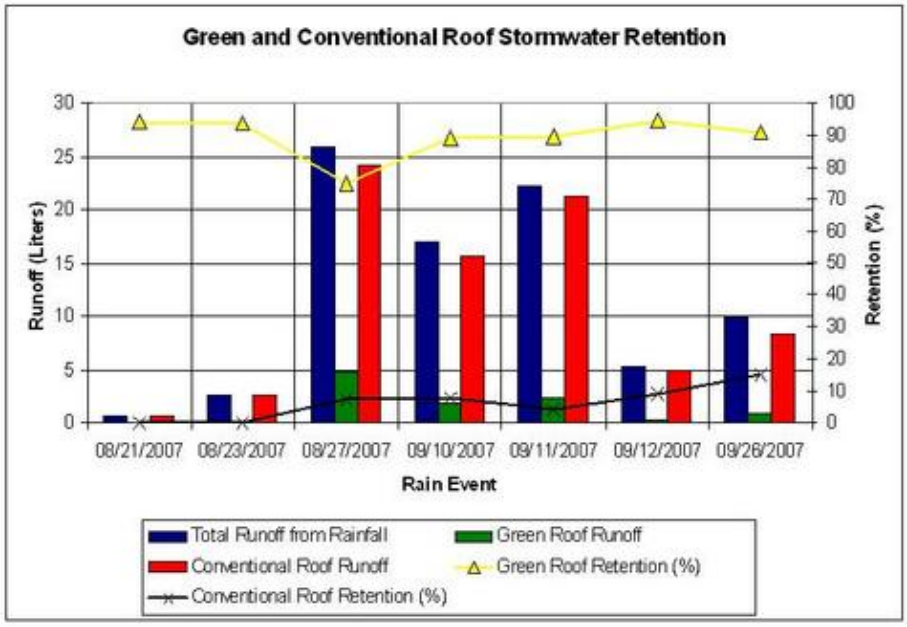
NEDLAW LIVING ROOFS

Improved Stormwater Management

Stormwater Reduction

Conventional roof surfaces are impervious to rainfall. When rain hits the surface of a hard roof it quickly transforms into runoff. Conventional roofs have little to no stormwater retention capability. The permeable surface of a green roof allows for rainfall infiltration and greater water holding capacity. After a storm event, water stored by the green roof is lost to evaporation and transpiration. As a result, green roofs can reduce total stormwater runoff volume on average by 50 % – 60 % (VanWoert et al., 2005; TRCA, 2006; Carter & Rasmussen, 2006) and in certain conditions can fully retain individual storm events (VanWoert et al., 2005; Bengtsson et al., 2005). Recent ongoing field research at Roof Greening Systems has shown that their green roof system has an average water retention capacity of 89.6 % after 7 rain events.



Furthermore, computer modeling of wide-scale green roof application can reduce total runoff from 1.7 % - 15.0 % for the entire watershed with 50 % - 100 % green roof coverage (TRCA, 2006; Carter & Rasmussen, 2006b).

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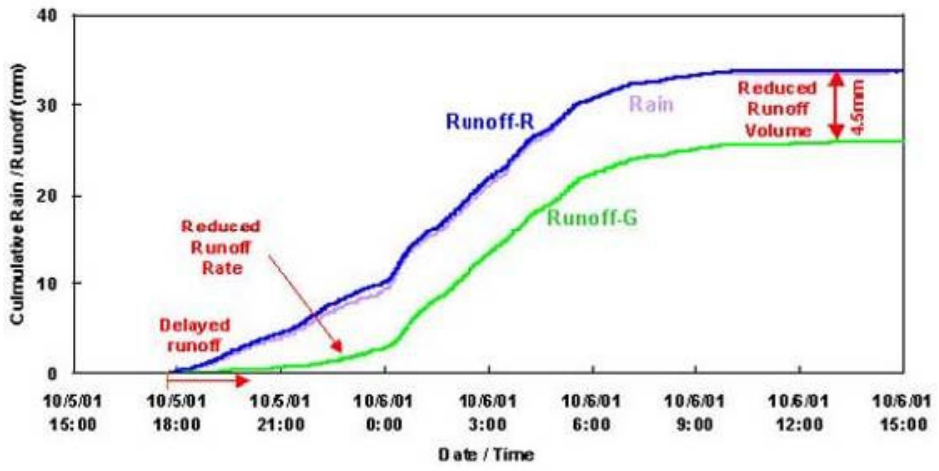
Increased Lag Time

Lag time is the amount of time between rainfall and runoff initiation. Green roofs have shown to increase lag time when compared to a hard surface roof (DeNardo et al., 2005; VanWoert et al., 2005; TRCA, 2006). Increased lag time is due the green roofs greater water holding capacity and the time it takes to completely saturate the growth medium before runoff is initiated. With a conventional roof surface, rainfall that cannot infiltrate into the hard surface is quickly transformed into runoff, leaving little to no time between rainfall and the initiation of runoff.

Peak Flow Reduction & Runoff Flow Time Extension

Peak flow is the point of greatest runoff flow. When compared to hard surface roofs, green roofs have shown to reduce runoff peak flow by over 50 % (TRCA, 2006). Reduced flow rates from the green roof are due in part to the water flow path. Water does not travel in a simple up-down motion but flows through the entirety of the green roof system (Bengtsson et al., 2005). As a result, the slower runoff flow rate extends runoff release 3 hrs after the cessation of rainfall and 30 minutes after the ending of conventional roof runoff (VanWoert et al., 2005).



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Implications for Stormwater Management Planning

Overall, reduction in total stormwater volume, decreased peak flows and increased lag times shows that green roofs are an effective stormwater source control. Their ability to be constructed on existing buildings allows them to be placed in dense urban areas where available land space for conventional stormwater controls (ie. stormwater ponds) is too costly or not available (Jennings et al., 2003; Moran et al., 2005). Further, reduction in total storm water volume and peak flow output reduces the amount of water conveyed and captured by other stormwater controls thus, reducing the risk of combined sewer overflows and the need for additional stormwater infrastructure (ie. stormwater sewers) (Bradford & Gharbaghi, 2004). In addition, reduction in stormwater volume would reduce contamination of natural bodies of water as runoff is a transport of several pollutants (metals, nutrients, chemicals) that would flow into natural aquatic systems (OME, 2003).