Stormwater Planning: A Guidebook for BC

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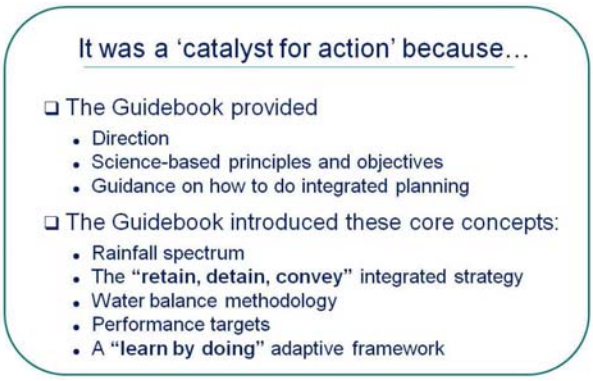
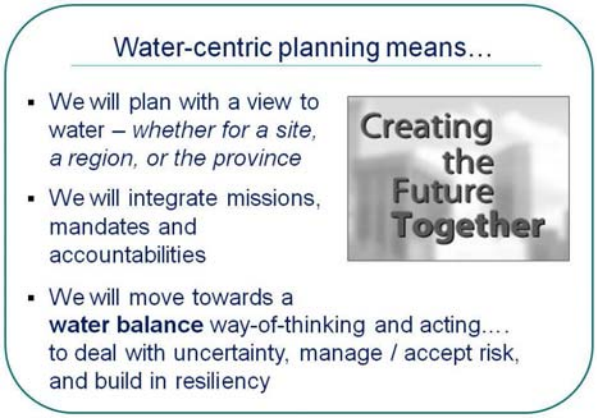
2. Stormwater Planning: A Guidebook for BC

Release of Stormwater Planning: A Guidebook for British Columbia in 2002 was a catalyst for action to implement a 'design with nature' approach to rainwater management and green infrastructure.



Water-Centric Planning Defined: Released in 2004, the Water Sustainability Action Plan incorporated A Watershed/Landscape-Based Approach to Community Planning as a core element. This was rebranded as 'water-centric planning' in 2006.



Watershed Restoration is Achievable

The Guidebook applied a science-based understanding, developed the water balance methodology to establish performance targets, and demonstrated that urban watershed restoration could be accomplished over a 50-year timeframe as and when communities redevelop.

The premise underpinning the Guidebook was that land development and watershed protection can be compatible (Figure 2). The basis for this premise was that municipalities exert control over runoff volume through their land development and infrastructure policies, practices and actions.

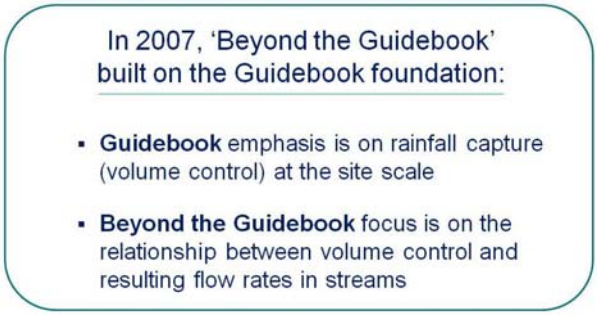
Landscape-Based Approach: Also in 2002, a Metro Vancouver working group and provincial staff collaborated to produce a discussion paper titled A Watershed / Landscape-Based Approach to Community Planning. The Guidebook was a pioneering application of this approach.

"The premise underpinning the landscape-based approach is that resource, land use and community design decisions will be made with an eye towards their potential impacts on watershed health," states Erik Karlsen, the principal author.

Beyond the Guidebook 2007

In June 2007, Beyond the Guidebook: Context for Rainwater Management and Green Infrastructure in British Columbia was released. By then, practitioners were becoming comfortable with what 'rainfall capture' meant in practice. So, it was time to focus attention on how to truly protect and/or restore stream health in urban watersheds.

Beyond the Guidebook initiated the paradigm-shift from the single-function view of traditional *'stormwater management'* to the integrated and holistic perspective that is captured by the term *'RAINwater Management'*. This also set the stage for defining water sustainability as an outcome` of green infrastructure policies and practices.



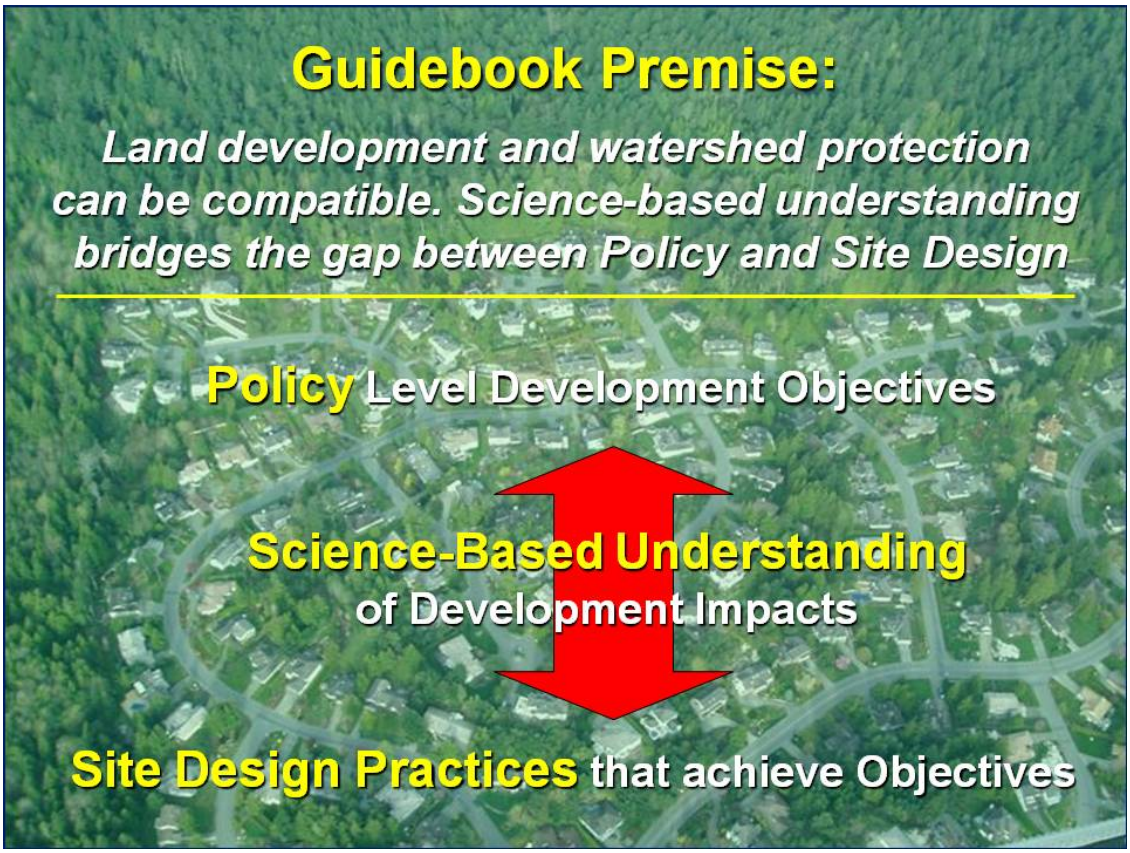
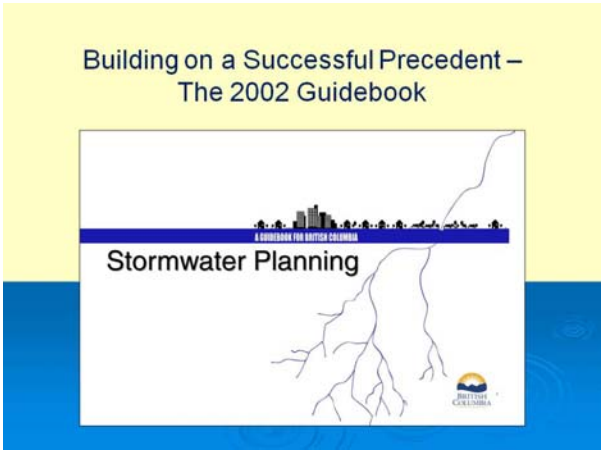

Guidebook Premise:
Land development and watershed protection can be compatible. Science-based understanding bridges the gap between Policy and Site Design
Policy Level Development Objectives
Science-Based Understanding
of Development Impacts
Site Design Practices that achieve Objectives

Figure 2

Building on Case Study Experience

To ensure local government and practitioner credibility, the Guidebook drew heavily on BC case study experience. This is one of its strengths in offering a common sense, effective and affordable approach. 'Beyond the Guidebook' has continued to build on this case study foundation.



Water-Centric Planning: A Guidebook for British Columbia: "Leading and implementing change requires bridging of the gap between *planning* and *action*," states Glen Brown, Chair of the Water Sustainability Committee of the BCWWA.

"To bridge this gap, the Province in partnership with BCWWA and the Real Estate Foundation launched Convening for Action in British Columbia in 2005. We envisioned a series of pilot programs and case studies, with outcomes synthesized as chapters in Water-Centric Planning: A Guidebook for British Columbia.

"In 2005, we said this would be a different kind of guidebook. We said that the Guidebook would be the 'telling of the stories' of how change is being implemented on-the-ground in BC. Before the chapters could be written, however, the regional case studies had to run their course."

"Well, it is five years later, and Beyond the Guidebook 2010 is the story of how we got to here and where we are going next. *This is the Water-Centric Guidebook.*"

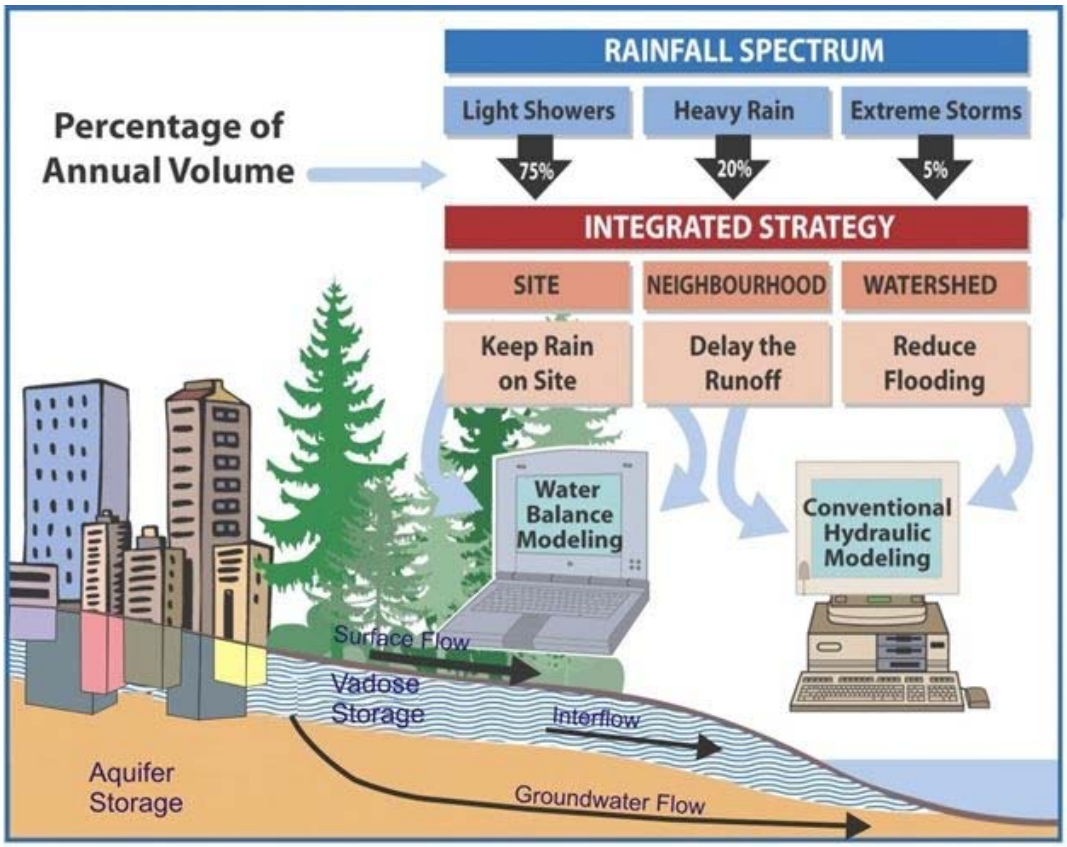
It Started with the Town of Oliver: "Convening for Action initiated a water-centric pilot through collaboration with the Town of Oliver and the Regional District of Okanagan-Similkameen," continues Glen Brown. "The opportunity for collaboration resulted from two planning initiatives: the Town of Oliver was a case study for *Smart Growth on the Ground*; and the Regional District was developing a Regional Growth Strategy."

"We branded these two case studies as *Convening for Action in the South Okanagan*," adds Tim Pringle, Director of Special Programs for the Real Estate Foundation of BC. "The Town of Oliver was the first building block and informed our contribution to the Regional Growth Strategy."

"We learned a lot about the power of a 'top down bottom up' strategy for influencing attitudes. In particular, a sharing and learning session hosted by the Town of Oliver in March 2006 had lasting significance. It became the prototype for an educational approach that leads to action."

Regional Team Approach: "The experience gained in the South Okanagan enabled us to be successful in Metro Vancouver and on Vancouver Island. Beyond the Guidebook 2010 is the story of people collaborating in the three regions. Central to the story is the regional team approach," notes Glen Brown."

"Beyond the Guidebook is built around Figure 3. The science behind it provides the technical foundation for achieving water sustainability through green infrastructure."



Source: *Stormwater Planning: A Guidebook for British Columbia*, 2002

Integrated Strategy for Managing the Rainfall Spectrum

Figure 3

Explanatory Notes – Key Messages:

Urban development reduces the 'vadose storage' and interflow. Therefore, restore these capabilities by means of green infrastructure solutions.

Basements and underground structures will lower groundwater levels to the footing level. The ground above this then becomes part of the vadose zone and can be used for vadose storage. When designed properly, this zone can form part of the green infrastructure solution.

Definitions: '*Aquifer Storage' refers to the saturated zone where all void spaces are filled with (ground)water. 'Vadose Storage' refers to the unsaturated zone where void spaces are filled with air AND water.*

From Rainfall-Based to Runoff-Based Approach

The term 'RAINwater management' has been coined to differentiate the past practices that concentrated upon the drainage system response to storms.....and the needs of the aquatic environment. The foundation upon which the 'RAINwater management' concept is built is the estimation of the amount of water in the stream over a long period of time.

This provides the linkage between the needs of the aquatic environment and the potential to physically alter the stream with increased erosion induced by urban development. The RAINwater management approach allows one to directly connect the impacts to a stream with the causes in the urban landscape.....and the mitigation methods needed to restore the natural water balance in the stream (Figure 4).

Performance Targets: "In 2002, the Guidebook introduced a science-based methodology for setting performance targets for managing **RUNOFF VOLUME** and **RUNOFF RATE**, states Peter Law (Ministry of Environment), Chair of the 2002 Guidebook Steering Committee. "We linked the use of performance targets to the Integrated Strategy (Figure 3); and we defined the rainfall spectrum in terms of three tiers, with each tier corresponding to a component of the Integrated Strategy, namely: *Rainfall Capture, Runoff Control* and *Flood Mitigation*."

"We referenced the three tiers to a value that we defined as the **Mean Annual Rainfall** (MAR)," continues Ted van der Gulik (Ministry of Agriculture & Lands), IGP Chair and a member of the 2002 Guidebook Steering Committee. "We introduced the MAR concept in order to facilitate a paradigm-shift in the way rainfall is viewed."

"As our understanding of what is achievable through 'RAINwater management' has grown, we have moved beyond the MAR concept. It is in addressing the relationship between 'rainfall capture' and 'runoff rate control' that Beyond the Guidebook picked up where the Guidebook left off in 2002."

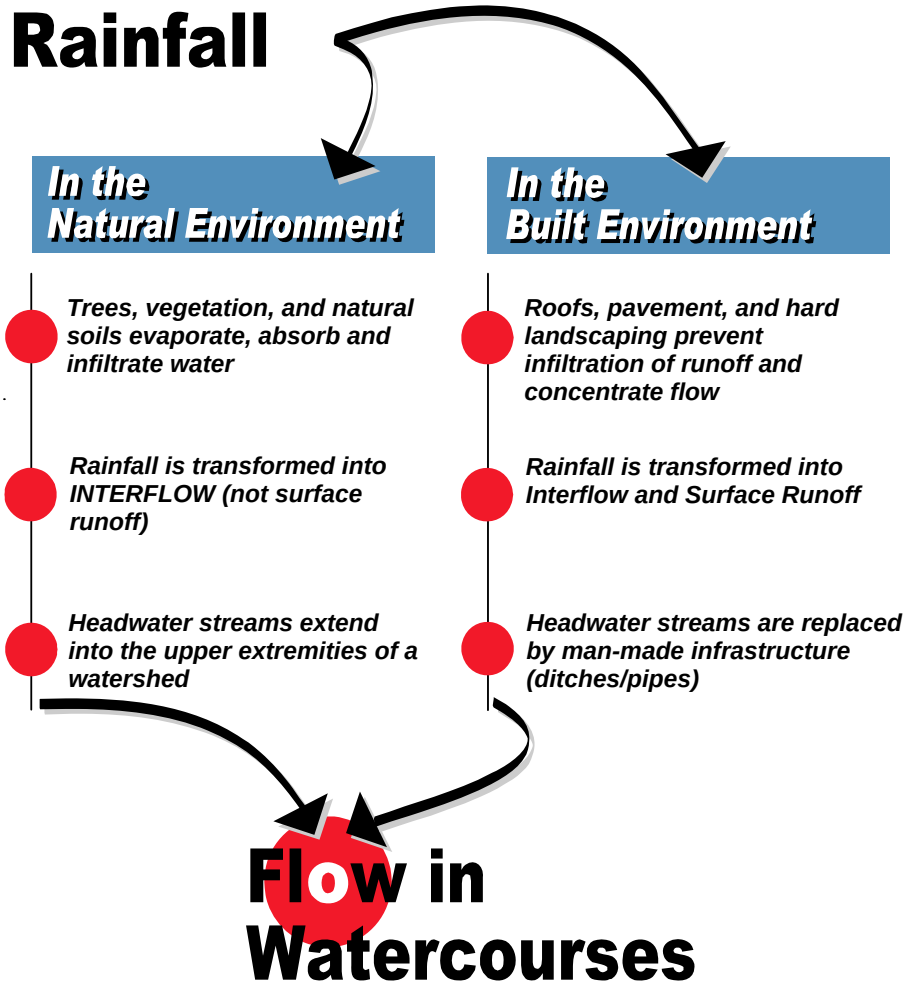
Stream Health: "Over the past decade, experience has shown that landscape-based measures for 'rainfall capture' are typically low risk, especially when they reflect an understanding of how to employ soil depth and tree canopy coverage to best advantage," states Richard Boase (District of North Vancouver), IGP Co-Chair.

"By 2007, this experience had set the stage for the next leap forward – which is to apply a 'runoff-based approach' to rainwater management at a watershed scale. This approach addresses the interaction of runoff with the physical aspects considered important to the aquatic environment."

"Stream health protection is a driver for Beyond the Guidebook. Stream health is a function of flow duration, and therefore correlates with stream erosion. Flow duration is something that we can measure and verify. We can also assess the potential for erosion or sediment accumulation within a watershed."

"As explained in Beyond the Guidebook 2007, several qualitative indicators can be utilized in assessing the potential for erosion or sediment accumulation within a watershed. The methodology is based upon shear stress as applied to the stream bed and banks over time. This is a measure of the energy available to cause erosion in a stream. Continuous simulation is the key to evaluating multiple development scenario comparisons."

"Using long-term records to calculate runoff means that the durations and frequencies of various occurrences within the watershed and stream can be estimated easily. Also, the 'runoff-based approach' leads us into examining the hydrograph for the entire year, not just one or two events," concludes Richard Boase. *(To learn more, refer to example and explanation on p.11)*



Source: Chapter 3, *Stormwater Planning: A Guidebook for British Columbia*, 2002

Desired Outcome: Manage Natural Environment and Built Environment as Integrated Components of a Healthy Watershed

Figure 4

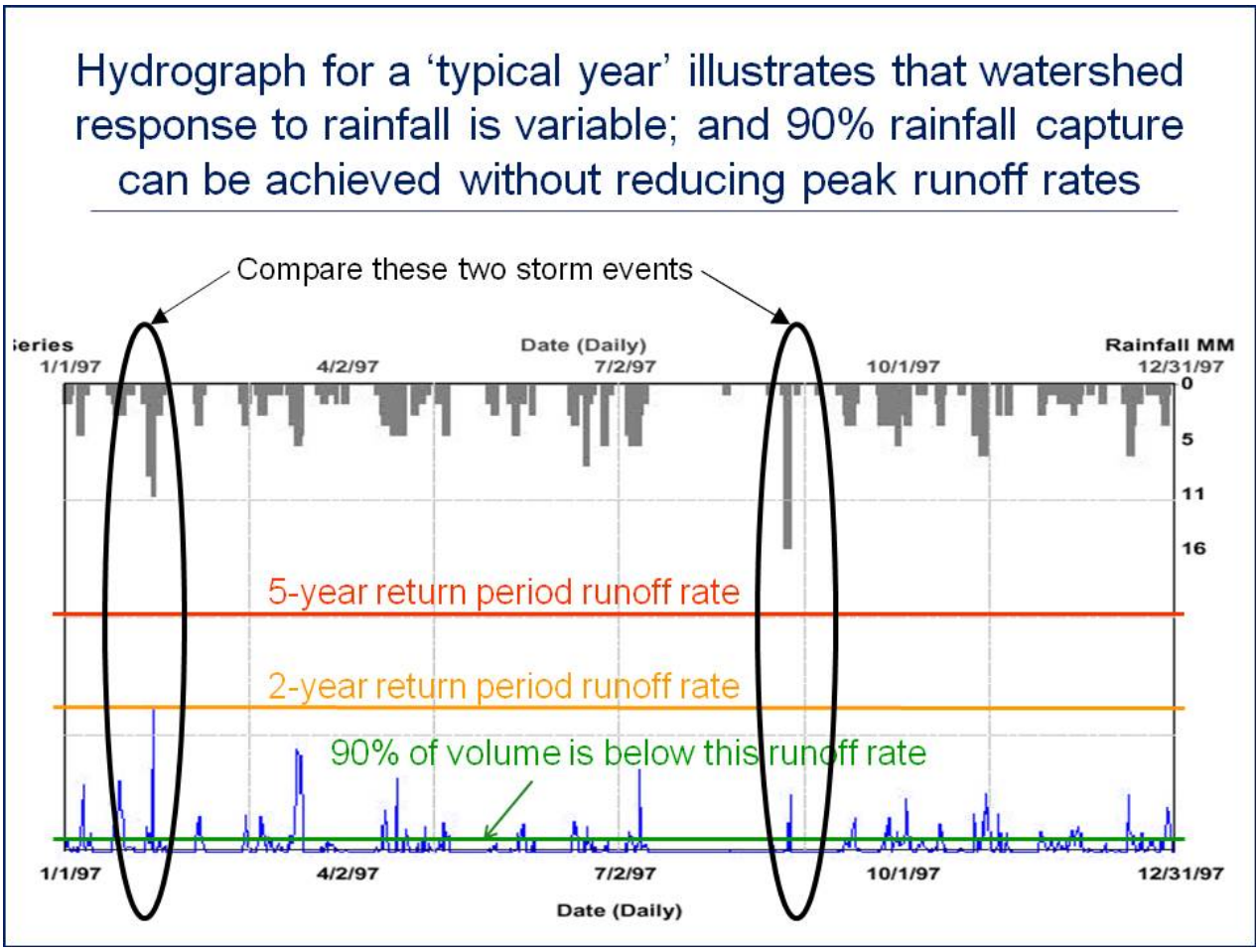
A Typical Year: The hydrograph below (Figure 5) illustrates a core concept underpinning Beyond the Guidebook.

This graphic shows that the larger of two rainfall events resulted in much less runoff. The smaller event was preceded by a period of wet weather such that more runoff resulted.

The hydrograph also shows that 90% of the total annual runoff volume corresponds to a very small runoff rate. The implication of this finding is that the 90% can easily be managed through rainfall capture measures.

For the other 10%, it is a matter of detaining and conveying in accordance with the integrated strategy for managing the complete rainfall spectrum.

Further, that retaining 90% on site would have little effect on peak runoff rates unless other practices are brought to bear. This implies that retaining 90% of the rainfall is only a part of the requirement for an effective rainwater management system. This underscores the need to manage the complete rainfall spectrum as illustrated by Figure 3.



Watershed Hydrograph for Typical Year

Figure 5