

Inter-Governmental Partnership Launches Plan to Expand the Capabilities of Online Tool for Green Design

To sustain the early success of the Water Balance Model for British Columbia, and to advance 'sustainable drainage' initiatives across Canada, the Inter-Governmental Partnership (IGP) is expanding the capabilities of this web-accessible decision support and scenario modelling tool.

At present, the main focus is on the use of source controls for runoff volume reduction to protect property, habitat and water quality. According to Kim Stephens, Project Coordinator, "Less volume means less flooding of agricultural and/or suburban lowlands. This is one reason why the WBM has



emerged as the rainwater management tool of choice in making sustainable land development decisions - it demonstrates how to achieve a light hydrologic footprint. Drainage engineers, however, want to simulate what happens to overflows once source controls have reached capacity during sustained wet weather periods. To provide the engineering community with 'one-stop shopping', we decided to enhance the WBM calculation capabilities plus add water quality. This means engineers will be able to hydraulically model the storage and routing of outflows from a subdivision and/or neighbourhood through a detention pond or down a stream channel."

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A TOOL THAT ENGINEERS WILL USE

The challenge is to provide expanded functionality for engineers yet at the same time avoid self-defeating complexity that would make the WBM unattractive to other target audiences. The concept of enhancing only the calculation engine rather than altering the user interface is key to maintaining the user friendly WBM while providing added capabilities. Merging the WBM calculation engine with QUALHYMO (QUALity HYdrologic Model) has been determined to be the most appropriate next step because:

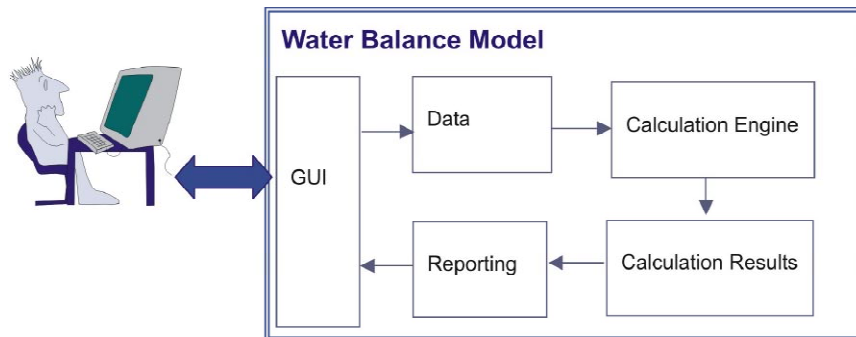
- Both are Canadian.
- Both are based on a philosophy of 'keeping it simple'.
- Both are non-proprietary.
- Both bring complementary strengths.
- QUALHYMO contains routines that incorporate many features requested by current WBM users.
- QUALHYMO has gone through numerous verification and testing processes, and the model is a proven piece of software.
- The resulting synergies create an opportunity to more effectively promote use of the WBM throughout Canada, and within the engineering community.



IMPROVE THE BUILT ENVIRONMENT, PROTECT THE NATURAL

In 2002, the Province of British Columbia published *Stormwater Planning: A Guidebook for British Columbia*. The Guidebook formalized a science-based understanding to set performance targets for reducing rainwater runoff volumes and rates. At the heart of the Guidebook is the Water Balance Methodology. Recognizing that practitioners and others needed a tool so that they could readily apply the Methodology, the Inter-Governmental Partnership then developed the Water Balance Model for British Columbia.

The WBM quantifies the effectiveness of site designs that incorporate rainwater source controls such as rain gardens, tree canopy, green roofs, absorbent soil, and infiltration facilities. It does a continuous simulation over one or more years to test facility performance under different combinations of land use, soil and rainfall. The modeling process is illustrated by the graphic below. The key point to note is that the merging of tools will take place in the box labelled Calculation Engine.



“The IGP believe that use of the WBM will promote integration of perspectives through a collegial and interdisciplinary approach that enables planning and design professionals to collaborate to achieve community liveability objectives”, commented Kim Stephens.

National Portal and Inter-Provincial Partnerships

The success of the Water Balance Model in British Columbia, particularly in promoting an understanding of how to improve the built environment and protect the natural environment, generated interest in expanding the focus of the tool to reach a national audience. This led to the decision in 2004 by Environment Canada, Canada Mortgage & Housing Corporation, and the Province of British Columbia to create the national portal at www.waterbalance.ca and foster the formation of inter-provincial partnerships as a means to pool sources of funding for model enhancement.

An inter-provincial dialogue with Alberta began in August 2004 and provided the catalyst for formation of the Alberta Low Impact Development Partnership (ALIDP), co-chaired by the Cities of Calgary and Edmonton. “The purpose in forming an inter-provincial partnership is to collaborate and share resources in order to facilitate improvements in land development practices in both provinces,” according to Liliana Bozic, ALIDP Co-Chair.

INTEGRATED WORK PLAN

Dr. Charles Rowney will play a guiding role in the merging of the two models. “Because Dr. Rowney is one of the pioneers of hydrologic modelling in Canada, we are excited that he will be hands-on with the project. Dr. Rowney will contribute his knowledge, experience and wisdom”, stated Laura Maclean (Environment Canada), IGP Co-Chair. Merging the WBM with QUALHYMO will yield five additional web-accessible hydraulic modelling capabilities identified as important to users:

Rainwater Storage Routing	Water Quality	Stream Erosion	Drainage Area Flow Routing	Snowmelt Runoff
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The Integrated Work Plan also includes major enhancements to the graphical user interface (GUI); plus integration with the Case Study Module that resides on the companion WaterBucket website. GUI enhancements will achieve over-arching ‘usability objectives’. Case study content will be generated from the WBM by linking it to the WaterBucket and expanding the capability of the Case Study Module.

Budget

The total budget is \$210,000. Full implementation of QHALHYMO functionality within the WBM is estimated to cost \$160,000. The budget allocations for GUI enhancements and case study function are \$20,000 and \$30,000, respectively.

First Steps to Launch the Project

The first priority is to create a web-based ‘front-end’ that will allow experienced technical users to run QUALHYMO calculations through the WBM interface. This is a two-step process, and accounts for roughly half the \$160,000 allocation.

QUALHYMO is a rainfall-runoff model originally developed in Ottawa by Dr. Charles Rowney in the 1980s, with funding from the Ontario Ministry of Environment, to assess the water quality in the Rideau Canal.

Step One

Prepare Software Design Mockup: The design and display code developed during this step is intended to form the basis of the working model once the QUALHYMO integration is completed. This non-active interface will serve to illustrate the power and flexibility of the future enhanced WBM.

Step Two

Prepare Data Input Tool: The tool developed during this step will convert current WBM input into an ASCII format that can be imported into QUALHYMO. This approach will provide a stepping stone from which to launch a full conversion of the WBM to the QUALHYMO engine with little or no duplication of effort.

Simply put, this two-step process would let users into site parameters and produce a text-based output file that can be run using the existing code for QUALHYMO, written in Fortran 77. An entry screen will give users a choice between the basic WBM and the enhanced QUALHYMO version.

Completion of the Project

The final steps in the merging process encompass recompiling the QUALHYMO code into web language (Microsoft ASP) so that the calculation routines will be accessible to the user interface; and revising the WBM database to allow users to move between the models, or to allow different types of users to work on the same scenario using either the existing or integrated WBM. This accounts for the balance of the \$160,000 allocation.

INTER-GOVERNMENTAL PARTNERSHIP

The IGP draws its strength from local government and is a consortium of local governments and regional, provincial and federal agencies. Formed in July 2002, it began as a subgroup of an inter-agency technical committee of the Greater Vancouver Regional District. The IGP quickly expanded to become a provincial group with municipal representation from four regions of British Columbia: Greater Vancouver, the Fraser Valley, Vancouver Island and the Okanagan Valley.

Rolling 3-Year Plan

The IGP has a \$1.5M program that comprises four categories of work:

Category A – Overall Usability

Category B – Graphical User Interface

Category C – Hydrology Engine

Category D – Outreach & Education

Priorities under the Rolling 3-Year Plan are established on the basis of feedback regarding user needs, and are dynamic. Having a comprehensive plan provides the IGP with flexibility to 'mix-and-match' both funding agency interests and funding contributions to specific deliverables. At any given time, the IGP will have a number of initiatives underway.

Vision of the IGP

To Promote Changes in Land Development Practices so that:

- The built environment will preserve and/or restore the natural water balance over time
- Performance targets will be achieved for runoff volume and flow rate reduction at the source, *where rain falls*

Water Balance Model Outreach & Continuing Education Program

The IGP has pioneered a comprehensive and multi-layered communications and workshop training program. The goal is to build broad-based support for moving from talk to action in implementing on-the-ground changes in rainwater management practices at the site level.

Key partners for delivery of hands-on training workshops for practitioners are the Real Estate Foundation of BC, the Urban Development Institute, and the Association of Professional Engineers & Geoscientists of BC.

Contact Information

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Outreach & Continuing Education Program

This program has comprised sessions for:

- Elected Officials
- Local Government Staff
- Development Community
- Municipal Advisory Committees
- Community Stewardship Groups
- Professional Associations

Including training workshops at UBC, UVIC, BCIT, North Island College, and UBC-Okanagan