitat and greenspace in the City, and reducing the urban heat island effect. Examples of extensive green roofs in British Columbia include the White Rock Municipal Works Yard; the UniverCity Cornerstone mixed commercial, office, residential building at Simon Fraser University, Burnaby; the new Electronic Arts office and studio complex in Burnaby; the Greater Vancouver Regional District headquarters building in Burnaby; and the new Vancouver Conference Centre (under construction).

As cities like Toronto move ahead with green roof policies and projects, British Columbia municipalities may be interested in the regulatory options available to them to promote this technology. In addition, municipalities should know how to adopt policies and procedures that ensure safe roofs are constructed while protecting landowners and the municipality from liability concerns. The following paper reviews municipal tools available in British Columbia, and presents model bylaw wording that could be introduced by municipalities.

In selecting an appropriate green roof approach, policy-makers should be closely familiar with the technical benefits, costs, specifications, and maintenance implications of green roofs. This paper does not cover these issues, but instead the authors refer the reader to technical publications, training, and industry working groups accessible through the BCIT Centre for the Advancement of Green Roofs website, located at <http://www.greenroof.bcit.ca>

2.0 Tools for Encouraging or Requiring Green Roofs

The *Local Government Act* is the main source of enabling legislation for local governments to promote or even require green roofs. The following sections outline different sections of the Act and how they could be used to enable green roofs, through runoff control bylaws, amendments to landscaping bylaws, zoning bylaws, system fees, and policy documents.¹

Appendix A provides sample wording for BC local governments considering green roof bylaws. Throughout these model bylaws, the precise incentive level or required coverage of green roof have been left deliberately blank. Local governments will want to assess the appropriate incentive or requirement based on building costs and values in their own jurisdiction.

Local governments seeking to promote green roofs have often used a progressive approach - first running knowledge-building pilot projects on institutional buildings (e.g. GVRD, Toronto), then offering incentives for installing green roofs on private buildings (e.g. Portland). Green roofs can also be part of a toolbox of techniques to meet environmental performance standards (e.g. stormwater criteria). Once a familiarity has become established, more forceful regulatory approaches may be more acceptable (e.g. Germany).

2.1 Runoff Control and Stormwater Management

Green roofs have storm water retention and evaporation capabilities that can play a part in a local government storm water management policy, mitigating urban runoff characteristics and reducing the flow of pollutants to watercourses. Municipalities have been given powers in s.907 of the *Local Government Act* to require those constructing paved and roof areas to manage and provide for the ongoing disposal of surface runoff and storm water, including setting maximum

¹ It should be noted that local governments cannot use a local *Building Bylaw* to universally require green roofs, as building standards are largely a provincial matter. The B.C. Building Code is an adaptation of the National Building Code of Canada, and focuses on ensuring safe, healthy buildings. The BC Building Code establishes a performance standard for roofs: the roof must not leak, or collapse under ordinary loads. Green roofs can meet these performance standards, are thus consistent with the BC Building Code, and have therefore been an acceptable roofing practice for many years in BC.

ratios of impermeable material. Green roofs are a means of managing surface runoff and storm water, to be considered alongside other strategies like constructed wetlands and permeable paving. A municipality may vary stormwater requirements based on factors such as zoning, land use, lot size, and the type of municipal storm water facilities in the area. An important aspect of these regulations is that they may include ongoing requirements for proper maintenance of the roof.

At a policy level, green roofs can be promoted through Integrated Stormwater Management Plans and Liquid Waste Management Plans. Green roofs may also be a tool for developers to meet City-wide stormwater standards. In the City of Burnaby, stormwater requirements are performance-based – allowing a developer to select appropriate tools to meet the run-off performance criteria (e.g. detention vaults, swales, pervious paving). Green roofs are another potential tool available to meet run-off criteria. Preliminary data from the Lower Mainland are showing green roofs to be effective at reducing the volume of stormwater and reducing peak flow running from a site – particularly during the dry season – and thus limiting the erosive powers of stormwater on downstream watercourse systems. This feature could cumulatively mitigate impacts on downstream fish habitat. Green roofs will be most attractive for communities and agencies promoting the goal of stormwater volume reduction (as opposed to just stormwater detention).

2.2 Density Bonusing (Amenity Zoning)

Many B.C. local governments have used some type of density bonusing (amenity zoning) under s.904 of the *Local Government Act*, the zoning power, to achieve affordable or special needs housing objectives or secure community amenities. A green roof that creates a local microclimate, provides insect and bird habitat and breaks the otherwise unrelieved, constructed look of urban environments is likely an eligible “amenity” for the purposes of these provisions. Generally, the idea with these bylaws is that there is a base density of development that is available to everyone, and a density increment that one may earn by providing a specified amenity. The increment has to be worth enough to the developer to be an incentive to provide the amenity, so considerable insight into land values and construction costs is required to properly calibrate the bylaw. Careful analysis is also needed on the ability of areas subject to this form of zoning, to absorb the incremental density that will be developed if the approach is successful; utility infrastructure as well as neighbourhood opinion has to be considered. If the other private benefits of using a green roof are well-understood, it may not be necessary to provide a very large incentive.

This approach has been used successfully in Portland, Oregon in the City’s Central District. The amount of density bonus allowed for a given building depends on the amount of green roof coverage in relation to the building’s footprint. The bonus has been calculated on the costs and structural

requirements of the technology (not significant for some building types), and the density benefits to the landowner.

This type of approach can be successful where increased density is of high value to a landowner (e.g. high density residential or office). It will not be successful where developers are already below permitted floor area ratios (e.g. strip commercial or lower density office park). In these situations, other incentives or requirements will be needed to promote green roofs.

2.3 Landscaping Bylaws for Buildings

Local governments may designate areas zoned for commercial, industrial and multi-family residential development as special areas for control of the “form and character” of buildings. In these areas, development permits are required as well as building permits, and development permits may according to s.920 of the *Local Government Act* include requirements respecting the character of the development, including landscaping, and the form, exterior design and finish of buildings and structures, in accordance with guidelines specified in an official community plan or zoning bylaw. To the extent that the composition and appearance of a roof are matters of form and character and in particular landscaping, development permit guidelines could mandate the use of green roofs. There are also specific regulatory powers in s.909 of the *Local Government Act* dealing with landscaping to enhance the natural environment, which could be used to require the use of green roofs in areas not subject to development permit requirements.

Landscaping requirements may be appropriate for low-density buildings with large impervious roofs and thus a significant impact on stormwater run-off and the urban heat island effect. Combined with landscaping in parking areas, green roofs could mitigate the impact of such development on the local climate and watercourses. Light-weight, extensive roofs are most appropriate for the long-span roofs typical in this form of development.

2.4 Financial Incentives – Combined Sewer System Fee Reduction

Local governments are permitted to collect a range of fees and charges for the services that they provide, and these fees may be based on a broad variety of factors and may include discounts and penalties. In areas with combined storm water and sanitary sewage systems, where heavy storms can carry sewage into treatment plant bypasses and directly to the environment, sewer user charge discounts can be used as a “carrot” to encourage property owners to use on-site storm water management strategies including green roofs. By reducing stormwater volume and peak events, sites containing green roofs would likely be gentler on downstream infrastructure over the course of a year, prolonging infrastructure life and thus deferring replacement costs.

A preliminary review of capital cost charges (eg development cost charges) suggests that a municipality would be unlikely to reduce these charges because of green roof installation. While green roofs reduce total volume of run-off over a year, they would not significantly affect peak flood rain events once they become saturated. Municipal engineering would therefore still need to design and install the same size downstream pipes for these peak flood events.

3.0 Green Roof Standards

A key factor in green roof design is ensuring adequate standards. Because the Building Code does not specifically mandate green roofs, there are currently no technical standards in the Code ensuring that these facilities are properly designed, constructed and operated. Thus, local governments venturing into this policy area must identify and incorporate relevant standards into their bylaws; otherwise the green roof that is earning the density bonus or the special break on municipal fees may not be doing its job. There is a useful power in s.15 of the *Community Charter* permitting local governments to incorporate into bylaws standards and codes published by any provincial, national or international body or standards association or enacted as a law anywhere in the world. The standard may be incorporated as it stands on a specific date or as amended from time to time.

At time of writing the Canadian Standards Association and BC Association of Landscape Architects are drafting green roof technical standards. When complete, these will be a very useful for local governments developing green roof bylaws. In the meantime, BCIT's Centre for the Advancement of Green Roof Technology is a useful clearinghouse of information on green roof standards under development in other parts of the world that local governments might consider referencing in their bylaws (e.g. Germany and the USA). For individual green roof designs, these standards may also be referenced, with the design signed-off by the project architect.

4.0 Liability Considerations

Any local government building regulation discussion in the era of the “premature building envelope failure” soon turns to liability, and avoiding it. How can local governments responsibly promote the idea of retaining water on roofs, without compromising their position in claims for building failure? Many local governments have responded to the large 2001 damages award against Delta (*The Owners, Strata Plan NW3341 v. Canlan Ice Sports Corp. et al*) by revising their building bylaws to make it clear that, except in the case of very simple construction such as single family dwellings, their inspectors do not undertake to review building plans or inspect construction in the field, and cannot therefore be held responsible if this work is not properly done. These tasks are undertaken for

their developer clients by more highly qualified professional engineers and architects, who provide “Letters of Assurance” to the local government as to the project’s compliance with applicable building standards and are responsible if something goes wrong. Most roof structures on larger buildings are already subject to this procedure. As long as this approach is used in the design and inspection of green roofs, the liability exposure of the local government should not increase. Close attention should be paid, however, to the terms of the insurance policies that cover the work of these professionals, as the insurance industry has begun to exclude water penetration claims from errors and omissions insurance coverage for design professionals.

5.0 Conclusions

This paper has highlighted a variety of tools available to BC municipalities to promote green roofs. Green roofs are an acceptable roofing technique under the BC Building Code, and municipalities can avoid liability risks and concerns by requiring that all green roof installations are signed-off or certified by a professional. Forthcoming Canadian and BC standards will facilitate standardization of the industry, enhancing quality installation and maintenance for the life-span of the buildings.

The BCIT Centre for the Advancement of Green Roof Technology is an excellent source of background information on green roofs, including typical range of costs for the technology, local industry specifications and contacts, education and training, technical approaches used elsewhere in the world, and specific stormwater performance and building heating / cooling benefits in a Lower Mainland context from their green roof monitoring network.

In the past, roof space may have been considered an afterthought. As land is becoming more scarce in BC urban areas, stormwater management awareness is growing, and energy prices are increasing for building heating and cooling, green roofs are becoming increasingly viable. Green roofs are one more potential tool in the BC local government tool-box for promoting healthy and more sustainable communities.

References

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