

October 1, 2010

Ms. Darlene Conway, P.Eng.  
Senior Project Manager  
Infrastructure Services and Community Sustainability  
Infrastructure Policy Unit  
City of Ottawa  
110 Laurier Avenue West, 4<sup>th</sup> Floor  
Ottawa, ON K1P 1J1

Dear Ms. Conway:

**Proposal No.: 04001251.4050.001**

**Regarding: Shirley's Brook and Watt's Creek Stormwater Management Study, Kanata, ON  
Phase 1 Work Plan**

AECOM is pleased to provide the City of Ottawa (the City) with the following work plan to complete Phase 1 of the Shirley's Brook and Watt's Creek Stormwater Management Study. Our work plan is based on a review of background data provided by the City in addition to a pre-consultation meeting held on September 16, 2010 and is organized according to the following sections:

- Understanding of the Assignment
- AECOM Corporate Profile & Study Team Experience
- Study Approach & Work Plan
- Study Schedule

## **1. Understanding of the Assignment**

The City of Ottawa has identified the need to review and update the stormwater management (SWM) criteria and associated requirements for the remaining development lands within the Shirley's Brook and Watt's Creek subwatersheds. The study will be undertaken as a Class EA Master Plan and will comprise an updating of existing subwatershed conditions, preliminary comparison and evaluation of alternative SWM measures, selection of recommended options and identification of further studies required to satisfy the Class EA process.

Concerns have been raised regarding an existing proposal to divert surface drainage from a large area associated with the proposed Kanata Lakes North (KLN) development, located within the headwaters of Shirley's Brook, into the Watt's Creek system (via the Kizell Drain). The initial drainage diversion concept was proposed as part of the Marchwood Lakeside Master Drainage Plan prepared by Cumming Cockburn Ltd. (CCL) in 1984 and was viewed as a benefit through the use of a

large area of natural storage associated with the Beaver Pond SWM facility that discharges into the Kizell Drain. Subsequent to this, the Shirley's Brook/Watt's Creek Subwatershed Study (Dillon, 1999) was completed, recommending that natural drainage divides generally be maintained. Also, public and regulatory agency awareness regarding the potential impacts (e.g., increased flooding, accelerated stream erosion, impacts to aquatic habitat etc.) associated with large-scale drainage diversions has increased considerably. However, the planning for this area has progressed over the years on the assumption of the diversion proceeding and, as such, the draft-approved plan for the remaining lands has not accounted for a SWM block or blocks that would address stormwater management for the area of the plan naturally draining to Shirley's Brook.

Given the history associated with the Kanata Lakes North development, the significant size of the proposed diversion, changes in regulatory approval and permitting requirements, and the anticipated concerns of downstream landowners, the general intent of the overall Study is to provide a high level evaluation of SWM alternatives that will assist stakeholders in determining whether the original diversion proposal should be pursued further via a Schedule C Class EA, or whether an alternative SWM approach, that precludes the need for a diversion, represents the preferred SWM solution.

The Study Area comprises the entirety of the Shirley's Brook and Watt's Creek subwatersheds. Specifically, the Master Plan Class EA will focus on the evaluation of stormwater management alternatives to address the impacts of remaining development on the receiving watercourses. The Kanata Lakes North (KLN) plan represents the majority of the remaining development lands within the subwatersheds and is draft-approved. The developer is currently seeking clearance of draft conditions for a portion that drains naturally to the Beaver Pond SWM facility.

In order to complete the Class EA Master Plan process in a timely and cost effective manner and allow for input and review from the City and other stakeholders, it is proposed to complete the overall Study in two separate phases.

Phase 1, which is the focus of this work plan and budget proposal, will include an update of existing storm drainage conditions for the existing and future lands proposed to drain to the Beaver Pond facility. A confirmation of existing SWM pond performance and preliminary assessment of future performance will be completed in order to confirm whether there is sufficient capacity within the facility to accommodate existing drainage as well as the future proposed diversion (i.e., full build-out of KNL plan) and continue to meet the prescribed quality and quantity (flood control) targets. This phase will not investigate erosion criteria (which will be addressed in Phase 2 work).

Results of the Phase 1 Study will enable the City to determine the scope of stormwater management alternatives to be evaluated as part of the Phase 2 work that will be undertaken to fulfil Phases 1 and 2 of the Class EA Master Plan process.

## **2. Study Team**

### **2.1 Corporate Profile**

AECOM is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With approximately 46,000 employees around the world, AECOM is a leader in all of the key markets

that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 100 countries and had revenue of \$6.3 billion during the 12-month period ended June 30,2010.

AECOM is committed to protecting the safety and health of our employees and meeting our obligations with respect to the protection of others affected by our activities and has developed a comprehensive Safety, Health and Environmental Policy. In addition, all Study team members have completed the required Accessibility Training under Ont. Reg. 429/07. Additional information, including Proof of Insurance, WSIB Clearance Certificate and WISR can be made available to the City upon request.

## **2.2 Study Team Experience & Responsibilities**

Our team members for this Study have a proven track record for applying innovative methods to assist our Clients in the planning, development, and implementation of their projects, as well as managing the associated environmental challenges. The capabilities of our engineering, planning and natural environment team members are highlighted in the following capsule descriptions including their respective roles in the assignment. Individual curriculum vitae for each Study Team member can be made available to the City upon further request.

**Joe Puopolo, P.Eng. PMP – Project Director** – Joe has over 32 years experience in water resources and related environmental engineering fields of practice, and currently serves as the Manger of our Water and Natural Resources Team. As can be noted from his curriculum vitae, Joe has managed numerous projects dealing with watershed/subwatershed master planning, floodplain management, urban drainage design, stormwater management, hydrologic and hydraulic modelling of drainage systems, storm/sanitary sewer infrastructure improvements, flood control works, environmental assessment, restoration, and environmental approvals management for both the public and the private sectors. His project experience covers the broad range of management, technical and consultation aspects that are essential to the successful execution of this undertaking. Generally, this has involved multi-disciplinary teams of engineers, scientists and professionals working co-operatively toward resolving environmental challenges. *Joe will serve as Project Director to make certain that appropriate resources are made available for the Study. He will also provide project quality control to ensure that all deliverables meet the satisfaction of the City of Ottawa.*

**Glenn A. Farmer – Project Manager/Technical Lead** – Glenn is a Senior Environmental Technologist at AECOM with over 20 years of experience in water resources engineering encompassing a wide range of studies and projects including watershed/subwatershed master planning, storm/sanitary sewer infrastructure, urban drainage design, stormwater management, hydrologic and hydraulic modelling of rural and urban drainage systems and co-ordination of environmental approvals for both the public and the private sectors. Glenn has extensive experience with environmental impact assessments and hydrologic/hydraulic and stormwater management studies, having managed the Water Resources Engineering & Flood Warning Group at the Toronto and Region Conservation Authority for over 6 years. *Glenn will serve as the Project Manager for the Study and will be the designated City contact. He will be directly responsible for all aspects of the Study and will also oversee all technical analysis, providing direction to professional and technical staff.*

**Jim Walker, P.Eng. – Hydrology/Hydraulic Modelling** – Jim has more 7 years of experience in the fields of environmental and water resources engineering. He is involved in hydrologic and hydraulic modelling, stormwater management, watershed/subwatershed planning, urban drainage and municipal services design, geo-environmental investigations, environmental monitoring, source water protection, regulatory permitting and approvals, and project management. Through his participation on a wide range of projects for both public and private sector clients, he has gained extensive experience with preliminary and detailed design of engineering works including stormwater management facilities, urban and industrial drainage infrastructure, storm and sanitary sewers, flow monitoring systems, wastewater pumping stations, wastewater treatment systems, water mains and water supply systems. *Jim will be responsible for hydrologic and hydraulic modelling activities and will provide direction to technical support staff.*

**Blair Shoniker, MA, MCIP, RPP – Public Consultation/Class EA Master Planning Process** – Blair holds a Bachelor of Urban and Regional Planning degree from Ryerson University and a Masters in Environmental Impact Assessment and Management from the University of Manchester. He has over 7 years of strategic environmental planning experience and has participated on numerous EAs and development planning applications in Canada, Australia and the UK for both public and private sector clients. Currently, he is involved in a variety of Individual and Class EA projects for provincial highways, waste management, watershed/subwatershed planning, municipal roads and water & wastewater infrastructure throughout Ontario. *Blair will co-ordinate AECOM's public consultation and Master Planning activities and will liaise with City staff as required to ensure that the Study follows the process as set out in the Municipal Class Environmental Assessment, Municipal Engineers Association, 2007.*

**Bryan Valve – Geographic Systems & Mapping** – Mr. Valve has over 7 years of experience in the GIS, Spatial Analysis and Spatial Data Management field. Along with his extensive knowledge of cartographic theory and data visualization he is an experienced GIS modeller. Examples of his modelling work are water balance and runoff/infiltration models, soil contaminant modelling and prediction, watershed modelling, aquifer vulnerability/significant groundwater recharge area modelling as well as the delineation of intake protection zones (IPZ) and sensitivity ranks for source water protection studies in Ontario. He has experience with statistical interpolation methods such as kriging and inverse distance weighting (IDW) and has used them to predict seasonal groundwater levels and the location of geologic formations. Bryan is familiar with geostatistical methods such as hot spot and cluster analysis and has used these methods in geodemographic studies. *For this assignment, Bryan will be responsible for the co-ordination of all GIS and mapping data and production of required maps, plans and presentation materials.*

### **3. Study Approach & Work Plan**

As noted above, the overall Study will follow the Class EA Master Planning process using Approach #1. Phase 1 of the Study, which is the focus of the current work plan, will comprise the major tasks as described in the following sections.

#### **3.1 Background Data Collection and Review**

Background data collection and review will involve a desktop exercise to enable an understanding and synthesis of previously completed studies and relevant supporting information. All data regarding

drainage and infrastructure made available from the City will be consolidated and thoroughly reviewed including, but not limited to the following information:

- all relevant studies and reports provided by the City of Ottawa
- hydrologic and hydraulic modelling completed for development areas within the Study Area
- current SWM design criteria and rainfall data provided by the City of Ottawa (e.g., drainage design guidelines, IDF curves, rainfall depths etc.,)
- GIS information maintained by the City of Ottawa
- available storm drainage design drawings and details

All data received and reviewed will be compiled into a summary table for inclusion in the Phase 1 Study report for reference purposes.

### **3.2 Define Data Gaps & Conduct Field Verification**

Based on the results of the background data collection and review, data gaps will be identified and field investigations conducted to verify existing Study Area conditions including:

- Current status of development
- Land cover and densities
- Drainage direction and boundaries
- Major and minor system outlet locations
- Spot verification of on-site detention (i.e., storage areas, ICD's etc.)

Photographic records of all field observations will be recorded on field inventory sheets and included within the Phase 1 study report appendices for reference.

### **3.3 Prepare Enhanced GIS Study Area Base Map**

Previous studies and reports (i.e., CH2MHILL, 2008) will be utilized in addition to additional data obtained from the City as well as field investigations to prepare an *Enhanced GIS Study Area Base Map*. The Map will include the following data layers:

- Shirley's Brook and Watt's Creek (Kizell Drain) subwatershed boundary (using detailed topographic mapping in consultation with the City of Ottawa)
- boundaries of existing and future Kanata Lakes and Kanata Lakes North development phases
- existing and proposed land uses
- direction of major and minor storm drainage
- location of existing and proposed storm sewers
- location of all major and minor system outlets into the Beaver and Kizell Ponds
- location and type/size of additional off-line SWM infrastructure (e.g., ponds etc.,)
- proposed transportation & infrastructure related projects (i.e., Terry Fox Drive Extension, Goulbourn Forced Road, etc.,)

Available attributes will be integrated with collected spatial data where available. The enhanced base map, in conjunction with background studies and reports will be utilized to prepare a summary write-up describing the history of development within the Study Area including status of all planning approvals.

### **3.4 Preparation of a Comprehensive Hydrologic Model for Existing Conditions**

In order to confirm the performance of the existing Beaver Pond SWM facility that services the Kanata Lakes and Kanata Lakes North developments, a comprehensive single event SWMHYMO hydrologic model will be prepared for existing and proposed lands draining to the facility. The following activities will be completed as part of this task:

- Compile all previous hydrologic models prepared as part of the Kanata Lakes and Kanata Lakes North Developments (KLD & KNLD) and prepare a summary table of model input parameters for review.
- Identify any gaps in modelling using available data from the City in conjunction with field observations.
- Verify model parameters to ensure that updated model is representative of conditions observed in the field. Parameters to be reviewed include:
  - drainage catchment areas
  - impervious ratios
  - Time to Peak (Tp) estimates
  - Curve number (CN) and initial abstraction/losses (IA, depression storage etc.)
  - channel and storage routing elements (e.g., Beaver and Kizell cells)
  - model connectivity
- Review and update as required existing Beaver Pond and Kizell cell stage-storage-discharge relationships using the following data:
  - background reports and studies
  - digital topographic mapping provided by the City
  - detailed survey of the pond and outlet structure (to be provided by the City of Ottawa)
  - visual observations recorded during field investigation
- Incorporate the revised routing information into the comprehensive SWMHYMO model.
- Carry out a preliminary model validation exercise:
  - use recorded rainfall from the July 24, 2009 storm event collected from closest rain gauge station (e.g., Ottawa CDA, local municipal gauge etc.)
  - update antecedent conditions and adjust model parameters accordingly
  - compare simulated water levels within the Beaver Pond with photographs recorded the day following the event
- Execute the updated SWMHYMO model using the original and updated 2-100 year design storms and compare against a range of other design events (AES, Chicago, etc.)
- Summarize peak flows at key points including peak inflows, outflows, storage volumes and maximum pond levels associated with the Beaver Pond as well as the Kizell Pond (undisturbed)

- Compare results to quality/quantity targets documented in previous reports as well as the Certificate of Approval (C of A) issued by the Ministry of the Environment (MOE) for the Beaver and Kizell cells (No. 5190-7L6RRY, November 2008).
- Plot the maximum existing condition 100-year water level (original and updated design storm depths) within the Beaver Pond on detailed topographic mapping in order to identify potential impacts to adjacent buildings, roads and infrastructure.
- Record conclusions and initial recommendations in the Phase 1 Study Report, including all supporting calculations and modelling output.

### **3.5 Preliminary Hydrologic Assessment for Future Land Use Conditions**

In order to assess impacts to the existing facility as well as downstream peak flows under future land use conditions, the remaining lands within the Study Area that are proposed for development (i.e., Kanata Lakes North development) will be integrated into the comprehensive SWMHYMO model. The following activities will be carried out as part of this task:

- Prepare input parameters for the remaining development areas using data extracted from background reports. Review to ensure consistency with the existing condition SWMHYMO model as well as the City of Ottawa's Sewer Design Guidelines (i.e., major system design)
- Re-run model for 2-year to 100-year design storms and summarize output in report tables and provided in supporting report appendices
- Complete a comparison of Beaver and Kizell cell peak inflows, outflows, storage volumes and maximum water levels under both existing and future conditions
- Compare results to quality/quantity (flood control) targets documented in previous reports as well as the Certificate of Approval (C of A) issued by the Ministry of the Environment (MOE) for the Beaver and Kizell cells (No. 5190-7L6RRY, November 2008)
- Plot the maximum future 100-year water level (original and updated design storms) within the Beaver and Kizell cells on detailed topographic mapping and identify potential impacts to adjacent buildings, roads and infrastructure
- Complete an additional assessment of the Kizell Pond to confirm the preliminary outlet configuration (i.e., at Goulbourn Forced Road crossing) and minimum berm requirements in order to prevent a "spill" to the Carp River watershed and continue to meet the proposed targets as noted in the MOE C of A
- Record conclusions and initial recommendations in the Phase 1 Study report, including all supporting calculations and modelling output

### **3.6 Public Consultation/Class EA Master Planning Process**

As noted above, Phase 1 of the Study will follow a Class EA Master Planning process, Approach # 1 (MCEA, 2007). Accordingly the following activities will be carried out as part of this task:

- Preparation of a Problem & Opportunity Statement

- Preparation of all Public Information Centre (PIC) material including PowerPoint presentations, handouts and boards (all presentation materials will be circulated to the City for review and approval prior to the PIC).
- Compilation of and response to comments received.

The City of Ottawa will be responsible for co-ordination and issuing all notices and web page updates.

### **3.7 Study Meetings/Co-ordination**

The following meetings and project co-ordination activities are proposed as part of the Phase 1 Study:

- The Project Manager will attend two (2) Technical Working Group (TWG) meetings with City of Ottawa staff.
  - Meeting # 1 - review interim results of the hydrologic modelling update, request any remaining information, resolve any outstanding items prior to finalizing the analysis and discuss the scope of the TAC meeting
  - Meeting # 2 – discuss the draft Existing Conditions report and confirm presentation material for Public Information Centre # 1
- The Project Manager/Director will attend one (1) meeting with the Technical Advisory Committee (TAC). It is anticipated that the meeting will be co-ordinated by the City prior to PIC # 1 to discuss initial results of the Phase 1 analysis and confirm the anticipated scope of the Phase 2 Study.
- The Project Manager, along with key Study Team members will participate in a Public Information Centre (PIC#1) to present the initial findings of the Phase 1 Study.

### **3.8 Study Deliverables**

Phase 1 Study deliverables will include the following:

- Preparation of background materials, presentation information and minutes/action items arising from the two (2) meetings with City of Ottawa staff and one (1) meeting with the TAC
- Preparation of all presentation materials associated with the initial Public Information Centre (PIC#1)
- Preparation of a Draft and final Phase 1 Study Report that:
  - describes the approaches and methodologies used to assess the Beaver Pond and Kizell cell SWM performance under current and future build-out conditions;
  - summarizes the results of the comprehensive hydrologic modelling carried out to confirm the above;
  - discusses Phase 1 Study findings and initial recommendations pertaining to possible stormwater management alternatives for remaining development areas within the Study Area;

- identifies an initial scope of work for Phase 2 under the Master Plan Class EA process;
- includes all field observations, supporting calculations and modelling output; and
- is formatted to integrate into the overall Class EA Master Plan document that will be completed at the conclusion of Phase 2;
- digital versions of all modeling input/output files, supporting graphics, and updated GIS information;
- .pdf and Word version of final report; and
- 15 hard copies of the final report.

#### 4. Study Schedule

It is anticipated that five months will be required to carry out Phase 1 of the Study. Assuming an October 2010 start-up, AECOM can commit to completing the required technical analysis, public consultation activities and report preparation as noted in the above tasks by the end of February, 2011. A detailed Study Schedule indicating the time requirements for each major task is presented in attached **Table 1**.

We look forward to working closely with the City of Ottawa in order to successfully complete this challenging yet interesting phase of the Class EA Master Planning process. Should you have any questions or require additional information please do not hesitate to contact the undersigned to discuss.

Sincerely,  
**AECOM Canada Ltd.**



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GAF:mm  
Encl.

Table 1  
Shirley's Brook/Watts Creek Stormwater Management Study  
Phase 1 Study Schedule

Task ID	Description	Style	Start	Finish	Oct '10			Nov '10				Dec '10				Jan '11				Feb '11						
					10	17	24	31	07	14	21	28	05	12	19	26	02	09	16	23	30	06	13	20	27	06
3.1	Background Data Collection & Review		Mon 10/11/10	Mon 10/25/10	[Task Bar]																					
3.2	Define Data Gaps & Conduct Field Investigations		Mon 10/25/10	Mon 11/08/10			[Task Bar]																			
3.3	Prepare Enhanced GIS Study Area Base Map		Mon 11/08/10	Mon 11/22/10				[Task Bar]																		
3.4	Preparation of Comprehensive Hydrologic Model for Existing Condition		Mon 11/08/10	Mon 12/20/10			[Task Bar]																			
3.5	Preliminary Hydrologic Assessment for Future Conditions		Mon 12/13/10	Mon 01/17/11								[Task Bar]														
3.6	Public Consultation / Class EA Master Plan Process		Mon 10/11/10	Mon 02/14/11	[Task Bar]																[Task Bar]					
3.7	Study Meetings / Coordination		Tue 12/14/10	Tue 02/15/11																						
3.8	Study Documentation		Fri 01/21/11	Mon 02/28/11																						

TWG #1 DEC 14/10      TAC #1 JAN 14/11      TWG #2 FEB 8/11      PIC #1 FEB 15/11

Draft Report JAN 21/11      Final Report FEB 28/11



Task [Task Bar]      PIC Meetings [Pink Circle]      Technical Advisory Committee (TAC) Meetings [Yellow Star]

Technical Working Group Meetings [Green Diamond]      Deliverables [Red Square]