
Investigation of the potential for the Queensland Building Code to encourage Biophilic Urbanism in Queensland cities

Overview of the Queensland Building Code and other regulatory measures

There are broadly three tiers of legislation affecting building and development in Australia.

The *Building Code of Australia (BCA)* provides a nationally uniform set of technical provisions for the design and construction of buildings and other structures in Australia. It covers matters such as structure, fire resistance, access and egress, services and equipment, and energy efficiency as well as certain aspects of health and amenity.¹

The *Queensland Development Code (QDC)* consolidates Queensland-specific building standards into a single document, and covers Queensland specific requirements and considerations that are outside the scope of the Building Code of Australia, and must be adhered to in addition to the requirements of the Building Code of Australia.

The *Sustainable Planning Act 2009 (SPA)* is the overarching piece of legislation Queensland's principal planning legislation that coordinates planning at the local, regional and State levels. SPA, like its predecessor the Integrated Planning Act 1997 ("IPA"), also manages the processes by which development occurs and includes laws relating to:

- The preparation of local government planning schemes;
- What constitutes a 'development' and when this would require local government approval;
- How development applications must be lodged, notified and assessed. It preserves the Integrated Development Assessment System (known as IDAS), first developed under IPA; and
- Appeals to the Planning and Environment Court.

The Sustainable Planning Act 2009 guides the development in Queensland, and the making of state planning regulatory provisions, regional plans and state planning policies.

The *Building Act 1975* and the *Building Regulation 2006* are the key pieces of legislation governing building construction in Queensland, and neither have items related to trees, plants, vegetation or biophilic elements.²

Local governments will generally have development and building requirements in addition to the Queensland and national requirements. These may include more specific requirements, such as height restrictions, and will generally translate the city or regional plan into actionable requirements for

¹ BCA (2011) *The Building Code of Australia*, Australian Building Codes Board, Australia. www.abcb.gov.au/en/about-the-national-construction-code/the-building-code-of-australia, accessed 07 December 2011

² DLGP (2011) *Laws and Codes, Building*, Department of Local Government and Planning, Queensland Government, Australia www.dlgp.qld.gov.au/building-laws/

developers and builders to ensure that the development and/or building is in-line with the intent of the plan.

In addition to these main federal, state and local regulations, there are other pieces of legislation that contain building related provisions. Over time, these are generally incorporated into the Queensland Development Code or appropriate piece of legislation. For example, currently the MP 5.3 retail meat premises, MP 5.5 private health facilities, MP 5.7 residential services buildings and MP 5.4 child care centres are yet to be consolidated into the QDC.³

These codes and legislation are hierarchical in structure, such that local government building and planning requirements can be additional to the state and national requirements, but cannot be less. Similarly, the Queensland Development Code is additional to the Building Code of Australia. However, if there is an inconsistency between the Building Code of Australia and the Queensland Development Code, the Queensland Development Code prevails.⁴

Non-legislative mechanisms There are also non-legislative mechanisms that can be introduced to encourage key building and development measures, such as accelerated development approval processes.

For example, the Queensland government has introduced the *Green Door* mechanism, which will accelerate decisions for development proposals that are identified to be among the most sustainable in Queensland. Green Door is an important initiative under ClimateQ, the Queensland Government's strategy to address climate change. The Queensland Government will work collaboratively with the development industry, local governments and referral agencies to identify the most sustainable development proposals in Queensland - Green Door Projects. It will then fast track the development and assessment of these applications through the integrated development assessment system (IDAS) by using IDAS efficiently.⁵

The Queensland Government has also introduced new sustainable housing laws to increase the efficiency of Queensland homes and reduce Queensland's greenhouse gas emissions. These laws are part of the Cleaner Greener Buildings initiative, Climate Q: towards a greener Queensland. Aligned with

³ DLGP (2011) *Queensland Development Code*, Department of Local Government and Planning, Queensland Government, Australia. www.dlgp.qld.gov.au/building/queensland-development-code.html, accessed 05 December 2011

⁴ DLGP (2011) *Queensland Development Code*, Department of Local Government and Planning, Queensland Government, Australia. www.dlgp.qld.gov.au/building/queensland-development-code.html, accessed 05 December 2011

⁵ DLGP (2011) *Green Door*, Department of Local Government and Planning, Queensland Government, Australia. dlgp.qld.gov.au/development-applications/green-door.html, accessed 05 December 2011

these new requirements the Queensland government is offering various incentives to assist households make the necessary changes and investments.⁶

Biophilic elements for buildings could be encouraged through some of the Climate Q mechanisms, such as the energy equivalent rating. New houses and townhouses, and major renovations to existing buildings, must achieve a minimum 6-star energy equivalence rating, and new unit buildings and major renovations to units must achieve a minimum 5 star rating.

Rationale for the use of planning and policy mechanism to encourage biophilic urbanism

Biophilic urbanism provides many public benefits, including stormwater management, reduced urban heat island effect, reduced energy demand, improved air quality, improved water quality, increased urban aesthetic, increased habitat for biodiversity, improved recovery from illness, reduced depression, stress and anxiety and others.

Despite these benefits, barriers to the wider implementation of biophilic elements in Australian cities persist. Preliminary investigations suggest these barriers include:

- Upfront costs;
- Lack of knowledge and awareness;
- Planning frameworks (Business as usual),
- Lack of quantitative/financial analysis of BU (rather than qualitative)
- Cultural stagnation,
- Control issues (e.g. at local government level there are internal struggles about control and how things happen),
- Lack of Information at the level of the decision makers (eg buildings, town planning)
- Lack of research on local, holistic systems,
- Benefits/Costs fragmented,
- Regulations/Planning permit requirements,
- Lack of integrated planning,
- Lack of rigorous cost benefit analysis using a systems approach, and
- Level of social disconnection to natural environments⁷

Policy and government intervention can assist in overcoming many of the barriers. Further, given the significant public benefits of biophilic elements, governments can assist in overcoming the split

⁶ www.dlgp.qld.gov.au/sustainable-housing/

⁷ SBEnc Stakeholder Workshop, Hosted by the Western Australian Department of Treasury and Finance (held at the Optima Building), and facilitated by Curtin University and QUT, 13 July 2011, Perth.

incentive to install biophilic elements in privately owned infrastructure and land through providing incentives and compensation.

Risks and considerations in encouraging biophilic urbanism in Australia

There are potentially a number of risks and considerations that will need to be addressed in introducing policies, incentives and/or regulation for biophilic elements. A preliminary investigation has revealed the following risks and considerations, outlined in the following paragraphs.

Need for standards and guidelines that are appropriate to the Australian context and climate

As an emerging field, there is a need for standards and guidelines that are appropriate for the Australian context and climate to guide the installation and maintenance of biophilic elements. This is essential to minimise perceived and actual risk and uncertainties around products and materials, and to regulate expectations of performance.

Need for local performance data

The performance of biophilic elements depends on local conditions, such as climate. The benefits derived from biophilic elements will vary depending on these local conditions, and without local performance data, it may be difficult to accurately allocate incentives and offsets for installing biophilic elements. There may also be political risk in supporting a program to encourage biophilic elements based on the performance found elsewhere, as the results of the program may not meet expectations. Of greater consequence, local performance data is essential as a basis for developing standards and regulations that ensure that the biophilic element can withstand local conditions and does not cause infrastructure damage or risk to human health.

Stakeholder lack of knowledge

A lack of knowledge amongst key stakeholders, including developers, associated industries (such as insurance companies, roofing companies, etc), residential households, development application assessors, and many others may be a risk to such a policy. Not understanding what biophilic elements are, how they work, the benefits they provide, the risks that may result from poor design, maintenance requirements and other key knowledge areas is likely to result in resistance to policy measures and poor implementation of policy measures.

Lack of capacity

There may be a risk in introducing regulation requiring biophilic elements in urban design and buildings if there is not the capacity within the community to design and construct such elements. This risk may be mitigated by a staged introduction of such requirements, such that an industry has time to develop, and/or providing additional support to develop the industry, such as incentives for companies to set up, creating training programs, providing information on processes and products, and a rating scheme for quality assurance and performance of biophilic elements.

Structural loading of buildings and infrastructure

Biophilic elements are often integrated into a building's structure or façade, such as for example green roofs and green walls, and the structural loading of the building must be sufficient. Other elements nearby buildings may also affect building integrity, such as shading trees whose roots may affect

underground plumbing infrastructure or building foundations, and branches which could cause damage during storms. As new construction will represent only a small proportion of the building stock in cities, efforts to significantly increase the amount of nature in cities need to consider how to retrofit existing buildings with biophilic elements. For the example of retrofitting green roofs onto existing buildings, a recent feasibility investigation found that the process is more challenging and expensive than for new construction projects. The added weight of even extensive (lighter weight, with a thinner substrate layer) may necessitate increasing the structural capacity of the room, and that a structural engineer must determine the load bearing capacity and current structure and design plans for doing so when necessary.⁸

Conflict with other policies and regulations

There may be a need to consider potential conflicts with other policies or urban planning objectives, such as achieving higher density. Regulation or policies encouraging biophilic elements need to consider how they can synergistically meet these

Maintenance of biophilic elements

Mechanisms for ensuring appropriate maintenance of biophilic elements may be necessary. For example, this may include ongoing maintenance such as weeding, watering and replacement of vegetation on a green roof or wall, or pruning shade trees. Biophilic elements with standing water, such as ponds and wetlands, may need to be maintained to ensure biodiversity such that mosquito larvae are controlled. Ponds and wetlands can be damaged during heavy rain events, or fill with sediment (in some cases this is due to poor design), and provisions for maintenance are important so that these do not become unsightly, dysfunctional and/or dangerous.

Ensuring biophilic elements remain functional

Where regulatory measures are used to require the installation of biophilic elements, provisions may be necessary to ensure that these continue to perform the intended function. This is particularly the case where public funds are used to subsidise their installation due to the public benefits they provide. For example, biophilic elements designed to retain and clean stormwater, such as green roofs, green walls, swales, bioretention ponds *et cetera*, may need to be periodically checked to ensure that they have not been compromised deliberately (such as diverting stormwater directly to the sewer) or through lack of maintenance (such as sediment build up, plant die-off, soil compression *et cetera*).

Opportunities and existing mechanisms to encourage biophilic urbanism in Australia

Building Code of Australia (BCA)

The BCA provides technical provisions for the design and construction of buildings in Australia. It could include provisions to ensure, for example, adequate structural loading for green roofs. As such, the BCA can provide standards and provisions to ensure the safe and appropriate design and construction of

⁸ Shepard, N. (2010), *Green Roof Incentives, A 2010 Resource Guide*, DC Greenworks, Washington DC, USA.

biophilic elements, however may not be the appropriate mechanism to mandate or encourage the use of biophilic elements.

Sustainable Planning Act (SPA)

The SPA manages the process by which development in Queensland takes places. It guides the state, regional and local planning process in Queensland. It integrates planning across government, and regulates the process for making state, regional and local plans as well as prescribing standards planning provisions to be included in these plans. Notably, a key purpose of the SPA is to managing the effects of development on the environment.⁹

The SPA directs state, regional and local planning schemes, and hence inclusions in the SPA for the use of biophilic elements will filter through to these various levels of government.

Queensland Development Code (QDC)

The QDC currently does not have provisions specifically related to biophilic urbanism. There are, however, several existing provisions into which allowances for biophilic elements could be incorporated, including offering credits for green roofs, green walls and shade trees towards the energy rating of buildings in recognition of the energy these can save in building heating and cooling.

There may be opportunities to offer credits also in recognition of the public benefits biophilic elements provide, including reduced urban heat island effect, stormwater management, visual amenity, habitat creation, air pollution mitigation, *et cetera*.

The Sustainability Declaration,¹⁰ which must be filled out before any home is sold in Queensland, does not have any items related to nature or vegetation (biophilic element). These could be included, along with an estimate of cost saving that could derive from biophilic elements. The declaration, along with the QDC, recognises the benefit of outdoor living areas.

Building Codes Queensland

The BCQ addresses issues not covered in the Building Code of Australia, particularly where the issues may be Queensland specific, relating to climatic or other localised factors. It provides technical building provisions. Hence, the BCQ may be able to address risks and considerations relating to biophilic elements, such as the processes and requirements for ensuring sufficient structural support existing for green roofs and walls, that the roots and branches from shade trees do not damage infrastructure, and

⁹ Department of Infrastructure and Planning (2009) *Your guide to the Sustainable Planning Act 2009*, Queensland Government

¹⁰ Department of Local Government and Planning (2011) *Sustainability Declaration*, Queensland Government. www.dlgp.qld.gov.au/sustainable-housing/sustainability-declaration.html, accessed 05 December 2011.

that biophilic elements do not impinge on the rights or property of neighbouring properties. The BCQ would generally not prescribe the use of biophilic elements.¹¹

ClimateQ: Towards a greener Queensland

The Queensland Government's ClimateQ initiative includes measures to respond to pressures on infrastructure and buildings from population increases and climate change. This includes considerations such as reducing the greenhouse gas emissions generated by Queensland's buildings, improving energy efficiency, and considering the risks from extreme events, sea level rise, increased temperatures and other predicted impacts of climate change.¹² ClimateQ as a strategy does not specifically advocate biophilic elements, however with adequate information and evidence on how these can mitigate the impacts of climate change and reduce building energy consumption, these may be able to be incorporated into this initiative.

¹¹ BCQ (2011) *Personal communications*,

¹² Queensland Government (2011) *ClimateQ, Planning and Building*, Office of Climate Change, Queensland. www.climatechange.qld.gov.au/whatsbeingdone/climatechangestrategy/towardagreenerqueensland/planningandbuilding.html, accessed 07 December 2011