

21 April 2016

Freshwater Consultation 2016,
Ministry for the Environment
P.O. Box 10362
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Re: Freshwater Consultation 2016

This submission is from the Architectural Centre, an incorporated society dating from 1946, which represents both professionals and non-professionals interested in the promotion of good design.

The Architectural Centre is primarily interested in matters directly related to aspects of design and the built environment. These are especially important to this consultation in terms of their ability to positively impact on water use through the collection of freshwater, efficient water reticulation, reduced water pollution (e.g. in stormwater systems), but equally they have the potential to unduly increase water waste and pollution.

Buildings and design practices are hence important contributors to the aim of maintaining and improving overall water quality and increasing the efficient use of fresh water and affecting good management practices (p. 10).

It is these aspects in particular that this submission focusses on.

1. The Architectural Centre agrees that water is a precious resource, culturally and spiritually (i.e. for Māori) and to sustain biological functions of life, but strongly believes that New Zealand's good fortune in its volume of water is not something to take for granted.
2. The urban environment and how it is designed can significantly contribute to improving the quality of water which enters the storm water system (and consequently ocean and waterways), and to reducing the volume of runoff. Key issues include:
 - i. What we use to build our roads and footpaths (e.g. asphalt), and the chemicals which are washed from these materials during rain.¹
 - ii. The amount of surface area which is impervious (i.e. covered in concrete or asphalt)

¹ Nemeth, Andrew, Devon Ward and Walter Woodington "The Effect of Asphalt Pavement on Stormwater Contamination" (Worcester Polytechnic Institute BSc project report, 28 May 2010) (BSc https://www.wpi.edu/Pubs/E-project/Available/E-project-052810-151011/unrestricted/Asphalt_and_Stormwater_IQP_2010.pdf)



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Rain on asphalt

3. Both design and maintainance of buildings can significantly impact on the efficient use of fresh water. Currently, for example, 18-19% of residential water use is literally flushed down the toilet in Auckland.²
4. As a rule we are not good at maintaining buildings in New Zealand. For example, lack of maintenance of unreinforced masonry buildings in Christchurch has been identified as contributing to the failure of these buildings,³ thus undermining the resilience of our communities in post-disaster contexts. This lack of maintenance of residential and commercial buildings includes seemingly banal things such as dripping taps, which can waste up to 90 litres of water a day.⁴



5. In the same way that we do not maximise the potential of the solar energy that falls free on our rooves, we do not maximise localised water collection. Supplementing or replacing council-supplied water sources makes better use of

² "Efficient appliances and fixtures can significantly reduce water use" (1 July 2015) BRANZ
<http://www.level.org.nz/water/water-supply/appliances-and-fixtures/>.

³ "Buildings that were well maintained over their life generally performed better than their less well maintained equivalent as a weathertight building envelope reduces the rate of progressive deterioration due to water ingress to masonry and to timber diaphragms." Dizhur et al "Performance of Masonry Buildings and Churches in the 22 February 2011 Christchurch Earthquake" p. 284.
<http://www.nzsee.org.nz/db/SpecialIssue/44%284%290279.pdf>

⁴ "Save Water" Wellington City Council (n.d.) <http://wellington.govt.nz/services/environment-and-waste/water/save-water>.

our resources, making communities more resilient (both in natural disasters such as earthquakes and in the climate volatility likely with climate change).



Roof garden

6. Financial incentives to save water work. Recent PhD research examining commercial water-use in Auckland and Wellington, which audited 93 commercial buildings, found that the different structuring of water payments in Auckland (with charges for both potable and waste water based on meter readings) compared to Wellington (with charges for potable water based on meter but waste water included in rates) significantly influenced water consumption.⁵



Green wall

7. In the context of the above, the Architectural Centre strongly recommends that the NPS-FM:

⁵ Bint, Lee "Water Performance Benchmarks for New Zealand: Understanding Water Consumption in Commercial Office Buildings" (Wellington: Victoria University PhD thesis, 2012) <http://hdl.handle.net/10063/3673>; "Reducing water consumption in commercial office buildings" *Phys.org* (12 December 2012) <http://phys.org/news/2012-12-consumption-commercial-office.html>.

- i. Require all councils to adopt a water-sensitive design guide (WSUD). We recommend the WCC WSUD as an example.⁶
- ii. Support research into viable materials for road-building and footpaths and other outdoor spaces (e.g. car parks) which do not leach into stormwater runoff. The American EPA research from September 2011 identifies the need for such research, while acknowledging limited alternatives to asphalt- and coal tar-based sealants. They conclude that "Future research needs include finding an inexpensive alternative to either asphalt- or coal tar-based products (i.e., new soy-based sealants)."⁷ We also recommend the UK Planning Policy Statement PPS25 (Communities and Local Government), 2006-2014, which restricted both the rates and volumes of runoff from new developments to be "No greater than the rates prior to the proposed development, unless specific off-site arrangements are made which result in the same net effect."



Permeable paving

- iii. Specify maximum percentages of urban land with impervious surfaces, where appropriate (for example land which is predominantly clay-based will not benefit from a permeable surface).
- iv. Confine concentrated areas of higher impervious ground cover (e.g. urban limits).



Swale

⁶ Wellington City Council *Water Sensitive Urban Design: a guide for WSUD stormwater management in Wellington* (n.d.) <http://wellington.govt.nz/~media/services/environment-and-waste/environment/files/wsud-guide.pdf>

⁷ Rowe, Amy and Thomas O'Connor *Assessment of Water Quality of Runoff from Sealed Asphalt Surfaces* (United States Environmental Protection Agency, September 2011) p. 30. <http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100ECC8.txt>

- v. Encourage the use of swales (rainwater harvesting technique), roof gardens and other permeable surfaces to enable rain to be absorbed into the ground and remove pressure on stormwater systems.
- vi. Require water-efficient plumbing (e.g. low flow toilets; dual flush cisterns, aerators on hand basin taps).
- vii. Support the development of regional water consumption benchmarks to better understand water consumption.
- viii. Require water charging to be directly related to water consumption, not building value.
- ix. Reward residential grey water systems, and make these mandatory for all public buildings and commercial and residential buildings over a certain size.⁸
- x. Reward domestic water collection systems, and make these mandatory for all public buildings and commercial and residential buildings over a certain size.
- xi. Reward good residential and commercial building maintenance practices

8. The quality of freshwater in the future, as we experience sea-level rises, will change as our 200 underground freshwater aquifers (p. 6) are displaced with seawater (seawater intrusion) meaning that some freshwater supplies will no longer be viable due to saltwater contamination.⁹ This is another type of diffuse pollution, a concept identified in the consultation material as "our greatest challenge for improving water" (p. 8). This means that wider strategies to target climate change (e.g. related to transport), which do not appear to directly affect water quality and quantity, are as important to address in a NPS-FM.

In conclusion, while much discussion regarding fresh water quality and quantity has focussed on agricultural use and the countryside, the Architectural Centre believes that, in addition to rural initiatives, the city, the urban workplace and the home must all contribute to the improvement of our water quality and the efficient use of water. The Architectural Centre believes that legislative instruments, such as the NPS-FM, have an important role to play in assisting the needed transition to water effective design solutions in our everyday built environment.

Thank you for this opportunity to participate in the Freshwater Consultation 2016 consultation. If you have any questions please do not hesitate to contact me.

Yours faithfully



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⁸ Bint, Lee "Water views" *BUILD* (June/July 2015): 82-83. <http://www.buildmagazine.org.nz/assets/PDF/Build-148-82-Research-Water-Views.pdf>

⁹ For example: Meyer, Frederick "Ground-Water Movement in the Floridan Aquifer System in Southern Florida: effects of Rising Sea Level on Ground-Water Movement" *South Florida information Access (SOFIA)* (4 September 2013) <http://sofia.usgs.gov/publications/papers/pp1403g/sealevel.html>