

An aerial photograph of a river system, likely in British Columbia, showing a network of waterways. A large, semi-transparent blue overlay is applied to the river channels and surrounding areas, representing stormwater management zones. The background shows a mix of green forested land and urban or developed areas with buildings and roads.

# **Stormwater Planning: A Guidebook for British Columbia**

Integration of Stormwater Management with Land Use Planning

**Integrating Policy, Science and Site Design**



# The Guidebook is the product of an Inter-Governmental Partnership

- Government of Canada
- Province of British Columbia
- Greater Vancouver Regional District
- Nanaimo Regional District
- Local Government Case Studies

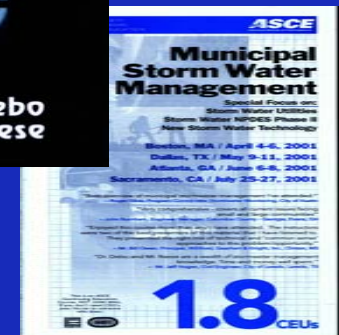
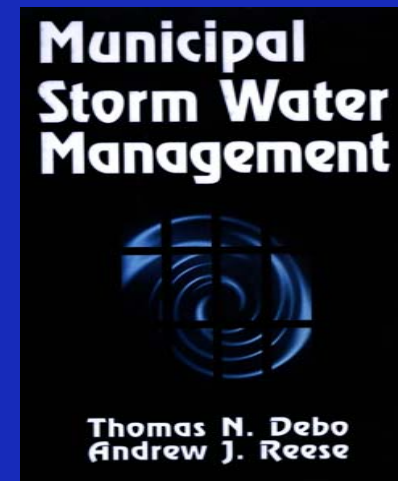


Andy Reese

# “Do you know where you really are in the shifting paradigms of stormwater management?”

1. Run it in Ditches
2. Run it in Pipes
3. Run it in Stormwater Pipes
4. Keep it from Stormwater Pipes
5. Well, Just Don't Cause Flooding
6. Oh, and Don't Pollute Either
7. It's the Ecology, Stupid
8. Water is Water is Watershed
9. Green and Bear It

**10. Build the Vision, Create the Legacy**



# Build a Vision, Create a Legacy

- Apply a science-based approach to create a shared vision of **achievable goals**
- Facilitate a **participatory decision** process to build stakeholder consensus and agree on expectations
- Obtain **political commitment** to integrate stormwater management with land use planning



# Land Development and Watershed Protection can be Compatible

**Policy** Level Development Objectives

**Science-Based** Understanding of  
Development Impacts

**Site Design** Practices that achieve Objectives

# Target Audience(s)

- Senior managers
- Local government engineers and planners
- Developers and the consulting community

# Guidebook Structure

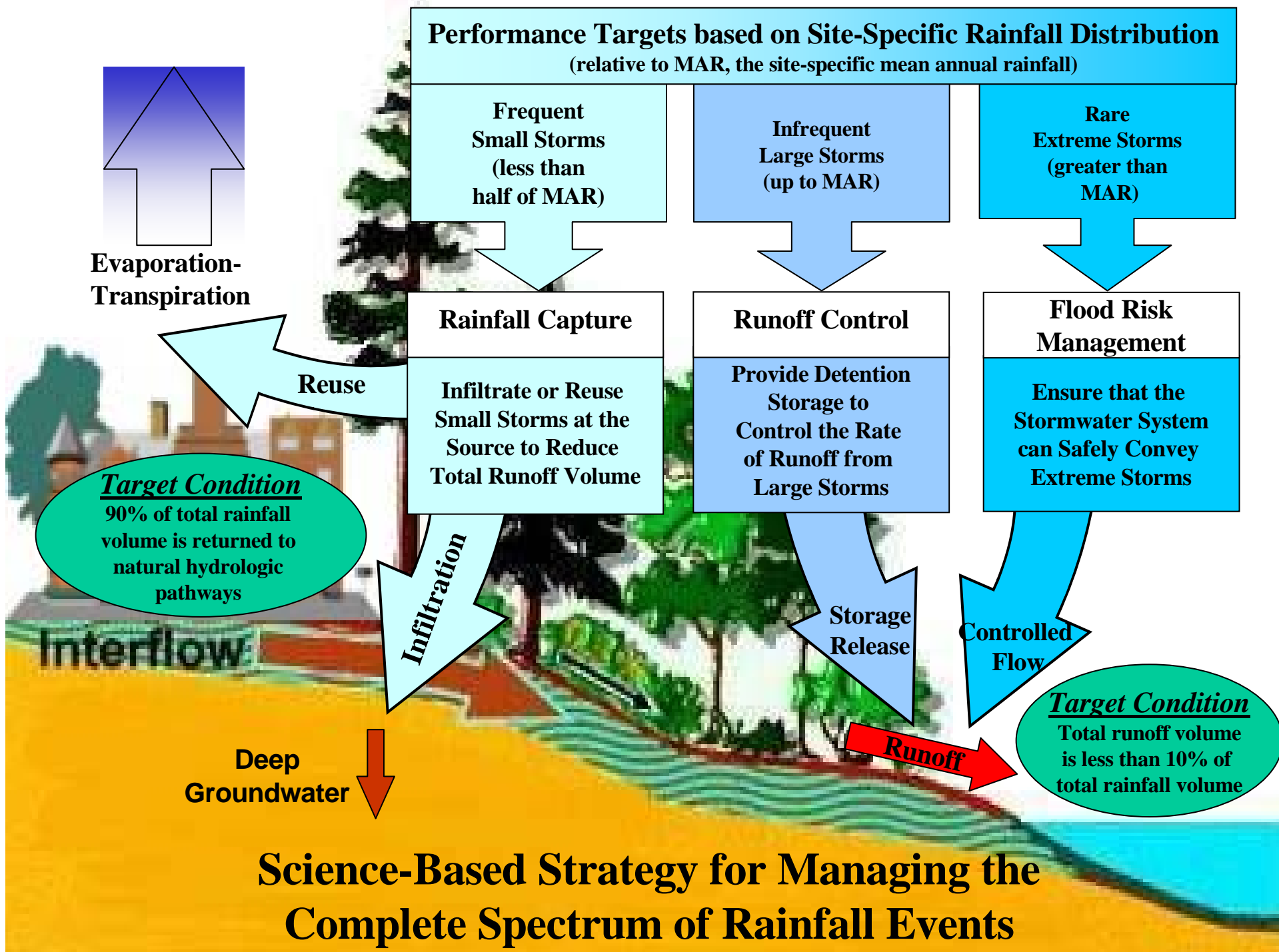
**A - The Problem (Why?):**

**B - Integrated Solutions (What?):**

Setting Priorities. Setting Performance Targets.

**C - The Process (How?):**

Defining roles, methods, means and timing for making  
the move from planning to action





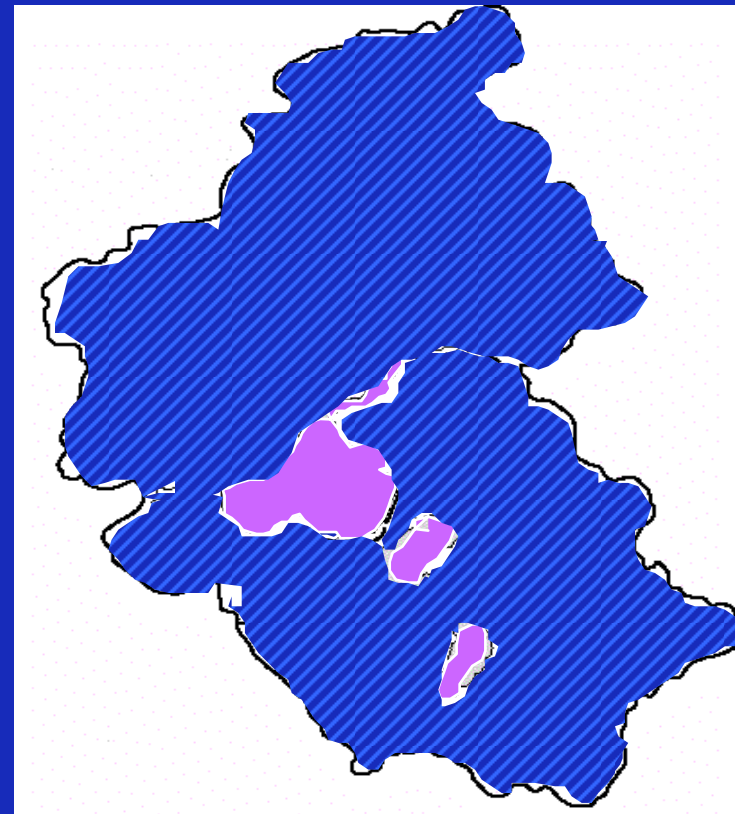
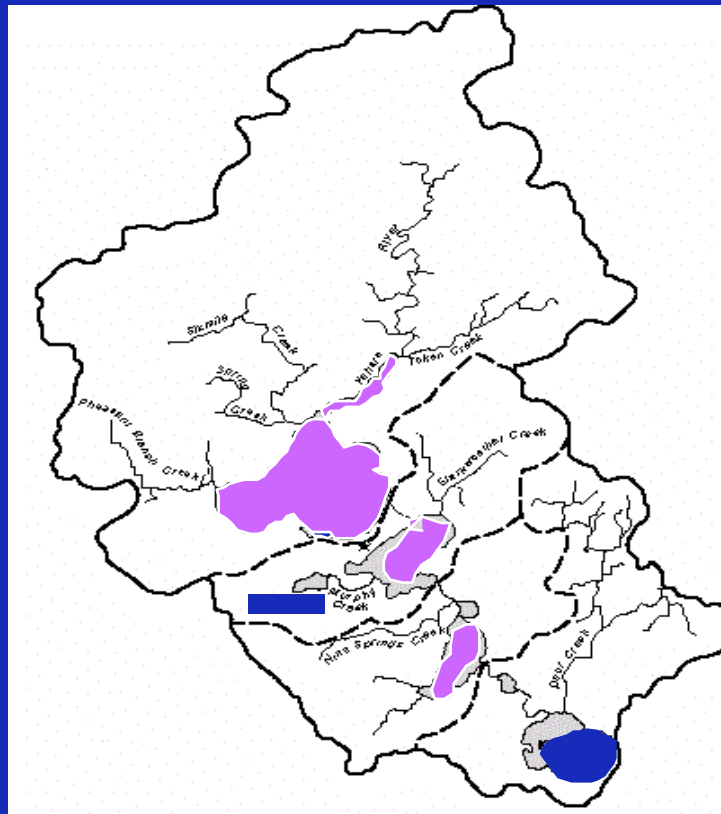


# What the Target Condition for a 'Healthy Watershed' Means

Manage runoff volume so that an urban watershed behaves as though it has less than 10% impervious area



# 10% Impervious = 90% Volume Capture



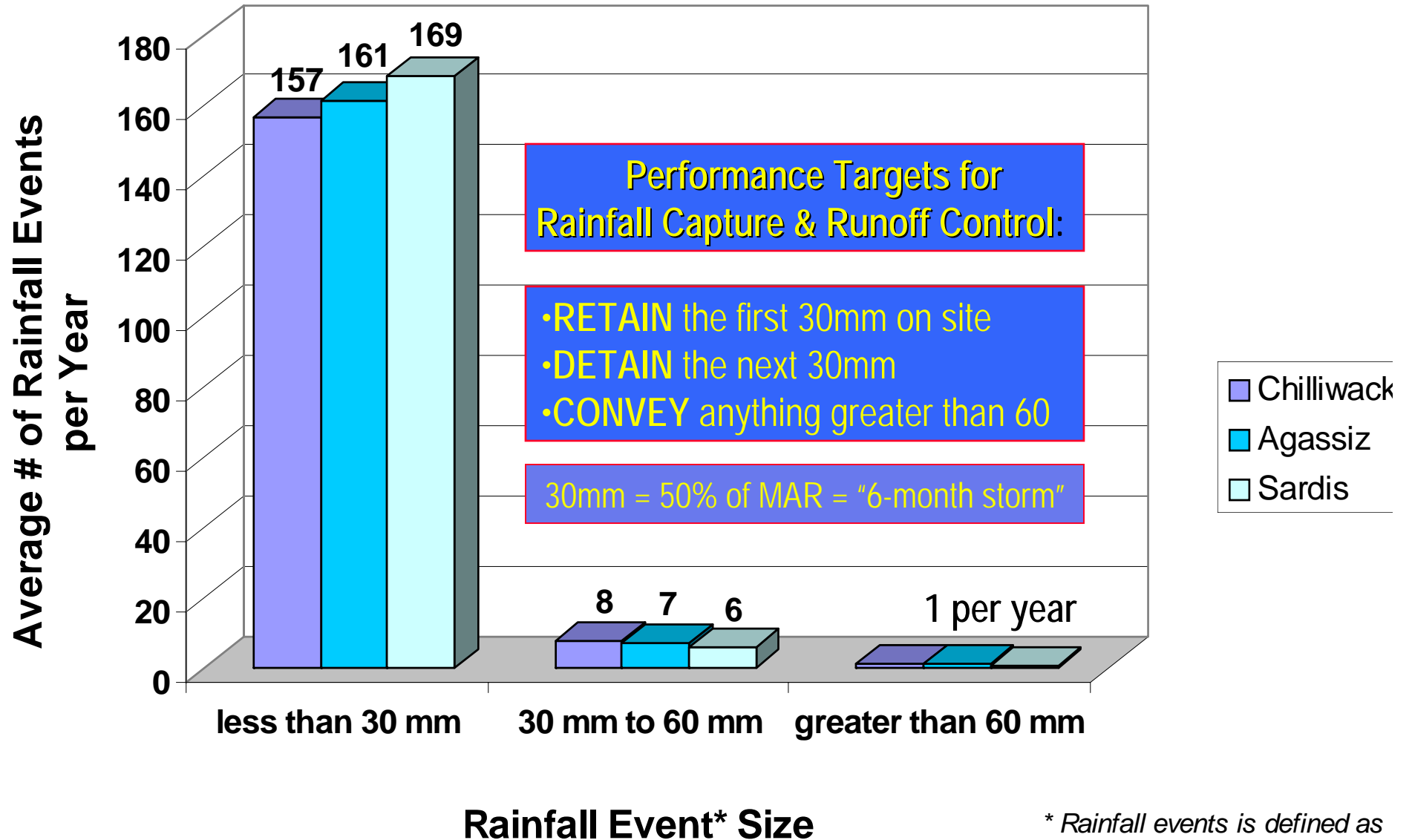
# Performance Targets

- are volume-based (rainfall capture)
- apply at the watershed, neighborhood and site planning scales
- tie back to the natural hydrologic condition (Water Balance)
- do not change regardless of starting condition
- address both flooding and watershed health concerns



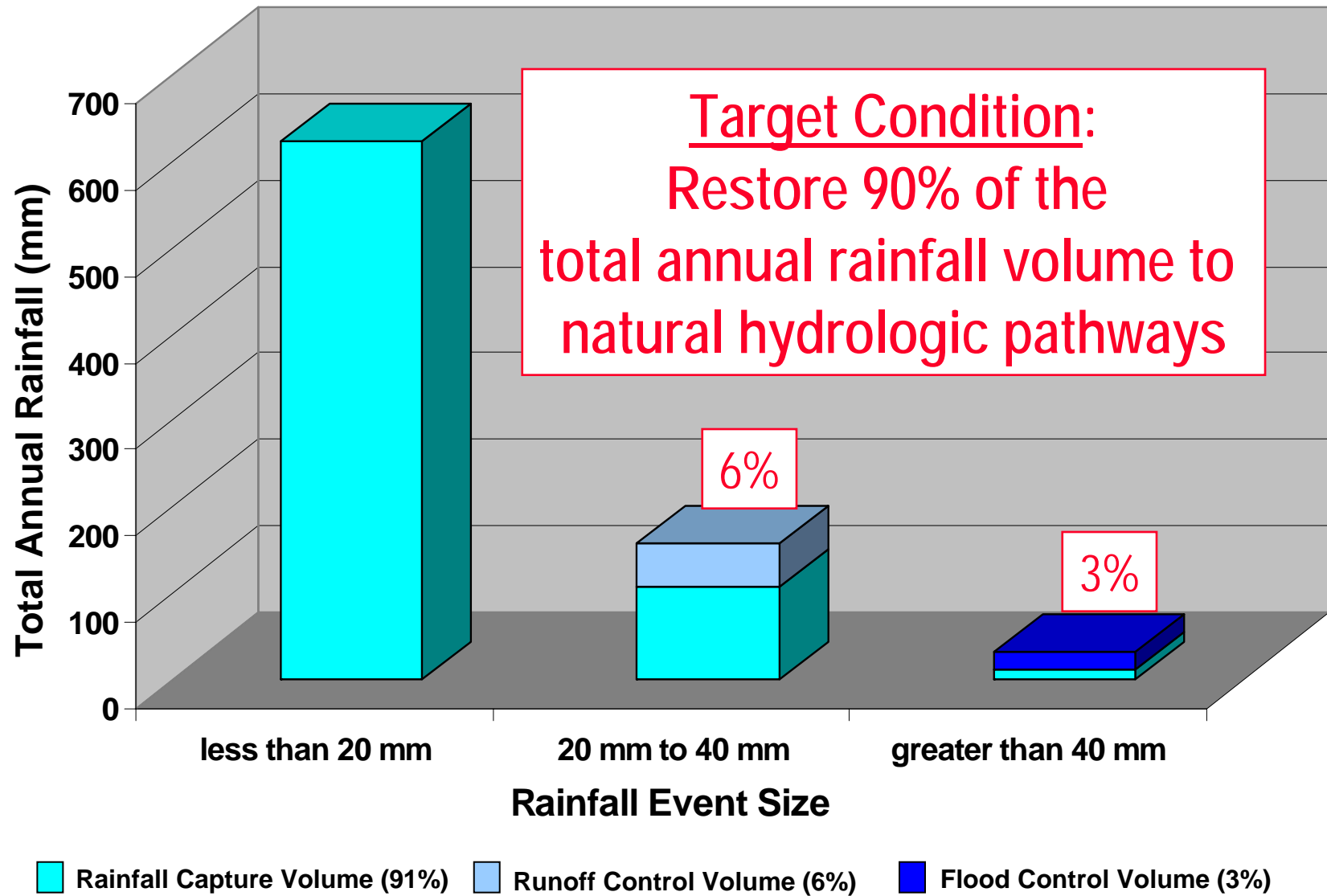
# Distribution of Number of Annual Rainfall Events

## Chilliwack Region



\* Rainfall events is defined as total daily rainfall depth (24 hrs)

# Distribution of Annual Rainfall Volume (Parksville)



# Greater Vancouver Regional District Project Goal

Evaluate *Hydrologic Performance* of various source control options, particularly the ability to reduce runoff volume at the source

The Project Deliverables 'Add Depth' to the Stormwater Planning Guidebook



# Source Control Categories




- Impervious Controls
- Absorbent Landscaping
- Infiltration Facilities
- Green Roofs
- Rainwater Re-Use



*"Best management practices (BMPs) and sustainable urban drainage systems (SUDS) are becoming more popular...."*

*"But there has been little systematic research to date on the costs, long-term effectiveness, and ecological impacts of BMP/SUDS"*

Source: Water Environment Research Foundation  
Request for Proposal, July 2001



The background of the slide is a world map. Several red stars are placed on the map to indicate the locations of the expert panel members. Small portrait photos of the members are also placed near their respective stars. The stars are located in North America (USA), Australia, and the Pacific region. The text 'Our Expert Panel comprises individuals who are pioneering source-control applications and/or research' is centered in a blue box with a yellow border.


**Our *Expert Panel* comprises individuals who are pioneering source-control applications and/or research**

- John Argue
- Peter Coombes
- Dan Medina
- Charlie Miller
- Patrick Condon
- Bill Derry
- David Reid

- Infiltration Technology
- Stormwater Re-Use
- Low Impact Development
- Green Roof Technology
- Urban Site Design
- Best Management Practices
- Landscape Architecture



# The Water Balance Model is a Decision Support / Scenario Modelling Tool that is used to...

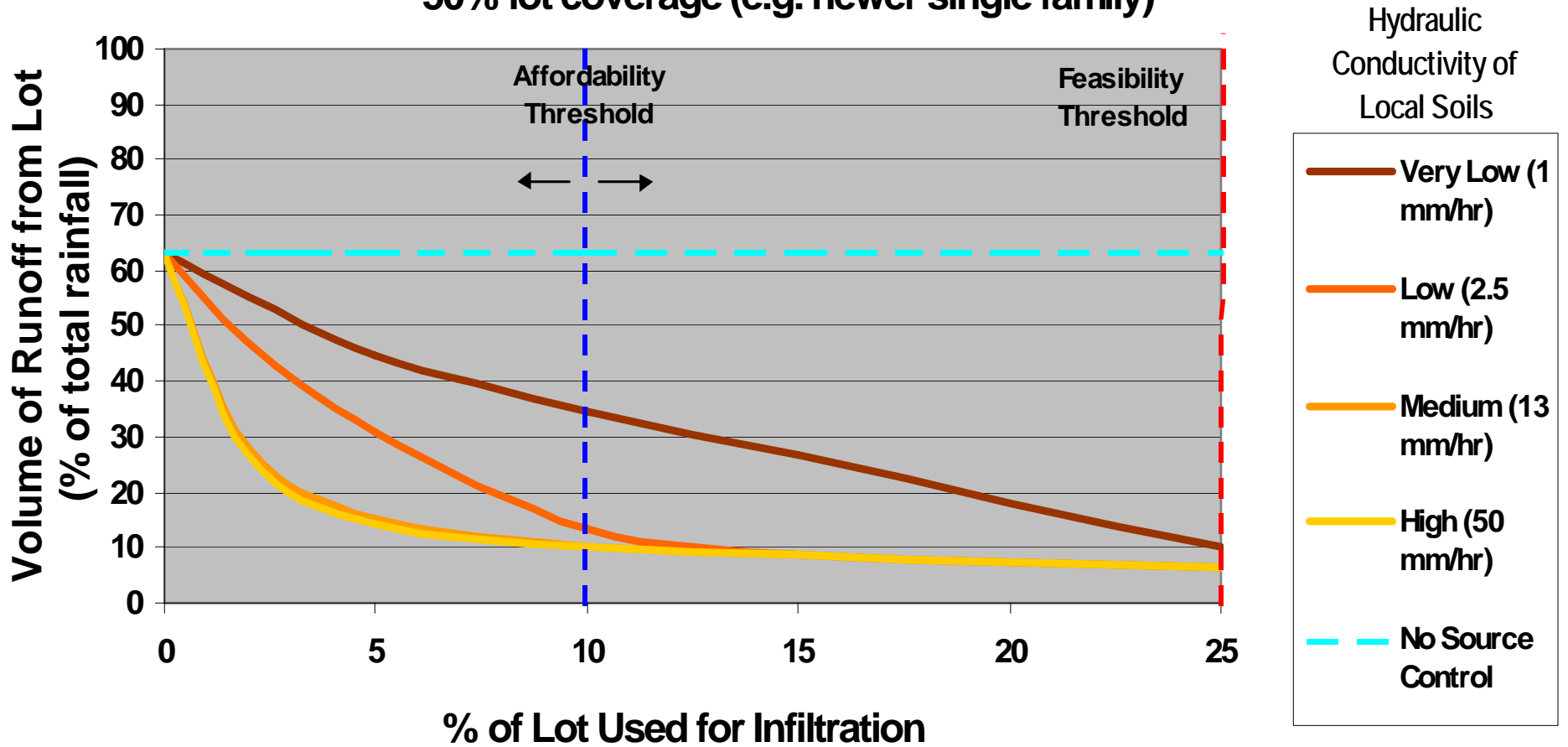
- 
- Visualize the 'how to' details of source control implementation
  - Model scenarios at the site, neighbourhood and watershed scales
  - Make decisions through a scientifically defensible, interactive, and transparent process

# Performance Thresholds

- How much space can be provided for infiltration?
- May depend on:
  - **Feasibility Thresholds** - the physical constraints associated with the available on-lot pervious space
  - **Affordability Thresholds** - willingness to pay (depends on site-specific costs and benefits).
- Infiltration Performance Curves
  - show the benefits of providing a certain amount of space for a given soil type and land use type (or road type)

# Infiltration Facility Performance (Runoff Volume Reduction)

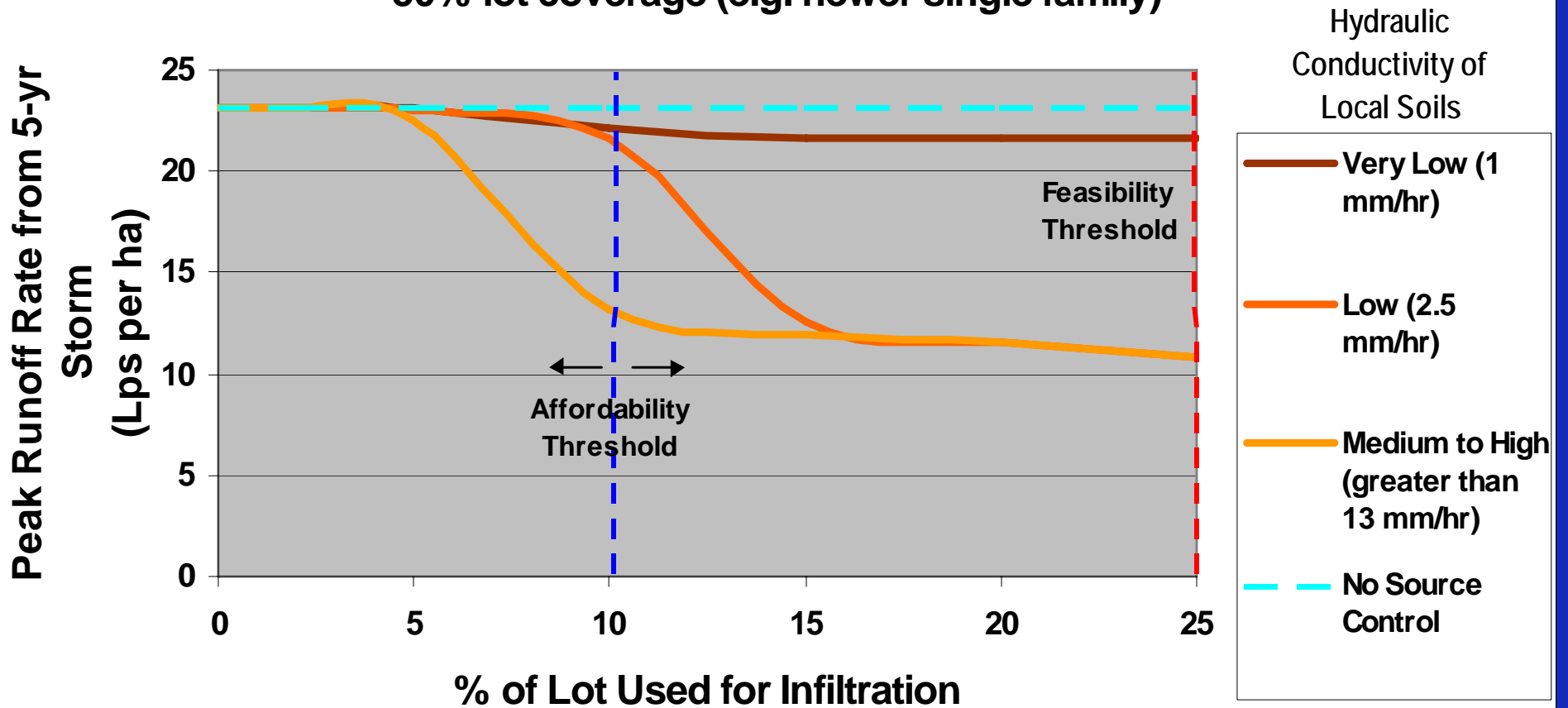
50% lot coverage (e.g. newer single family)





# Infiltration Facility Performance (Runoff Rate Reduction)

50% lot coverage (e.g. newer single family)



# Scenario modelling at the watershed scale enables us to answer these questions

- ❑ What is the existing level of annual runoff volume?
- ❑ What is an acceptable level in terms of flood risk and environmental risk?
- ❑ What actions are needed to prevent any further increase in runoff volume?
- ❑ What actions are needed to reduce total runoff volume over time?
- ❑ Is the 10% runoff volume target achievable over time?
- ❑ What level of volume reduction is achievable over time?



MacKay Creek

Burnaby Mtn

Como Creek

McKenney Cr

Quibble Creek

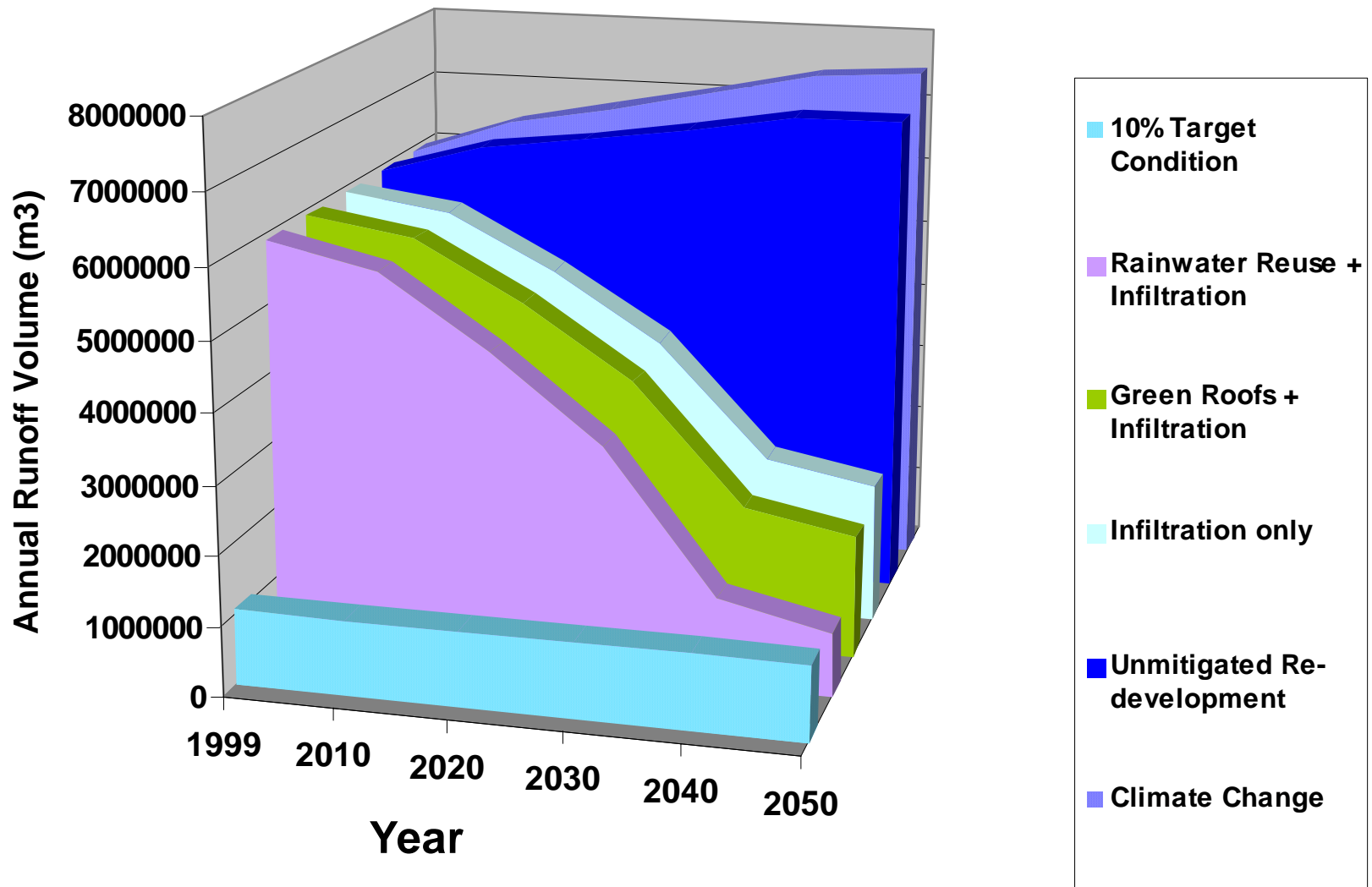
East Clayton

Application of the Water Balance Methodology  
to Greater Vancouver Watersheds

United States

# Quibble Creek Watershed Retrofit Scenarios

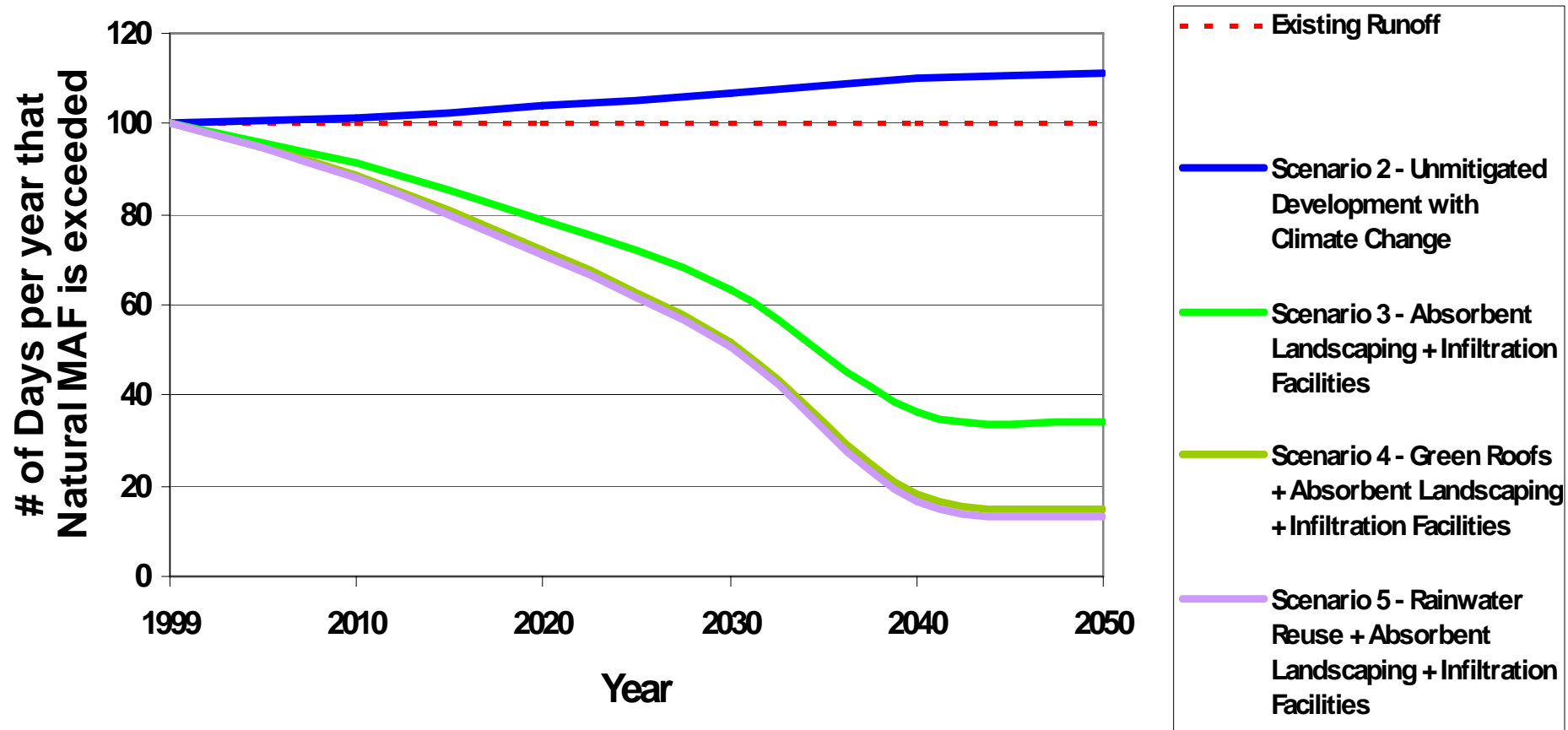
## Runoff Volume Reduction





## Quibble Creek Watershed Retrofit Scenarios

### Reduction in Frequency of Runoff Events Exceeding Natural MAF





# And in conclusion, Sustainable Development Opportunities

- The Water Balance Model is the key to figuring out how to build / retrofit communities that function hydrologically like natural systems
- Can go beyond stormwater to the **Integration of the *Urban Water Cycle***
  - optimizing **stormwater, water supply, and wastewater** as integrated components of the same system.

# Guidebook Availability:

As of April, 2002 on the BC Ministry of Water, Land and Air Protection - Municipal Pollution Prevention website:

[http://wlapwww.gov.bc.ca/epd/epdpa/mpp/mpp\\_home.htm](http://wlapwww.gov.bc.ca/epd/epdpa/mpp/mpp_home.htm)

Under "Stormwater" (the big pipe!)

