geoconvention
Virtual Event
September 21-23
2020
CSPG · CSEG · CWLS · GAC · MAC · IAH

Utilizing "Calibrated" Hydrogeologic Understanding for Groundwater Management Decision-Making

Paul J. Martin, Stephen J. Livingstone, Patricia A. Meyer
Aqua Insight Inc

Theory

Data assessment and interpretation tasks completed through the process of developing and calibrating a regional-scale groundwater flow model provides a wealth of hydrogeological knowledge that can be leveraged for many groundwater management decisions. One type of application for municipalities involves the assessment of risks associated with urban development and densification near municipal water supply wells.

Resource Management Case Study

Like many municipalities, the City of Barrie in southern Ontario is working to balance the need to protect the municipal groundwater supply and to support growth and brownfield redevelopment. Construction associated with development, particularly high-density development, can enhance hazards that could threaten water quality and quantity of municipal production wells. Water quality hazards include existing contamination areas that could be mobilized through new preferential pathways as deep construction works (e.g., caissons) are extended through naturally protective aquitards to bedrock. Water quantity hazards include reduced groundwater flow and enhanced surface water discharge due to perpetual dewatering, and reduction of groundwater recharge.

To make risk management initiatives and rationale transparent to developers, a strategy and tool-kit was created that combines the *likelihood* of potential hazards and the expected *exposure* level based on the planned development activities to evaluate risks associated with development. . In this context, risk is defined as the potential impact of the hazard on the quality and quantity of water at the municipal production wells, and to the developer in terms of costs associated with managing groundwater during and post-construction. Hydrogeological knowledge acquired through groundwater flow modelling and other Source Protection initiatives provided the 3-dimensional knowledgebase required to build appropriate tools.

Results, Observations, Conclusions

The strategy (**Figure 1**) and tool-kit developed brings together the local experience of City staff and the knowledge developed through Source Protection work into an interactive decision-support system for the City. The tool-kit allows City staff to confidently and transparently request a scope of work from the developer; it also allows prospective developers to evaluate potential risks for a given site and scale of development before investing heavily into planning. Where significant risks are identified through this screening-level assessment, site-specific field work requirements are identified to refine risk understanding and determine mitigative initiatives required to reduce or circumvent risks.

Summary

The data assessment and interpretation completed through source protection initiatives, such as developing numerical modelling tools, provides a wealth of hydrogeological knowledge that can be leveraged to help with many decisions. This presentation focuses on how municipalities can capitalize on previous modelling and interpretation investments to make informed groundwater management decisions; however, a similar process would also be appropriate for any groundwater management stakeholder group, including industrial water managers.

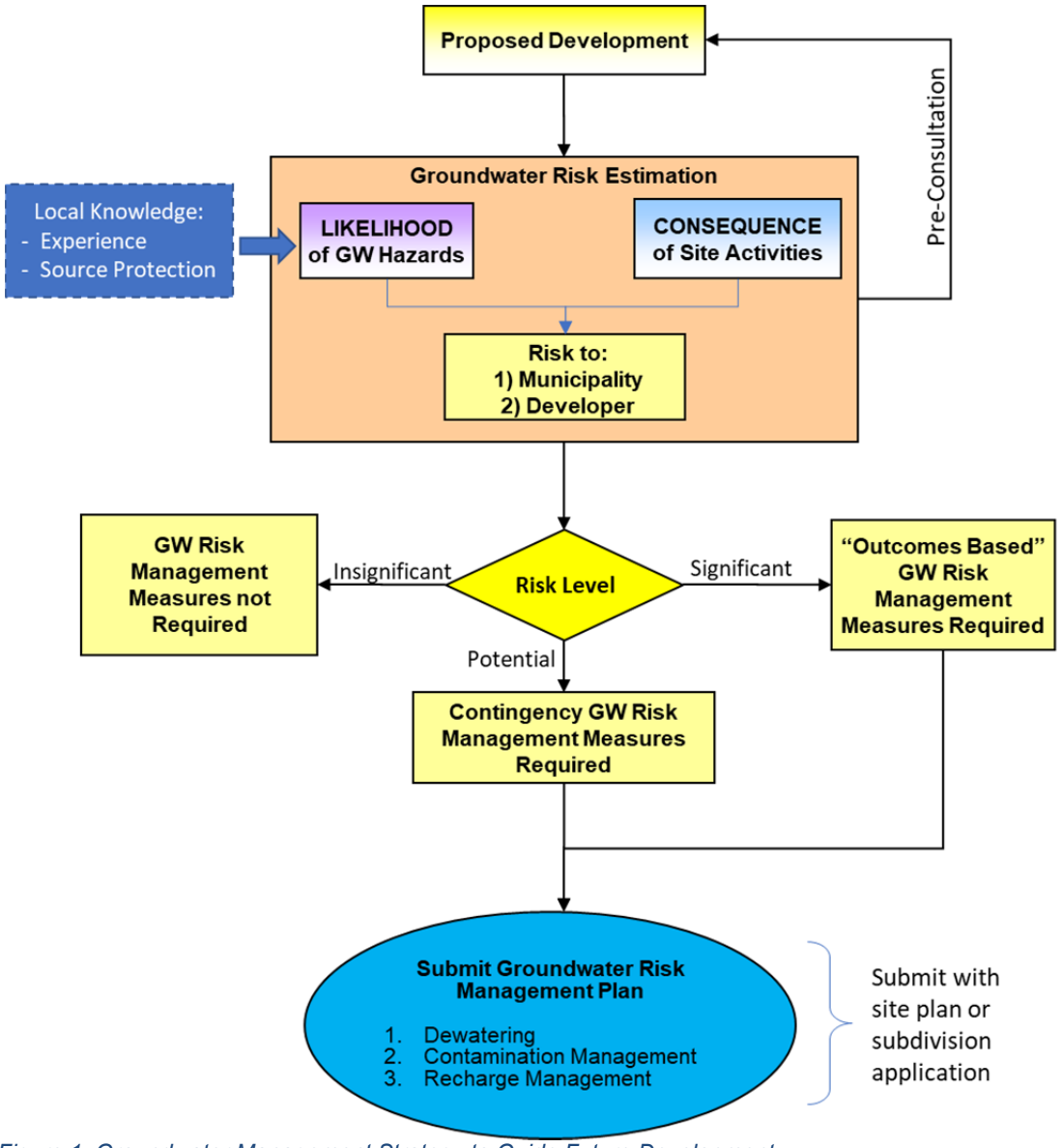

Figure 1: Groundwater Management Strategy to Guide Future Development