MARKHAM

Report to: Development Services Committee Date Report: March 18, 2014

**SUBJECT:** Guidelines for Management of Small Streams and Headwater Drainage Features

**PREPARED BY:** Abdullah Hossain, Sr. Environmental Engineer, Ext. 2628
Lilli Duoba, Manager, Natural Heritage, Ext. 7925

## RECOMMENDATION:

1) **THAT** the staff report entitled "Guidelines for Management of Small Streams and Headwater Drainage Features" be received;

2) **AND THAT** the City adopt the Toronto and Region Conservation Authority (TRCA) Evaluation, Classification and Management of Headwater Drainage Features (HDFs) Guidelines as the new protocol in evaluation and classification of headwater drainage features;

3) **AND THAT** City staff be directed to update the Markham Official Plan (Adopted December 2013), and other environmental guidelines to reflect the TRCA's HDFs Guidelines;

4) **AND THAT** staff be authorized and directed to do all things necessary to give effect to this resolution.

## PURPOSE:

The purpose of this report is to:

- Inform Council of the new TRCA Evaluation, Classification and Management of Headwater Drainage Features (HDFs) Guidelines;
- Recommend Council adopt the TRCA's HDFs Guidelines and undertake the necessary modifications to Markham Official Plan and other environmental or engineering guidelines/documents to replace the use of the Markham Small Streams Study protocol;
- Seek Council's approval to use the TRCA's HDFs protocol to evaluate and classify the headwater drainage features in the studies currently underway in support of the development of the City's Future Urban Area, and in other development applications.

## BACKGROUND:

Headwater drainage features (HDFs), also referred to as small streams, are ill-defined, temporary, small drainage features on the landscape that may not have defined stream bed or bank, and that convey flows periodically, intermittently or for a short period of time during or

immediately after rainfall or snow melt. These HDFs generally connect to larger watercourse systems and provide a valuable contribution to the health of watersheds including source water protection, groundwater recharge, attenuation of runoff, moderation of water temperature, enhancement of water quality and provision of habitat for terrestrial and aquatic species. These HDFs are not automatically protected in the same manner as clearly-defined watercourses, and they need to be assessed in terms of their form and function to determine how these features are to be managed over the long term and within the context of new development. Markham contains many headwater or small stream features in the rural area.

In 2002, the City of Markham in the absence of any provincial guidelines, retained consultants and prepared a comprehensive evaluation and management protocol and guideline to provide a clear decision making tool and to generate principles, strategies and guidelines for the protection and long-term management of small streams. The objective of the protocol and guideline was to maintain and enhance these drainage features where there is a demonstrated stream function to safeguard the health of the watershed ecosystem. Markham was the pioneer for this award winning strategy and was the first municipality to proactively provide guidance on the assessment and management of small drainage features. Markham's Small Streams Study (SSS) classification process and management recommendations are applicable only for those drainage features that are not regulated by the TRCA under Section 28(1) of the *Conservation Authority Act, R.S.O. 1990, c. C.27* . The study was endorsed by Council on February 20, 2007, and subsequently implemented through various City guidelines and the Markham Official Plan (Adopted December 2013).

In 1998, the *Conservation Authorities Act,* was amended and subsequent approval of individual Section 28(1) Regulations by the Minister of Natural Resources in May 2006, gave all Conservation Authorities the legal right to apply a consistent definition of "watercourse," which is: *"An identifiable depression in the ground in which a flow of water regularly or continuously occurs"* (Section 28 (25) of the *Conservation Authorities Act*). Characteristics that qualify a feature as a headwater drainage feature could also qualify that same feature as a watercourse under this definition and be subject to the conservation authorities' Section 28 regulations. With this change in definition of "watercourse", the TRCA together with the Credit Valley Conservation Authority (CVC) commenced a process to develop headwater guidelines to support the newly passed regulation. The City's Small Streams Study was an important input into the conservation authorities' work. In July 2013, the TRCA released its new headwater stream classification protocol entitled "Evaluation, Classification and Management of Headwater Drainage Features Guidelines (CVC and TRCA,)" (hereafter referred to as the HDFs Guidelines) to provide a consistent framework for the assessment, classification and management of headwater drainage features across their jurisdictions. This document was finalized in January 2014 and is available on the TRCA website: http://trca.on.ca/dotAsset/178334.pdf

The City's Small Streams Study was significant because it filled the gap of headwater drainage features protection when these features were not regulated by TRCA. Headwater drainage features are now required to be assessed in accordance with the TRCA's new HDFs Guidelines. The requirement to also assess these features using Markham SSS creates not only a duplication in effort and resources, but also has been demonstrated to potentially result in different

management recommendations creating a potential duplication of terms of guidelines. City staff have consulted with TRCA, Ministry of Natural Resources and the consultants retained for the City's Subwatershed Studies to confirm that the goals and standards for headwater feature protection are consistent between the documents and that endorsement of the TRCA's protocol would not diminish the City standard for management of these headwater features. Given the new legislation and definitions which now guide interpretation of headwater drainage features, the City's Small Streams Study is dated and is no longer a tool that the TRCA can utilize. In a letter dated January 6, 2014, TRCA reiterated Markham's significant contribution to the protection of small stream features and requested that the City now consider using the HDFs Guidelines for the assessment and management of HDFs in the City of Markham, replacing the Markham SSS protocol, see Attachment "A".

## OPTIONS/ DISCUSSION:

TRCA's HDFs Guidelines

Staff from various City departments have reviewed the TRCA's HDFs Guidelines. The ultimate goals and objectives of TRCA's HDFs Guidelines and Markham SSS are the same, i.e. providing protection, enhancement and long-term management of HDFs or small streams to ensure the health of the watershed ecosystem. While the field data collection methodology and classification system of small drainage features are different in the two documents, the overall process are similar and broadly divided into three components:

- Evaluation of Drainage Features: Desktop exercise and field data collection.
- Classification of Drainage Features: Data Analysis and Feature Classification based on functional importance in the watershed.
- Management Recommendation of Drainage Features: Management strategy based on Feature Classification to maintain the form and/or functions.

As mentioned earlier, a large part of the TRCA's HDFs Guidelines are founded on and are consistent with Markham SSS. However, staff identified a few key differences in the two protocols that demonstrated major advantages in using TRCA's HDFs Guidelines. These differences are summarized in Attachment "B".

Landowner and Agency Input

The Ministry of Natural Resources (MNR) has considerable interest in evaluation, classification and management of headwater drainage features related to the Redside Dace Recovery Strategy under the *Endangered Species Act, 2007, S.O. 2007, c. 6.* MNR staff are stakeholders in the City's Subwatershed Studies and support the use the TRCA's HDFs Guidelines.

Landowners in the City's Future Urban Area and their consultants have identified a preference for use of the TRCA's HDFs Guidelines, given the clearer articulation of science standards, ease of use and clear management recommendations, and many consultants have been trained in the Ontario Stream Assessment Protocol (OSAP) module need to implement the guidelines. The

City's Subwatersed Studies' consultant for the Future Urban Area also supports the use of the TRCA's Guidelines.

Implementation

In order to move forward and transition from the City's Small Streams Guidelines to the TRCA's HDFs Guidelines, staff will be required to recommend to the Regional Municipality of York appropriate modifications to the City's Official Plan including wording changes to policy 3.3.2.7, wording changes to the definition of *sensitive surface water features* and modify Appendix B to the OP. As City standards manuals are updated including Markham's Stormwater Management Guidelines, the appropriate revisions will also be undertaken.

**Conclusion**

Based on City staff assessment and feedback from external stakeholders, staff recommend that the TRCA's HDFs Guidelines be adopted for use in the City replacing the Markham SSS as the protocol for evaluation, classification and protection of headwater drainage features for the following key reasons:

1. HDFs Guidelines incorporate headwater stream definitions consistent with the *Conservation Authorities Act*,
2. HDFs Guidelines identify information inputs and provides a clear process for the evaluation of headwater drainage features,
3. HDFs Guidelines has the same objectives as the Markham SSS for the evaluation of features to determine protection in situ, protection of function/modification of feature or removal of feature based on assessment of form and function,
4. HDFs Guidelines are widely used by consultants and municipalities for land development in the TRCA and CVC areas and training is provided to assist in the implementation. HDFs Guidelines are supported by landowners and the Ministry of Natural Resources,
5. HDFs Guidelines consider the terrestrial features, and
6. HDFs Guidelines provide the practitioners flexibility in how certain features are to be managed and protected.

## FINANCIAL CONSIDERATIONS AND TEMPLATE: (external link)

Not applicable to this report.

## ALIGNMENT WITH STRATEGIC PRIORITIES:

The implementation of the recommendations provided in this report are in-line with the City's environmental goal and focus to protect, enhance and restore Markham's natural features and green spaces as part of a vital and healthy ecosystem.

## BUSINESS UNITS CONSULTED AND AFFECTED:

This report was discussed with TRCA and circulated internally to the Asset Management and Planning Departments, and their comments have been incorporated into this report.

## RECOMMENDED BY:

**Alan Brown, C.E.T**
**Director of Engineering**

**Jim Baird, M.C.I.P, R.P.P**
**Commissioner, Development Services**

## ATTACHMENTS:

Attachment "A": TRCA Letter dated January 6, 2014

Attachment "B": Summary of Differences between Markham SSS and TRCA's HDFs Guidelines

Attachment "A"

Toronto and Region Conservation
*for* The Living City

January 6, 2014

CFN 50400

By mail and email (lduoba@markham.ca)

Ms. Lilli Duoba, MES, MCIP, RPP
Manager, Natural Heritage
City of Markham
101 Town Centre Boulevard
Markham, ON L3R 9W3

Dear Ms. Duoba:

**Re: Markham Small Stream Study Integration with TRCA's Headwater Drainage Features Guidelines**

The purpose of this letter is to request that the City of Markham consider adopting the TRCA's more recent Headwater Drainage Features Guideline in order to capture new definitions from the Province through the Conservation Authority's (CA) generic regulation, advancements in the science around small streams and to provide consistency with other CAs and Provincial protocols.

First of all, we would like to congratulate the City of Markham for pioneering the development of a guideline that, for the first time, attempted to address the impacts of changes in land use on the natural functions of Headwater Drainage Features (HDFs, also known as small streams). Never before had any municipality or natural resource agency attempted to do this. Markham lead the way in raising awareness of the importance of these, previously under-valued and over-looked features, to watershed health. Markham committed the time and funds to undertake the necessary background scientific investigation that resulted in the first evaluation, classification and management framework for small streams. TRCA is grateful to Markham for inviting us to participate in that process. We know that it was a long and complicated one.

TRCA has always recognized the importance of small streams to watershed health, but could not always achieve their protection or appropriate management. In large part, it was the completion of Markham's Small Stream Study that set the foundation for TRCA to pursue the development of a guideline that would apply a consistent framework for the management of HDFs across our jurisdiction.

Subsequent to Markham finalizing its Small Streams Study, TRCA, as well as all other Conservation Authorities, underwent changes to its regulatory framework as part of the Generic Regulation conformity exercise in 2006. These changes gave all Conservation Authorities the legal ability to apply a consistent definition of "watercourse", which is: "*an identifiable depression in the ground in which a flow of water regularly or continuously occurs*" (Section 28(5) of the Conservation Authorities Act). This definition provided the legal framework to apply the regulation in a way that would include more than just features with "defined bed and banks", as

previously applied in practice by TRCA. Characteristics that qualify a feature as an HDF could also qualify that same feature as a watercourse under this definition and be subject to the conservation authorities' Section 28 regulations.

Due to these regulatory changes, TRCA undertook a Headwater Study to synthesize the current understanding of the natural functions of Headwater Drainage Features. This study also identified scientific gaps and the process for addressing these gaps, developed a monitoring protocol for HDFs, as well as a guideline to apply a consistent framework for managing these features on the landscape. The monitoring protocol was developed over a period of 3-4 years in partnership with the Ministry of Natural Resources and a number of Conservation Authorities across southern Ontario. This protocol has now been adopted by the Province as a module in the Ontario Stream Assessment Protocol (OSAP), which is the Provincial standard for conducting monitoring within wadable streams. This module forms the basis of the evaluation section of TRCA's HDF Guideline.

TRCA released an interim guideline in 2007. The interim guideline was used by TRCA, other CAs and consultants working on development plans. The results of the on-going research and experiences of the practitioners were used to refine and update the guideline. The final guideline was approved by the TRCA Board in July 2013.

TRCA's HDF Guideline is really a representation of the evolution of our scientific understanding and practical application of field evaluation criteria since the Markham Small Stream Study was completed. TRCA's guideline is currently being used by Conservation Authorities across southern Ontario, and it is our hope that this document provides a consistent framework for managing HDFs within our regulatory mandate. There already exists a contingent of consultants that have been trained in applying the headwaters OSAP module, and have experience in applying the TRCA Guideline through urban development applications.

Ultimately, the goals and objectives of the Markham Small Stream Study and TRCA's HDF Guideline are the same: providing protection for the natural functions of HDFs/small streams. As such, we are asking that the City of Markham consider using TRCA's Guideline for the assessment and management of HDFs in the City of Markham in order to provide consistency and a more stream-lined and cost-effective process for achieving protection and management of these important features and their hydrologic functions. In addition, the City of Markham and TRCA will need to collaboratively establish a policy implementation framework that can achieve our mutual interests in HDFs within the purview of our respective legislative planning and regulatory roles and responsibilities.

Sincerely,

Carolyn Woodland, OALA, FCSLA, MCIP, RPP
Director, Planning and Development

CW/db

Attachment "B"

Summary of Differences between Markham SSS and TRCA's HDFs Guidelines

| **Markham SSS Guidelines** (February 2007) | **TRCA HDFs Guidelines** (January 2014) | **Staff Remarks** |
|---|---|---|
| SSS was initiated to provide management recommendation of small streams (with no defined bed and banks) which were not regulated by TRCA based on the old definition of "watercourse" (Pre-2006). | New definition of watercourse was introduced in generic regulation of *CA Act* in 2006. Based on the new definition of watercourse, small streams are considered watercourses and are subject to TRCA's regulation. | Both guidelines provide a process for review and evaluation of small drainage features. |
| No specific guideline on field data collection methodology. | Clear protocol for field data collection and evaluation based on Ontario Stream Assessment Protocol (OSAP) modules developed by the Ministry of Natural Resources (MNR) and TRCA. | Consultants are trained to use the OSAP modules. This is consistent with protocol of conservation authorities. |
| SSS provides limited direction for timing of field surveys. | Direction provided for timing of field surveys. | Greater clarity provided in HDFs to ensure consistency in field surveys. |
| SSS protocol has no flexibility to alter the features that are within the recharge/discharge zone. | TRCA guidelines have better science and therefore permit greater flexibility in classification of the features that are within the recharge/discharge zone. | More flexibility provided in the HDFs based on updated science |
| SSS classification is intended for a single homogeneous feature (does not recognize different characteristics of each section). Does not take into account changes in form and function along the length of the feature. | Better science in classification system to take into consideration individual section of a watercourse. Takes into account changes in form and function along the length of the feature. | HDFs can deal with a larger system which does not have a single homogeneous form and function. |

| **Markham SSS Guidelines** (February 2007) | **TRCA HDFs Guidelines** (January 2014) | **Staff Remarks** |
|---|---|---|
| | | |
| SSS has utilized the 'form/shape' as a tool to assist in classifying the features. Three evaluation flow charts are provided, one for each of the three groups based on form only:<br>• Group A- Conveyors<br>• Group B- Conduits<br>• Group C- Attenuators.<br>Each flowchart is used to determine the overall ranking of the feature with respect to its functions and finally ranked in three classes:<br>• Class 1: Most significant feature; must be protected in existing shape and function.<br>• Class 2: Moderated significant; can be altered if form and function are enhanced.<br>• Class 3: Least significant; can be eliminated. | A single simplified classification flow chart is provided in TRCA guidelines. TRCA guidelines do not distinguish the features in terms of 'form', but in terms of functional importance (e.g. important, valued, contributing, limited) in the following four categories:<br>• Hydrology<br>• Riparian<br>• Fish habitat<br>• Terrestrial<br>Based on the functional importance of the features in each of the above categories; a clear, easily understood management recommendation is provided:<br>• Protection<br>• Conservation<br>• Mitigation.<br>• Maintain Recharge<br>• Maintain/ Replicate Terrestrial Linkage<br>• No Management. | HDFs provides a better yet simpler classification system based on 4 key natural functions of headwater features:<br>• Hydrology<br>• Riparian<br>• Fish habitat<br>• Terrestrial<br>TRCA's management options are comparable to Markham ones as follows:<br>Protection = Class 1<br>Conservation = Class 2<br>Mitigation = Replicate function through LIDs etc. |
| Markham SSS classification system does not consider the terrestrial function of the features | TRCA guidelines consider the terrestrial function in classifying the features, which is an important function of the headwater features, | Terrestrial features are evaluated and protected in HDFs |
| SSS does not make reference to Low Impact Development (LID) or Stormwater Management (SWM) options since the SSS was completed prior to the advent of LID as a SWM tool. | TRCA guidelines allow the use of innovative LID techniques as a mitigation tool to replicate or enhance the function of headwater drainage features. | There is only limited mention in the SSS with respect to innovative SWM techniques as a means to replicate or enhance the function of small streams and this is consistent with the LID approach. |