CITY OF VAUGHAN

EXTRACT FROM COUNCIL MEETING MINUTES OF JUNE 24, 2014

Item 1, Report No. 26, of the Committee of the Whole, which was adopted, as amended, by the Council of the City of Vaughan on June 24, 2014, as follows:

By approving that the City of Vaughan's Natural Heritage Network Study be shifted into its own line item, to recognize that it is not part of the Landowners' background environmental studies.

Regional Councillor Di Biase declared an interest with respect to the foregoing matter insofar as it relates to Block 27, as his children own land in Block 27 given to them by their maternal Grandfather and did not take part in the discussion or vote on the matter.

1 NEW COMMUNITY AREAS
VAUGHAN OFFICIAL PLAN 2010
SECONDARY PLAN STUDIES - SUB-WATERSHED COMPONENT
TERMS OF REFERENCE FOR THE SUB-WATERSHED STUDIES: BLOCKS 27 & 41
FILE: 26.4
WARD 1

The Committee of the Whole recommends approval of the recommendation contained in the following report of the Commissioner of Planning, Interim Director of Planning/Director of Development Planning, and Manager of Policy Planning, dated June 3, 2014:

Recommendation

The Commissioner of Planning, Interim Director of Planning/Director of Development Planning, and Manager of Policy Planning in consultation with the Director of Development Finance & Investments recommend:

1. That the Terms of Reference forming Attachments 2 and 3, be endorsed as the basis for undertaking the Sub-watershed Studies which will support the preparation of the Secondary Plans and inform the subsequent preparation of Block Plans and supporting studies for the Blocks 27 and 41 New Community Areas.

2. That the Sub-watershed Studies (the "SWS") be undertaken by the Blocks 27 and 41 Landowners' Environmental Consultants and the full cost of each of the studies be funded wholly by the respective Landowner Group with no recovery from City funds.

3. That the Sub-watershed Studies be completed in consultation with, and to the satisfaction of, the City of Vaughan and TRCA; and, that they be subject to Peer Reviews to be undertaken on behalf of the City as part of the Secondary Plan process, and these peer reviews be funded through the previously approved 2013 Capital Budget for the New Communities' Secondary Plan Studies (PL-9535-13 and PL-9533-13).

4. That staff proceed to initiate procurement of Secondary Plan Study Consultants as per the Council approved recommendation of December 10, 2013; and, that the City Manager be delegated authority to award the contracts during the summer or election hiatus if necessary.

5. That this report and corresponding Council minutes be forwarded to the Toronto and Region Conservation Authority and York Region for information purposes.

Contribution to Sustainability

Policies arising from these studies must be consistent with those of the Provincial Policy Statement 2014, the Provincial "Places to Grow: Growth Plan for the Greater Golden Horseshoe",

…/2

the York Region Official Plan, the Vaughan Official Plan 2010; and, with "Green Directions Vaughan, Community Sustainability and Environmental Master Plan" respecting sustainable development and complete communities. The latter includes consideration of the Objectives and Actions under:

- Goal 2: To ensure sustainable development and redevelopment;
- Goal 3: To ensure that Vaughan is a city that is easy to get around with a low environmental impact; and
- Goal 4: To create a vibrant community where citizens, business and visitors thrive.

Economic Impact

It is proposed that the sub-watershed studies be completed by the Blocks 27 and 41 landowner groups' Environmental Consultants and funded fully by the landowners, with no expectation of recovery for these costs. Upon completion, the studies will be peer reviewed by the City's Environmental Consultants retained for the Secondary Plan Studies. The budget that has been allocated to the Secondary Plan Studies is sufficient to cover the costs of the City's peer reviews for each of the studies. Each peer review is expected to cost between $15K and $20K. Funding the peer reviews from these capital projects is not expected to have any adverse impact on the City's ability to fund the remaining costs of the Secondary Plan Studies.

The funding for the New Communities' Secondary Plan Studies was approved in the 2013 Capital Budget as follows:

- New Community - Block 27: Project PL-9535-13, budgeted at $515,000.00 ; and
- New Community - Block 41: Project PL-9533-13, budgeted at $515,000.00.

Communications Plan

The Secondary Plan Studies will require a public consultation program involving three stakeholder groups:

- A Technical Advisory Committee (TAC) made-up of the public sector, with representation from the Provincial and Regional governments, technical agencies and authorities, and utilities;
- A Landowners' and Landowners' Representatives Group (LLRG) focusing on landowners in the study area; and,
- Broader public consultation through a Wider General Consultation Program (WGCP).

Meetings will be held with the groups jointly, and separately as required and at important milestones throughout the study process. The RFPs for the Secondary Plan Studies will require the submission of public consultation plans as part of the proposal package. The final public consultation process will be approved by the Commissioner of Planning in consultation with the Director of Corporate Communications, prior to the initiation of the respective studies by the successful proponents. The peer review process for the sub-watershed studies will be part of the Secondary Plan process.

Purpose

To report back to Committee of the Whole on the Terms of Reference for the Sub-watershed Study (SWS) component of the New Communities' Secondary Plan process, and the funding and

implementation strategy for the completion of the studies; and to obtain endorsement of the draft terms of reference for the SWS, for the purposes of moving forward concurrently with and in support of the Secondary Plan process.

In addition, Council approval is sought to delegate the awarding of the consultant contracts for the Secondary Plan Studies within the approved funding envelope, during the summer or election hiatus if required.

Background - Analysis and Options

On December 10, 2013, Council directed that Staff proceed with the completion of individual Terms of Reference for the New Communities' Secondary Plan Studies and to proceed with the preparation and issuance of the Requests for Proposal. Council directed (in part):

> "That Planning staff report back to a future Committee of the Whole meeting on the Terms of Reference for the Sub-watershed Studies for the New Community Areas; and, a financial strategy detailing the expected costs and funding sources for their completion, after further consultation with TRCA and landowners."

Since the sub-watershed studies are required components of the Secondary Plan studies as per VOP 2010 policy, staff cannot proceed to finalize and issue the terms of reference for the Secondary Plan consulting work until the foregoing Council directive has been addressed.

Vaughan Official Plan (VOP) 2010

The VOP 2010, policy 9.2.2.14 - New Community Areas, d. ii) requires the completion of a sub-watershed study to be undertaken by the TRCA in coordination with the City, either preceding the Secondary Plan or concurrent with it.

Discussions were held with the TRCA, the landowners and the City to establish the most effective way of undertaking the SWS. The landowners, through their respective consulting teams have already prepared substantial amounts of detailed environmental data respecting the new community blocks and the adjacent areas. The TRCA also has data which can inform the preparation of the studies. In addition, the City, through the Natural Heritage Network Study, the earlier work on VOP 2010 and a number of Master Plan Studies (including the City-Wide Stormwater Management Master Plan Class EA), has background data and information that can contribute to the sub-watershed studies.

On this basis it was jointly decided that the respective consulting teams for Blocks 27 and 41 would be responsible for the preparation of the SWS for their affected sub-watersheds. It was agreed that the terms of reference would be developed by the TRCA, the City and the landowners' consultants; and, that the resultant studies would be subject to the approval of the City and TRCA. In this process all parties will be able to benefit from the existing data pool and any gaps would be subject to further analysis.

The TRCA has confirmed that it is in agreement with this approach. This is reflected in correspondence received from the TRCA, dated May 14, 2014, which advises that they are satisfied with the terms of reference for the SWS attached to this report as Attachments 2 and 3, and that Policy 9.2.2.14 – New Community Areas, d. ii) of the VOP 2010 will be addressed through the approach described above.

Development of the Terms of Reference for the Subwatershed Studies

The development of the terms of reference for the SWS has been part of an ongoing consultation process. Staff met with the TRCA, the landowners and their consultants on December 9, 2013 to

discuss the preferred approach to preparing the SWS, and the general requirements for the studies.

In January, 2014, staff met with each of the Blocks 27 and 41 landowner/consultant groups and TRCA staff, to define the required study components, preferred modelling approaches and the level of detail required for each of the SWS areas. Draft terms of reference were later submitted by each of the Blocks' Environmental Consultants in March of 2014; and further working meetings were held with City staff, TRCA and the landowners and their consultants in March and April of 2014 to review the drafts. Through consultation and the subsequent review of draft submissions, the terms of reference have been refined and the results are reflected in Attachments 2 and 3 to this report.

City staff, TRCA, the landowners and their consultants have all indicated that they are satisfied that the proposed terms of reference are appropriate to achieve the scope and monitoring requirements of the new communities' sub-watershed studies. The research and monitoring, which will be completed for the SWS areas, will also provide background information for the future Master Environmental Servicing Plans (MESP) which will be undertaken at the Block Plan approval stage.

Definition of Sub-watershed Study (Plan)

On May 6, 2014, the Toronto and Region Conservation Authority released the latest draft of *The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority* (the "LCP") for comment, prior to its final adoption by the TRCA Board later this year. It defines a *Watershed* as:

> *"The entire area of land whose runoff water, sediments and dissolved materials, drain into a lake, river, creek, or estuary. Its boundary can be located on the ground by connecting the highest points of the area around the river, stream or creek, where water starts to flow when there is rain. It is not man-made and does not respect political boundaries."*

A *Sub-watershed* is defined as:

> *"A subdivision of a watershed based on hydrology, generally corresponding to the area drained by a small tributary, as opposed to a major river."*

A sub-watershed plan provides a framework for integrated decision-making for the management of human activities, land, water, aquatic life, and aquatic resources within the sub-watershed area. Sub-watershed studies typically include the characterization of aquatic and terrestrial resources, an analysis of surface and groundwater systems, an assessment of potential land use impacts on existing resources, and the identification of management strategies to address a range of watershed management objectives. They also provide input into land use studies on natural heritage systems and approaches to surface and groundwater management that affect land use plans and/or servicing approaches. These general requirements for sub-watershed plans are typically tailored to sub-watershed specific conditions and local municipal needs and processes.

In this instance the sub-watershed studies will apply to individual headwater tributaries of the Humber and the Don Rivers, adapted to the scale and context of each of the study areas, as reflected in the attached terms of reference. Planning at the watershed and sub-watershed scale allows for the better assessment of cumulative effects and support for integrated, long-term planning.

Location of the Block 27 and 41 Sub-watershed Study Areas

The Block 27 sub-watershed area is part of the "Upper West Don Sub-watershed Area" as shown on Attachment 5. The SWS for Block 27 will consider the total area outlined as the "Upper West Don Sub-watershed", but for certain tasks will focus on smaller areas within the defined boundary.

The Block 41 sub-watershed area forms part of the larger "Purpleville Creek Sub-watershed" of the Humber River, as outlined on Attachment 6. Some of the Block 41 SWS work will apply to the entire area of the Purpleville Creek Sub-watershed, while other tasks outlined in the terms of reference will apply only to the Block 41 lands.

Scope of the Terms of Reference

Recognizing that the natural land features, wildlife species and planning regulations vary across different areas of the City, and that differing sets of background data are available respecting the New Community Areas, an individualized terms of reference has been prepared for each block. A summary of each terms of reference is provided below in sections A and B of this report.

A. Block 27 SWS Terms of Reference

The Block 27 SWS terms of reference includes 6 study components, which are highlighted in the following sub-sections:

1) Hydrology update and Stormwater Management Criteria Verification

   The hydrology update and stormwater management criteria verification is intended to estimate the potential hydrologic impacts to the sub-watershed area as a result of the proposed development for the Block 27 area. This work will aid in the siting of potential stormwater management ponds. The V02 hydrology model will be updated to reflect future considerations including proposed land use and proposed stormwater controls.

2) Regional Storm Assessment and Flood Impact Mitigation Strategy

   The Regional storm assessment and flood impact mitigation strategy will update the hydrologic model to determine the potential flood impacts to the Block 27 SWS area as a result of the proposed development and confirm recommended flood control criteria for future development lands.

3) Erosion Assessment

   An erosion threshold analysis, including field investigation, continuous modelling and evaluation of various control methods will be completed for the upper portion of the Upper West Don River Sub-watershed. This will require the development of a continuous model for the evaluation of the frequency at which erosive flows are experienced within the sub-watershed.

4) Hydrogeology

   The hydrogeological component of the sub-watershed study will focus on the immediate Block 27 land area and will present a high level assessment of existing hydrogeological conditions based on a desktop study of existing information.

In addition to a characterization of existing conditions, the study will include preliminary identification of potential development constraints (eg. groundwater receptors to be protected) and opportunities (eg. areas where enhanced infiltration may be feasible) that should be considered in more detail at the Master Environmental Servicing Plan (MESP) phase.

5) Water Balance

The water balance component of the SWS will focus on the Block 27 land area. It will present a high level assessment of the overall Block 27 water balance as well as identify features that are to be preserved and that may require recharge. The study will include preliminary identification of potential opportunities (eg. Areas where recharge may be feasible) that should be considered in more detail at the MESP phase. The results of the field examinations will be used to recommend mitigation strategies to maintain functions of natural areas to the extent feasible in this future urban setting.

6) Natural Heritage Assessment/Ecology

Based on the information available, existing natural heritage conditions will be described, including aquatic and terrestrial features and functions. This summary will be augmented with information obtained from the City's NHN Study and other relevant sources such as the TRCA and the Ontario Ministry of Natural Resources.

Additional updated natural heritage information will be required in support of the SWS, including headwater drainage features assessments, breeding bird surveys, updated ecological land classification mapping and community descriptions on participating properties within Block 27. A top-of-bank and features delineation will also be completed in conjunction with the TRCA and City staff.

B. Block 41 Sub-watershed Study Terms of Reference

The Block 41 SWS terms of reference focuses on the following 4 study components:

1) Regional Storm Assessment

The purpose of this component of the Block 41 SWS is to determine the need for, and if required, the type/size of Regional storm controls or other potential mitigation measures for future developing areas in the SWS area.

As part of this assessment, the existing Regional storm floodplain model and mapping will be reviewed and updated as required to reflect existing and future uncontrolled flows; and to identify existing and uncontrolled Regional storm water levels in downstream areas. In addition, the area downstream of Block 41, in the northern portion of Block 40, will be reviewed and the floodplain mapping updated as required.

2) Erosion Assessment

As part of this component of the SWS, detailed mapping and aerial photography, will be reviewed, stream reach delineated, and erosion thresholds determined to assist with stormwater management design (erosion control) for the SWS area. Based on the work completed through the erosion assessment, stormwater design criteria for stormwater management facilities and/or LID measures will be incorporated into the development design to maintain to the extent practical, existing conditions erosion potential.

3) Floodplain Delineation

The focus of this component of the SWS is the delineation of hazard lands within Block 41 consistent with the Provincial Policy Statement, the VOP 2010, and the TRCA requirements. The resulting mapping will be important in helping establish preliminary development limits in draft Secondary Plan concepts.

4) Natural Environment and Hydrogeological Characterization

A suite of ecological surveys and inventories will be completed to assist in determining the extent and quality of natural heritage features within Block 41. This work will include a discussion regarding the "Endangered Species Act" legislation and the identification of a "go forward" plan for addressing species at risk through the subsequent MESP.

The baseline monitoring for the hydrogeological characterization will identify environmental conditions and key features for further study at the MESP stage. The SWS will include a preliminary identification of potential development constraints and opportunities related to the hydrogeological conditions in Block 41, and recommendations for any changes to the hydrogeological monitoring locations and/or frequency of monitoring. It will also identify monitoring requirements for feature-based water balance analyses.

Funding of the SWS Components of the New Communities' Secondary Plan Studies

On April 15th, 2014, City Planning and Finance staff, met with the TRCA and landowners' consultants to discuss the funding for the cost of the SWS. It was agreed by all proponents that given the local nature of the studies, the fact that the studies were not identified as projects under the 2013 Development Charge (DC) Background Study and the need to proceed with the project in a timely fashion, that they be funded directly by the landowners and allocation of such costs amongst landowners would be dealt with through the respective area Developer Group Agreements. It was further acknowledged that there would be no recovery of these funds from future DC By-laws, but rather these costs would be directly absorbed as a cost of development of the two blocks. Through their consultants, the landowner groups have provided letters outlining their commitment to this funding approach (see Attachments 7 and 8).

The cost of the SWS have been estimated to be in the range of $220K for Block 27; and $400K - $500K for Block 41, and will be paid for by the landowner groups. These estimated costs are exclusive of City peer review costs as well as any review costs incurred by the TRCA. The TRCA is dealing directly with the landowners on their review costs, but it was acknowledged that the landowners would also be responsible for payment of the TRCA costs. It is proposed that the landowners' Environmental Consultants undertake the studies as a continuation of their field work completed to date on the new community areas. The consultants will confer with the TRCA and City staff throughout the preparation of the SWS, and will meet with the Technical Advisory Committees for the Secondary Plan studies, at milestones defined in the final workplan.

At the completion of the SWS, the consultants' reports will be subject to peer reviews by the City's Environmental Consultant(s), for the Secondary Plans and finalized to the satisfaction of the TRCA and City. The cost of the City peer reviews for the SWS will be paid through the funds previously allocated in the 2013 Capital Budget, for the development of the New Community Secondary Plans and it is expected that the existing project budgets are sufficient to absorb these peer review costs.

Study Timelines and Relationship to Secondary Plan Development

Preliminary work on the SWS has been undertaken by each of the landowners' Environmental Consultants and this work is expected to continue into the summer of 2015. Attachment 4 to this report shows the relative timelines of the SWS and the Secondary Plan studies. The attachment also reflects the milestones in the Secondary Plan process at which time the information available from the SWS is most important to the development of the Secondary Plan.

The SWS will aid in setting preliminary development limits and in helping determine appropriate stormwater management strategies/controls, in accordance with the conclusions and recommendations of the City-Wide SWM Master Plan, as required to accommodate the population and employment targets for the New Community Areas.

Next Steps

Once the SWS terms of reference and funding approach have been addressed to the satisfaction of Council, staff will proceed to finalize and implement the terms of reference for each of the Secondary Plan studies for the New Community Areas, and will prepare and issue the Requests for Proposals for the studies. This effort, including procurement and evaluation of proposals, is expected to occur through Summer/Fall 2014.

Relationship to Vaughan Vision 2020/Strategic Plan

The actions recommended in this report are consistent with the Vaughan Vision objectives to: Plan and Manage Growth and Economic Well-being; and to Lead and Support Environmental Sustainability.

Regional Implications

Regional staff will be requested to actively participate as members of the Technical Advisory Committee envisioned for each of the New Community Areas' Secondary Plan Studies, including the planning for transportation. The Region will also be circulated on all draft documents required for study deliverables.

Conclusion

The sub-watershed studies are an important component of the Secondary Plan development process. They will build on the conclusions and recommendations of the City-Wide SWM Master Plan Study and will assist in determining the appropriate stormwater management strategies for each of the new community blocks; by setting preliminary development limits, as well as addressing the management of endangered species. They will also advance the resulting Block Plan approval processes by providing the basis for the Master Environmental Servicing Plan (MESP).

Pursuant to the VOP 2010 requirement for the completion of sub-watershed studies concurrent with the development of the New Community Area Secondary Plans, City staff have worked with the Block 27 and 41 landowners and the TRCA to develop terms of reference for the Sub-watershed Studies for the affected portions of the upper reaches of the Humber and Don watersheds. The terms of reference form Attachments 2 and 3 to this report. As a result, it is recommended that the terms of reference be endorsed; the SWS be funded directly by the landowners with no expectation of recovery from City funds; and that the studies be undertaken by the landowners' Environmental Consultants. It is further recommended that they be subject to a peer review by the City's consultant, retained through the Secondary Plan process, and final approval by the City and the TRCA.

On this basis, it is recommended that the recommendations set out in this report be approved.

Attachments

1. New Community Areas Location Map
2. Proposed Terms of Reference for the SWS for Block 27
3. Proposed Terms of Reference for the SWS for Block 41
4. Secondary Plan Development Process Chart
5. Block 27 Sub-watershed Study Area
6. Block 41 Sub-watershed Study Area
7. Letter from Block 27 – Funding of Sub-watershed Study
8. Letter from Block 41 – Funding of Sub-watershed Study

Report prepared by:

Anna Sicilia, Senior Planner, ext. 8063

(A copy of the attachments referred to in the foregoing have been forwarded to each Member of Council and a copy thereof is also on file in the office of the City Clerk.)

Regional Councillor Di Biase declared an interest with respect to the foregoing matter insofar as it relates to Block 27, as his children own land in Block 27 given to them by their maternal Grandfather and did not take part in the discussion or vote on the matter.

COMMITTEE OF THE WHOLE JUNE 3, 2014

NEW COMMUNITY AREAS
VAUGHAN OFFICIAL PLAN 2010
SECONDARY PLAN STUDIES - SUB-WATERSHED COMPONENT
TERMS OF REFERENCE FOR THE SUB-WATERSHED STUDIES: BLOCKS 27 & 41
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Recommendation

The Commissioner of Planning, Interim Director of Planning/Director of Development Planning, and Manager of Policy Planning in consultation with the Director of Development Finance & Investments recommend:

1. That the Terms of Reference forming Attachments 2 and 3, be endorsed as the basis for undertaking the Sub-watershed Studies which will support the preparation of the Secondary Plans and inform the subsequent preparation of Block Plans and supporting studies for the Blocks 27 and 41 New Community Areas.

2. That the Sub-watershed Studies (the "SWS") be undertaken by the Blocks 27 and 41 Landowners' Environmental Consultants and the full cost of each of the studies be funded wholly by the respective Landowner Group with no recovery from City funds.

3. That the Sub-watershed Studies be completed in consultation with, and to the satisfaction of, the City of Vaughan and TRCA; and, that they be subject to Peer Reviews to be undertaken on behalf of the City as part of the Secondary Plan process, and these peer reviews be funded through the previously approved 2013 Capital Budget for the New Communities' Secondary Plan Studies (PL-9535-13 and PL-9533-13).

4. That staff proceed to initiate procurement of Secondary Plan Study Consultants as per the Council approved recommendation of December 10, 2013; and, that the City Manager be delegated authority to award the contracts during the summer or election hiatus if necessary.

5. That this report and corresponding Council minutes be forwarded to the Toronto and Region Conservation Authority and York Region for information purposes.

Contribution to Sustainability

Policies arising from these studies must be consistent with those of the Provincial Policy Statement 2014, the Provincial "Places to Grow: Growth Plan for the Greater Golden Horseshoe", the York Region Official Plan, the Vaughan Official Plan 2010; and, with "Green Directions Vaughan, Community Sustainability and Environmental Master Plan" respecting sustainable development and complete communities. The latter includes consideration of the Objectives and Actions under:

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Economic Impact

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allocated to the Secondary Plan Studies is sufficient to cover the costs of the City's peer reviews for each of the studies. Each peer review is expected to cost between $15K and $20K. Funding the peer reviews from these capital projects is not expected to have any adverse impact on the City's ability to fund the remaining costs of the Secondary Plan Studies.

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- A Technical Advisory Committee (TAC) made-up of the public sector, with representation from the Provincial and Regional governments, technical agencies and authorities, and utilities;
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Purpose

To report back to Committee of the Whole on the Terms of Reference for the Sub-watershed Study (SWS) component of the New Communities' Secondary Plan process, and the funding and implementation strategy for the completion of the studies; and to obtain endorsement of the draft terms of reference for the SWS, for the purposes of moving forward concurrently with and in support of the Secondary Plan process.

In addition, Council approval is sought to delegate the awarding of the consultant contracts for the Secondary Plan Studies within the approved funding envelope, during the summer or election hiatus if required.

Background - Analysis and Options

On December 10, 2013, Council directed that Staff proceed with the completion of individual Terms of Reference for the New Communities' Secondary Plan Studies and to proceed with the preparation and issuance of the Requests for Proposal. Council directed (in part):

> "That Planning staff report back to a future Committee of the Whole meeting on the Terms of Reference for the Sub-watershed Studies for the New Community Areas; and, a financial strategy detailing the expected costs and funding sources for their completion, after further consultation with TRCA and landowners."

Since the sub-watershed studies are required components of the Secondary Plan studies as per VOP 2010 policy, staff cannot proceed to finalize and issue the terms of reference for the Secondary Plan consulting work until the foregoing Council directive has been addressed.

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A. Block 27 SWS Terms of Reference

The Block 27 SWS terms of reference includes 6 study components, which are highlighted in the following sub-sections:

1) Hydrology update and Stormwater Management Criteria Verification

   The hydrology update and stormwater management criteria verification is intended to estimate the potential hydrologic impacts to the sub-watershed area as a result of the proposed development for the Block 27 area. This work will aid in the siting of potential stormwater management ponds. The V02 hydrology model will be updated to reflect future considerations including proposed land use and proposed stormwater controls.

2) Regional Storm Assessment and Flood Impact Mitigation Strategy

   The Regional storm assessment and flood impact mitigation strategy will update the hydrologic model to determine the potential flood impacts to the Block 27 SWS area as a result of the proposed development and confirm recommended flood control criteria for future development lands.

3) Erosion Assessment

   An erosion threshold analysis, including field investigation, continuous modelling and evaluation of various control methods will be completed for the upper portion of the Upper West Don River Sub-watershed. This will require the development of a continuous model for the evaluation of the frequency at which erosive flows are experienced within the sub-watershed.

4) Hydrogeology

   The hydrogeological component of the sub-watershed study will focus on the immediate Block 27 land area and will present a high level assessment of existing hydrogeological conditions based on a desktop study of existing information.

   In addition to a characterization of existing conditions, the study will include preliminary identification of potential development constraints (eg. groundwater receptors to be protected) and opportunities (eg. areas where enhanced infiltration may be feasible) that should be considered in more detail at the Master Environmental Servicing Plan (MESP) phase.

5) Water Balance

   The water balance component of the SWS will focus on the Block 27 land area. It will present a high level assessment of the overall Block 27 water balance as well as identify features that are to be preserved and that may require recharge. The study will include preliminary identification of potential opportunities (eg. Areas where recharge may be feasible) that should be considered in more detail at the MESP phase. The results of the field examinations will be used to recommend mitigation strategies to maintain functions of natural areas to the extent feasible in this future urban setting.

6) Natural Heritage Assessment/Ecology

   Based on the information available, existing natural heritage conditions will be described, including aquatic and terrestrial features and functions. This summary will be augmented with information obtained from the City's NHN Study and other relevant sources such as the TRCA and the Ontario Ministry of Natural Resources.

Additional updated natural heritage information will be required in support of the SWS, including headwater drainage features assessments, breeding bird surveys, updated ecological land classification mapping and community descriptions on participating properties within Block 27. A top-of-bank and features delineation will also be completed in conjunction with the TRCA and City staff.

B. Block 41 Sub-watershed Study Terms of Reference

The Block 41 SWS terms of reference focuses on the following 4 study components:

1) Regional Storm Assessment

The purpose of this component of the Block 41 SWS is to determine the need for, and if required, the type/size of Regional storm controls or other potential mitigation measures for future developing areas in the SWS area.

As part of this assessment, the existing Regional storm floodplain model and mapping will be reviewed and updated as required to reflect existing and future uncontrolled flows; and to identify existing and uncontrolled Regional storm water levels in downstream areas. In addition, the area downstream of Block 41, in the northern portion of Block 40, will be reviewed and the floodplain mapping updated as required.

2) Erosion Assessment

As part of this component of the SWS, detailed mapping and aerial photography, will be reviewed, stream reach delineated, and erosion thresholds determined to assist with stormwater management design (erosion control) for the SWS area. Based on the work completed through the erosion assessment, stormwater design criteria for stormwater management facilities and/or LID measures will be incorporated into the development design to maintain to the extent practical, existing conditions erosion potential.

3) Floodplain Delineation

The focus of this component of the SWS is the delineation of hazard lands within Block 41 consistent with the Provincial Policy Statement, the VOP 2010, and the TRCA requirements. The resulting mapping will be important in helping establish preliminary development limits in draft Secondary Plan concepts.

4) Natural Environment and Hydrogeological Characterization

A suite of ecological surveys and inventories will be completed to assist in determining the extent and quality of natural heritage features within Block 41. This work will include a discussion regarding the “Endangered Species Act” legislation and the identification of a “go forward” plan for addressing species at risk through the subsequent MESP.

The baseline monitoring for the hydrogeological characterization will identify environmental conditions and key features for further study at the MESP stage. The SWS will include a preliminary identification of potential development constraints and opportunities related to the hydrogeological conditions in Block 41, and recommendations for any changes to the hydrogeological monitoring locations and/or frequency of monitoring. It will also identify monitoring requirements for feature-based water balance analyses.

Funding of the SWS Components of the New Communities’ Secondary Plan Studies

On April 15th, 2014, City Planning and Finance staff, met with the TRCA and landowners’ consultants to discuss the funding for the cost of the SWS. It was agreed by all proponents that

given the local nature of the studies, the fact that the studies were not identified as projects under the 2013 Development Charge (DC) Background Study and the need to proceed with the project in a timely fashion, that they be funded directly by the landowners and allocation of such costs amongst landowners would be dealt with through the respective area Developer Group Agreements. It was further acknowledged that there would be no recovery of these funds from future DC By-laws, but rather these costs would be directly absorbed as a cost of development of the two blocks. Through their consultants, the landowner groups have provided letters outlining their commitment to this funding approach (see Attachments 7 and 8).

The cost of the SWS have been estimated to be in the range of $220K for Block 27; and $400K - $500K for Block 41, and will be paid for by the landowner groups. These estimated costs are exclusive of City peer review costs as well as any review costs incurred by the TRCA. The TRCA is dealing directly with the landowners on their review costs, but it was acknowledged that the landowners would also be responsible for payment of the TRCA costs. It is proposed that the landowners' Environmental Consultants undertake the studies as a continuation of their field work completed to date on the new community areas. The consultants will confer with the TRCA and City staff throughout the preparation of the SWS, and will meet with the Technical Advisory Committees for the Secondary Plan studies, at milestones defined in the final workplan.

At the completion of the SWS, the consultants' reports will be subject to peer reviews by the City's Environmental Consultant(s), for the Secondary Plans and finalized to the satisfaction of the TRCA and City. The cost of the City peer reviews for the SWS will be paid through the funds previously allocated in the 2013 Capital Budget, for the development of the New Community Secondary Plans and it is expected that the existing project budgets are sufficient to absorb these peer review costs.

Study Timelines and Relationship to Secondary Plan Development

Preliminary work on the SWS has been undertaken by each of the landowners' Environmental Consultants and this work is expected to continue into the summer of 2015. Attachment 4 to this report shows the relative timelines of the SWS and the Secondary Plan studies. The attachment also reflects the milestones in the Secondary Plan process at which time the information available from the SWS is most important to the development of the Secondary Plan.

The SWS will aid in setting preliminary development limits and in helping determine appropriate stormwater management strategies/controls, in accordance with the conclusions and recommendations of the City-Wide SWM Master Plan, as required to accommodate the population and employment targets for the New Community Areas.

Next Steps

Once the SWS terms of reference and funding approach have been addressed to the satisfaction of Council, staff will proceed to finalize and implement the terms of reference for each of the Secondary Plan studies for the New Community Areas, and will prepare and issue the Requests for Proposals for the studies. This effort, including procurement and evaluation of proposals, is expected to occur through Summer/Fall 2014.

Relationship to Vaughan Vision 2020/Strategic Plan

The actions recommended in this report are consistent with the Vaughan Vision objectives to: Plan and Manage Growth and Economic Well-being; and to Lead and Support Environmental Sustainability.

Regional Implications

Regional staff will be requested to actively participate as members of the Technical Advisory Committee envisioned for each of the New Community Areas' Secondary Plan Studies, including

the planning for transportation. The Region will also be circulated on all draft documents required for study deliverables.

Conclusion

The sub-watershed studies are an important component of the Secondary Plan development process. They will build on the conclusions and recommendations of the City-Wide SWM Master Plan Study and will assist in determining the appropriate stormwater management strategies for each of the new community blocks; by setting preliminary development limits, as well as addressing the management of endangered species. They will also advance the resulting Block Plan approval processes by providing the basis for the Master Environmental Servicing Plan (MESP).

Pursuant to the VOP 2010 requirement for the completion of sub-watershed studies concurrent with the development of the New Community Area Secondary Plans, City staff have worked with the Block 27 and 41 landowners and the TRCA to develop terms of reference for the Sub-watershed Studies for the affected portions of the upper reaches of the Humber and Don watersheds. The terms of reference form Attachments 2 and 3 to this report. As a result, it is recommended that the terms of reference be endorsed; the SWS be funded directly by the landowners with no expectation of recovery from City funds; and that the studies be undertaken by the landowners' Environmental Consultants. It is further recommended that they be subject to a peer review by the City's consultant, retained through the Secondary Plan process, and final approval by the City and the TRCA.

On this basis, it is recommended that the recommendations set out in this report be approved.

Attachments

1. New Community Areas Location Map
2. Proposed Terms of Reference for the SWS for Block 27
3. Proposed Terms of Reference for the SWS for Block 41
4. Secondary Plan Development Process Chart
5. Block 27 Sub-watershed Study Area
6. Block 41 Sub-watershed Study Area
7. Letter from Block 27 – Funding of Sub-watershed Study
8. Letter from Block 41 – Funding of Sub-watershed Study

Report prepared by:

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Respectfully submitted,

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Director of Development Planning

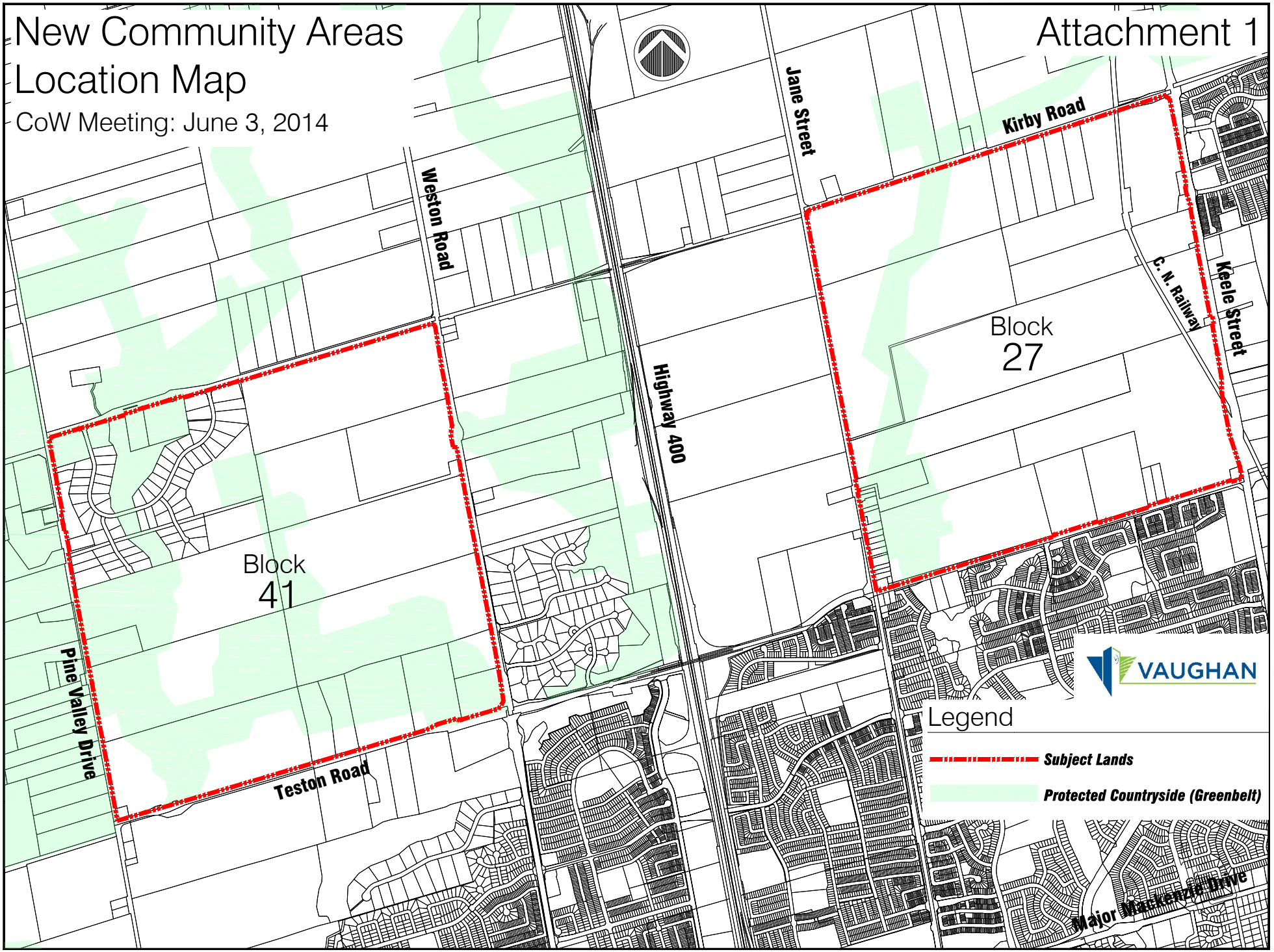
ROY MCQUILLIN
Manager of Policy Planning

/lm

New Community Areas Location Map

CoW Meeting: June 3, 2014

Attachment 1



ATTACHMENT 2

Block 27 (Teston Green) Landowners Group

TESTON GREEN

TERMS OF REFERENCE

Subwatershed Study Requirements for Block 27 (Teston Green), New Community Area in the City of Vaughan

MAY 2014

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1.0 Introduction and Purpose

The City of Vaughan's (the City) 2010 Official Plan has designated Blocks 27 and 41 as New Community Areas as illustrated on Official Plan Schedule 1 (**Figure 2-1**). It is the City's policy that New Community Areas are planned as complete communities with a mix of uses and densities that meet the minimum requirements set out in the City's Growth Plan and the York Region Official Plan.

The City is initiating the preparation of a secondary plan for the Block 27 New Community Area. Consistent with Official Plan policy, a Subwatershed Study (SWS) will be prepared concurrent with the preparation of the secondary plan. As well, the Block 27 Owners are preparing a comprehensive Block Plan Report to support the Block Plan application including the preparation of a Master Environmental Servicing Plan (MESP). Through discussions with representatives of the City, the Toronto Region Conservation Authority (TRCA), and Block 27 Owners given that the Block 27 New Community area represents one of the last pieces of developable land within the Upper West Don Subwatershed area, it is preferred to scope the SWS to satisfy the general conditions in the City's Official Plan policy, and defer much of the details to the MESP. Based on these discussions, this Terms of Reference (TOR) has been prepared to set out the SWS requirements in support of the Block 27 secondary plan.

2.0 Study Area

The Block 27 New Community Area is located east of the Highway 400 North Employment Corridor and is bound by Kirby Road to the north, Keele Street to the east, Teston Road to the south, and Jane Street to the west. **Figure 2-2** illustrates the location of Block 27. This Block contains very little in the way of existing development and primarily comprises of portions of the provincial Greenbelt and active agricultural areas. The Block is approximately 404ha in area. Approximately 50ha of the block is Greenbelt, with the remainder comprising primarily of agricultural lands.

Figure 2-3 notes lands within the Block represented by owners participating in the preparation of the SWS for this Block. As shown, the majority of the Block, aside from a few exceptions and some existing minor developed area, are participating Block 27 owners.

Block 27 lies within the Upper West Don River Subwatershed, which is part of the larger Don River watershed. As illustrated in **Figure 2-4**, Block 27 is located primarily within the Upper West Don Subwatershed and represents the bulk of the remaining developable lands within the Upper West Don Subwatershed Area apart from the southeast portion of Block 28 and the southwest portion of Block 21.

While the SWS Study Area extends beyond the Block 27 lands to include other portions of the Upper West Don River Subwatershed for select SWS tasks, the extent of external scope will be limited to specific tasks outlined in Section 3.0.

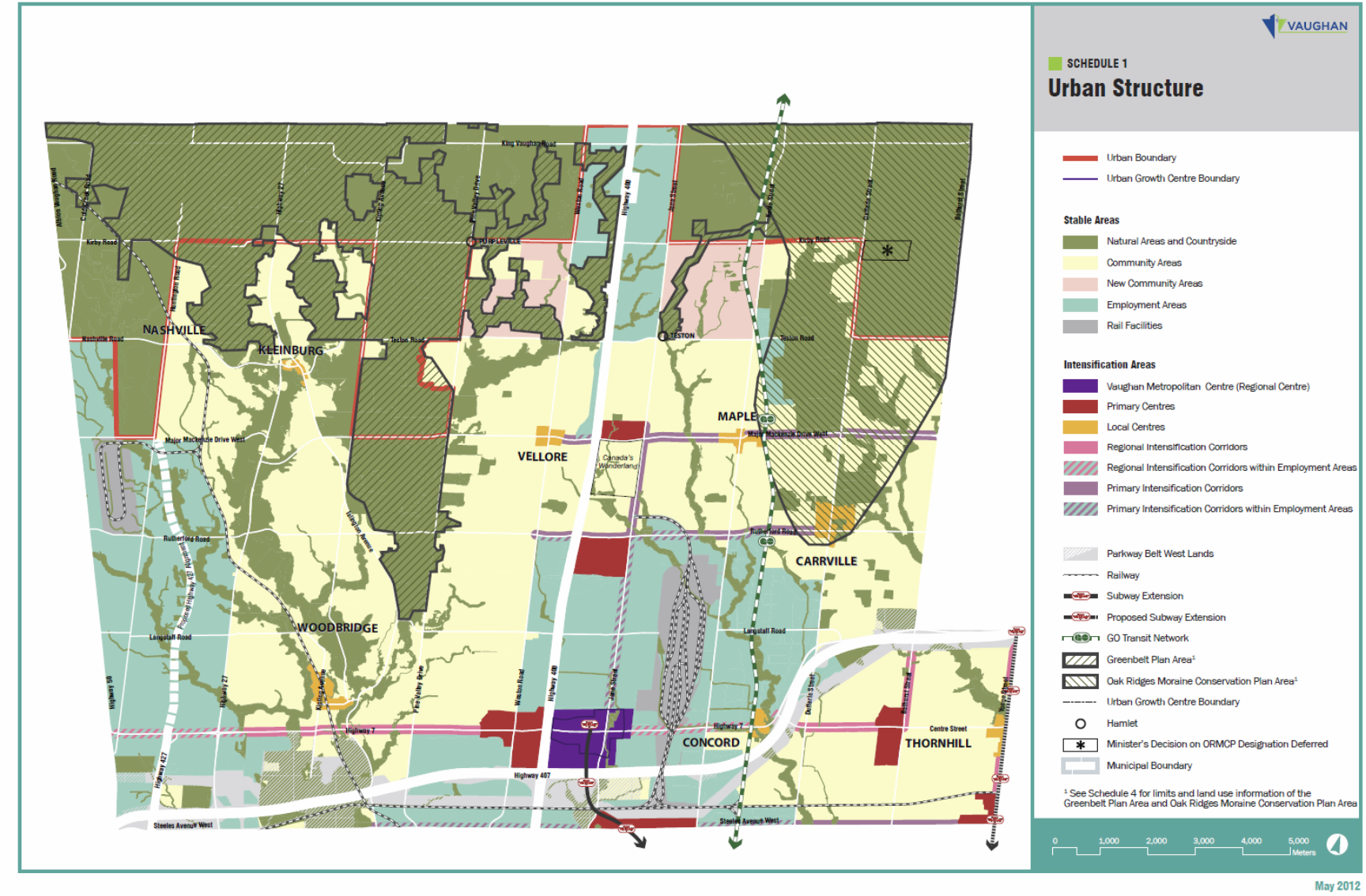


Figure 2-1 Official Plan Schedule 1

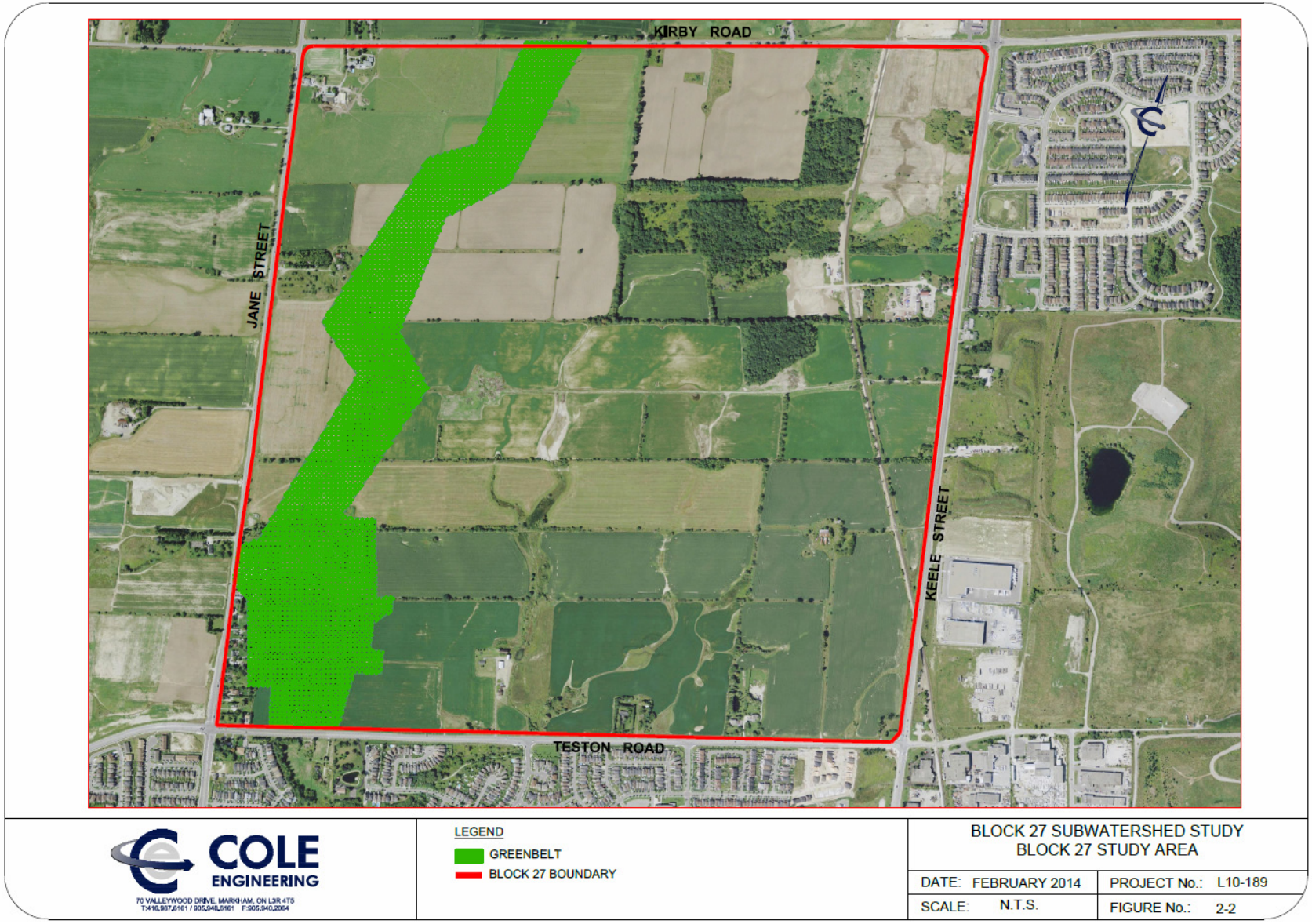


Figure 2-2 Block 27 Study Area

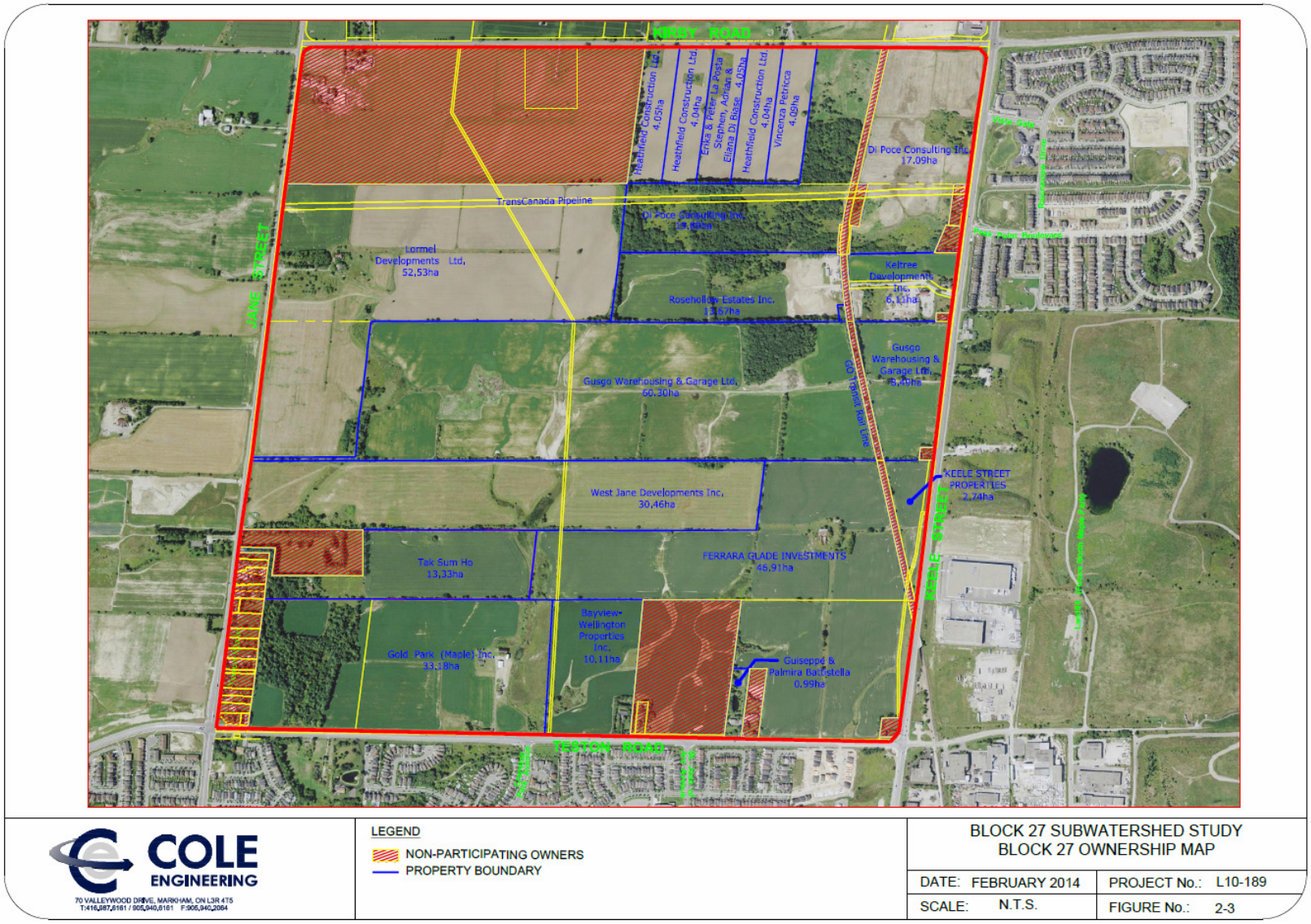


Figure 2-3 Block 27 Ownership Map

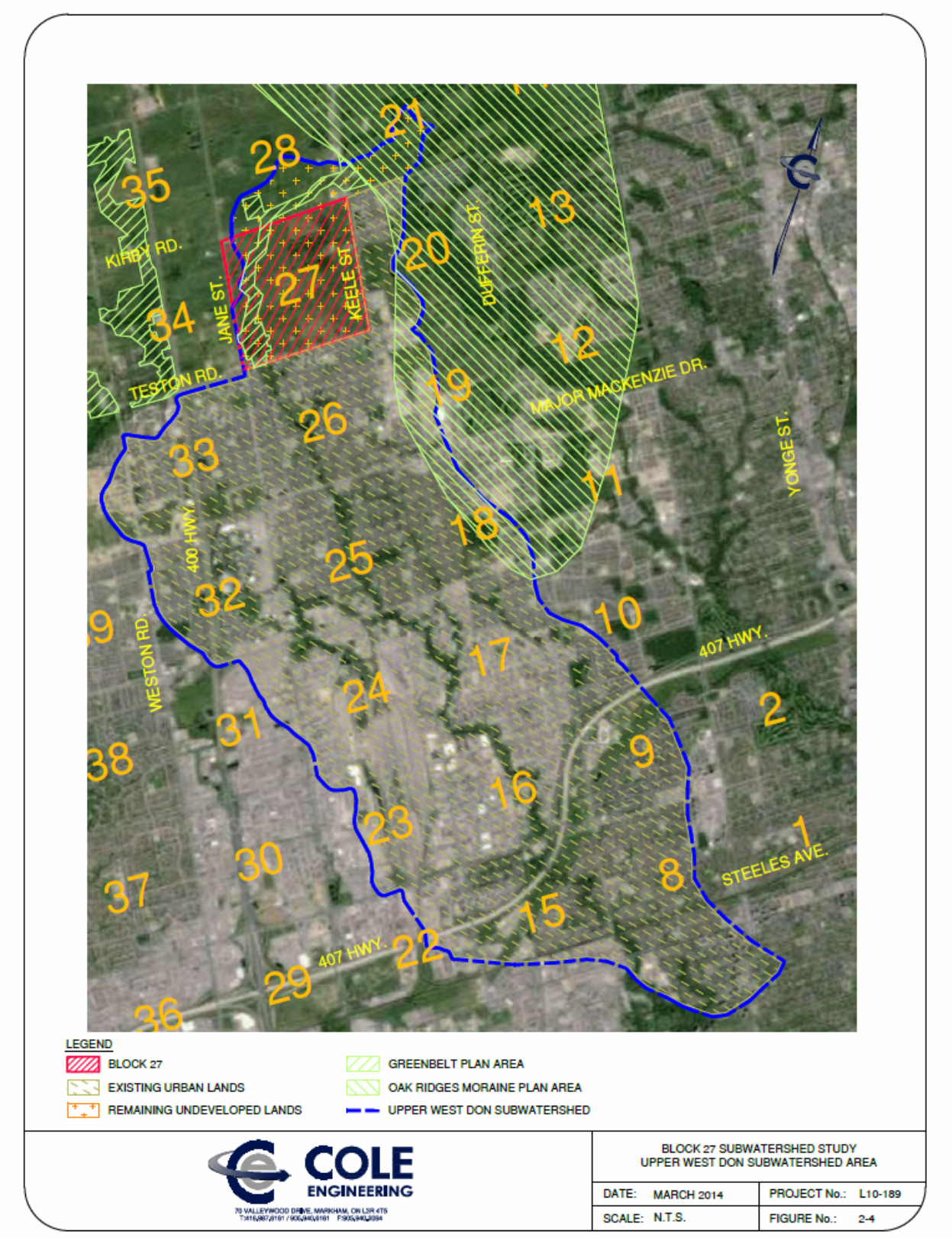


Figure 2-4 Upper West Don Subwatershed Area

3.0 Subwatershed Study Report

SWS typically include the characterization of aquatic and terrestrial resources, surface and groundwater systems, assessment of potential land use impacts on existing resources and the identification of management strategies to address a range of watershed management objectives. They provide input to land use studies on natural heritage systems and approaches to surface and groundwater management that affect land use plans and/or servicing approaches. These general requirements for SWS are intended to be tailored to subwatershed-specific conditions and local municipal needs and processes. Recognizing that the City of Vaughan Block Plan and MESP process addresses many of these requirements, specific requirements for the SWS versus the MESP work for the Block 27 area was discussed with the City and TRCA in December 2013, January and February 2014. Discussions identified work completed to date by agencies and landowners and its availability for use in SWS or MESP work. This exercise focused the Block 27 study requirements for a SWS work plan to support the City's secondary plan initiative.

Figure 3-1 below graphically illustrates the relationships of the SWS and MESP to secondary plan and block plan processes.

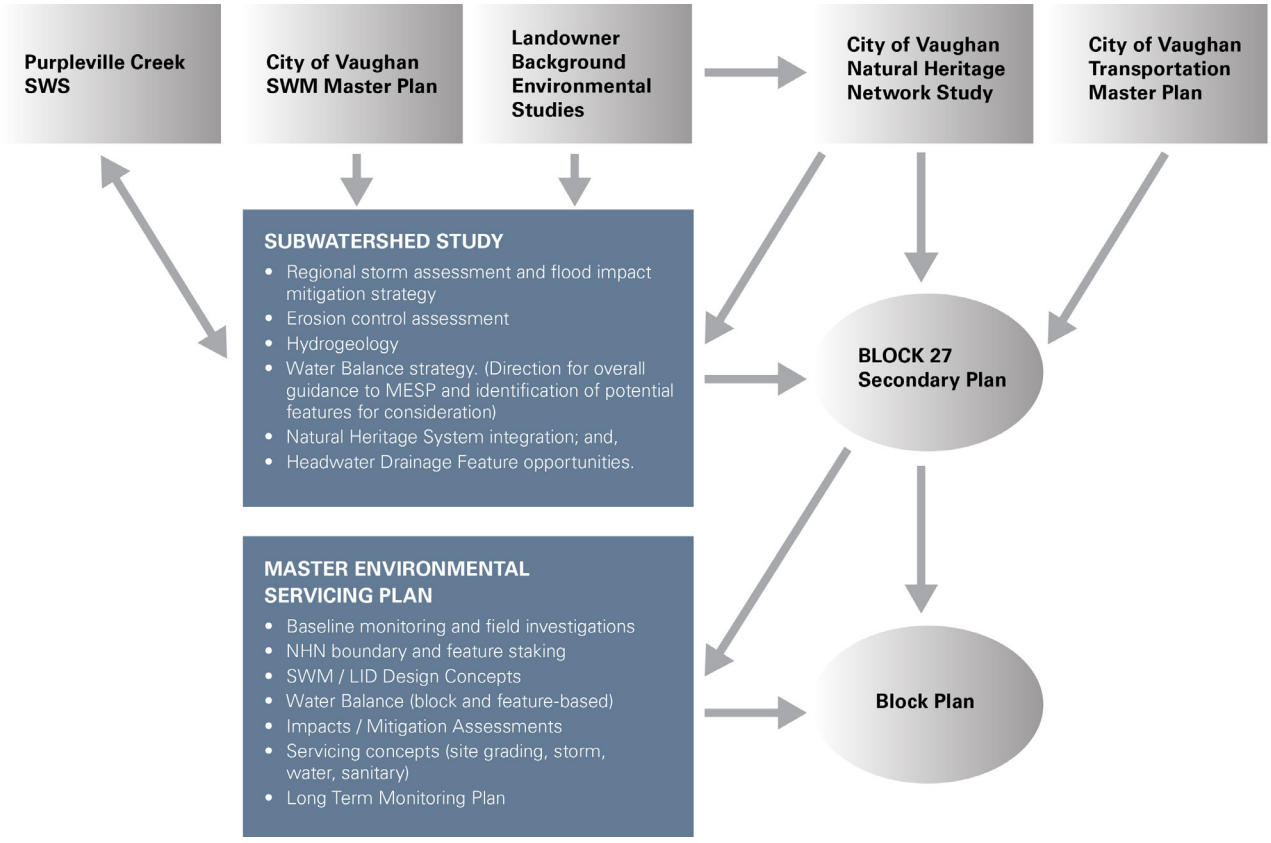


Figure 3-1 Subwatershed Study / MESP Content and Relationship to Planning Documents

3.1. Supporting Studies and Background Material

3.1.1. City of Vaughan Natural Heritage Network Study

In spring of 2012, the City initiated the Natural Heritage Network Study (NHN Study) aimed at building upon the natural heritage system mapping in the City's 2010 Official Plan. This four (4)-phase study is assessing the role of the existing natural heritage network in maintaining elements of biodiversity and ecological functions for the long-term, consistent with Section 2.1.2 of the Provincial Policy Statement.

While the NHN Study is considering the City as a whole, the focus of effort is within the central and northern portions of the municipality where the majority of future land use changes are proposed. This includes Block 27. Given that the Region of York has recently completed an evaluation of Significant Woodlands, the City's NHN is focusing on assessing and identifying Significant Wildlife Habitat and the extent and functions of headwater drainage features to develop a comprehensive NHN including recommendations for protecting, managing and enhancing natural features.

As of early March 2014, the City has completed Phases 1 and 2, and is in the process of completing Phase 3. The first two (2) phases involved background data evaluation, GIS mapping and target setting in 2011, followed by Phase 2 activities including targeted field reconnaissance during the spring and early summer 2013 of selected areas (including Block 27) to confirm the extent and quality of natural heritage features on these lands. Phase 3 is currently underway and involves data analysis and the ultimate formulation of the proposed NHN along with recommendations for protecting, managing and enhancing natural features. The proposed NHN will be finalized in late spring of 2014 and will then be followed by Phase 4 which will focus on formulating a Land Securement Strategy to ensure a long-term program to maintain and enhance the ecological integrity of the NHN.

The NHN Study conclusions will result in a recommended NHN for the Block 27 and other lands, and provide the necessary natural heritage input to the future secondary plan. The natural heritage component of the SWS will rely on field data collected in 2010 on behalf of the Block 27 Landowners Group in 2010, as well as supplemental site-specific information obtained through the City's NHN study. The SWS and will recognize and utilize the findings, conclusions and recommendations of the final NHN Study, as appropriate.

3.1.2. City of Vaughan Master SWM Plan

The City is completing the preparation of a City-Wide Storm Drainage / SWM Master Plan Class Environmental Assessment Study (MPCEA) to direct the required stormwater management infrastructure improvements to support the build-out of the new Official Plan. The study is city-wide in nature with a specific focus on the West Vaughan Employment, Woodbridge Core Intensification, Yonge-Steeles Intensification, and Kleinburg-Nashville New Community Secondary Planning Areas in addition to areas of intensification based on the City's redevelopment strategy. The study includes an evaluation of SWM opportunities and will provide general guidance for future secondary planning growth areas identified in the Official Plan. As part of the MPCEA, general guidance and recommendations for the future Block 27 secondary planning area will be provided considering current policies and criteria as well as considerations for future study.

3.1.3. Existing Natural Heritage Conditions Block 27 (Teston Green), 2014

Extensive and comprehensive natural heritage field investigations have been completed by Beacon Environmental for the participating properties within Block 27. This work has been compiled and summarized in the draft report entitled: *Existing Natural Heritage Conditions Block 27 (Teston Green), City of Vaughan, Regional Municipality of York (Beacon Environmental, January 2014)*. Copies of this existing conditions report have been provided to the City and the TRCA as background to assist in the characterization of the SWS area from an ecological perspective.

The following is a summary of the natural heritage work that has been completed to date:

- Vegetation Community (Ecological Land Classification) Mapping and Floral Surveys:
  - Surveys were undertaken on six (6) dates: July 16, 26 and 30th, 2010 and on August 18 and 24th, 2010.
- Wildlife Surveys:
  - Breeding bird surveys were undertaken on five dates: June 14th, 17th, 18th, 24th and 25th, 2010;
  - Breeding amphibian surveys were completed in accordance to the Marsh Monitoring Program protocol on three evenings: April 8th, May 4th and May 26th, 2010; and,
  - Additional breeding amphibian surveys were completed by North-South Environmental Inc. (NSEI), accompanied by Beacon Environmental, on April 16th, May 27th and May 30th, 2013.
- Aquatic Habitat and Headwater Drainage Feature Assessments:
  - Aquatic Habitat Assessments and Fish Sampling were conducted by Beacon ecologists on August 17th and November 8th, 2010;
  - This included detailed field assessments of all watercourses on-site, undertaken in accordance with the Headwater Drainage Feature Assessment (HDFA) protocols outlined in the report entitled: *TRCA Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines* (TRCA 2009) on August 17th and November 8th, 2010;
  - Additional HDFAs were carried out in select portions of Block 27 by NSEI and R.J. Burnside Associates, in association with Beacon, on April 19th and 22nd, 2103. This work was completed as part of Phase 2 of the City's NHN study and carried out in accordance with the draft TRCA / CVC (2013) HDFA protocol: *Evaluation, Classification and Management of Headwater Drainage Features Guidelines*.

The Beacon draft report presents a summary of the existing natural heritage conditions within the subject lands. Seasonally appropriate field investigations were undertaken to characterize the existing terrestrial and aquatic conditions, including fish sampling, breeding bird and amphibian surveys, vegetation community mapping and floral inventories, and investigations into the potential presence of species of conservation concern on and in the vicinity of the subject lands.

The findings of these investigations are documented in this report.

3.1.4. City of Vaughan Environmental Management Guide (Draft June 2013)

The City's Environmental Management Guide (EMG) is an update to the original EMG document that was prepared in 1994 in support of OPA 400 to provide direction for the preparation of an EIS or other environmental reports at the scale of the Block Plan and Plan of Subdivision / Site Plan. This draft revised EMG will be finalized through the completion of the City's NHN Study. The draft EMG identifies, "…*the range of studies and provides guidance regarding the level of detail of submittal information to prepare environmental reports in support of development applications according to environmental policies in Chapter 3 of the City of Vaughan Official Plan.*" The City's OP identifies the EIS and MESP as the main environmental reports to be prepared in support of the policies of the VOP at the block plans stage.

The EMG provides guidance on report content in the form of typical table of contents for EIS / MESP work as part of the Block Plan application. EIS requirements will be addressed as part of the MESP. The EMG will be used to guide the preparation of the Block Plan reports.

3.1.5. Block 27 Hydrogeology Report

In support of the Block Planning process for Block 27, Cole Engineering completed a hydrogeological investigation entitled "Hydrogeological Investigation for the Block 27 Residential Development". The study included a comprehensive review of available geological and hydrogeological reports and mapping, and an extensive groundwater and surface water investigation and monitoring program, including:

- 89 boreholes (including the geotechnical investigation) drilled to depths ranging from 6.3 m to 30.9 m;
- 29 monitoring wells, including seven nested wells, screened at depths ranging from 4.0 to 30.2 m;
- Single well response tests at seven monitoring wells to determine hydraulic conductivity values;
- 14 mini-piezometer nests installed in stream banks and wetland features;
- 10 stream flow monitoring locations;
- Long-term groundwater level and stream flow monitoring; and,
- Groundwater and surface water quality sampling and analysis.

The objectives of the hydrogeological investigation were to:

- Characterize the geological setting and describe the units underlying the Site;
- Characterize the hydrogeological conditions, including identification of confined and unconfined aquifers, horizontal and vertical groundwater flow patterns, and groundwater quality;
- Identify areas of groundwater recharge and discharge, including groundwater contributions to wetlands and stream baseflow;
- Identify local water users, such as domestic wells and MOE permit to take water (PTTW) holders;
- Assess potential short-term and long-term impacts to the natural environment and groundwater users (e.g., domestic wells) as a result of the proposed development; and,
- Provide recommendations on management measures to mitigate potential impacts and maintain important groundwater functions.

3.1.6. Purpleville Creek Subwatershed Study

The northwest (NW) portion of the Block 27 Planning area is tributary to Purpleville Creek which is part of the Humber River watershed. Parallel to the Upper West Don River SWS, the Purpleville Creek SWS will be undertaken in support of the Block 41 Planning Area. As such, the NW portion of Block 27 will be evaluated within the Purpleville Creek SWS to establish the SWM and ecological objectives within the Purpleville Creek Subwatershed context. Close coordination between the two projects will take place specifically as it relates to the sharing of data and the establishment of potential connectivity along the watershed boundaries.

3.1.7. Other Studies and Reference Documents

There are numerous other studies, plans, guidelines, etc. that will provide input and guidance to the preparation of the SWS and/or MESP work. They include, but are not limited to:

- Provincial Policy Statement (2014)
- York Region Official Plan (2010);
- City of Vaughan Official Plan (2010);
- Phase II Drainage Study / Flood Vulnerable Sites – Areas 1-6 & 8 (City of Vaughan, 2014);
- Species at Risk in Ontario (SARO) List, regulation to the Endangered Species Act, 2007 (ESA);
- Ministry of Natural Resources: Natural Heritage Reference Manual: Second Edition (MNR 2010);
- Don Watershed Report Card (TRCA, 2013);
- Don River Watershed Plan Geology and Groundwater Resources – Report on Current Conditions (TRCA, 2009);
- Don River Watershed Plan Baseflow and Water Use Assessment – Report on Current Conditions (TRCA, 2009);
- Don River Watershed Plan Land and Resources Use – Report on Current Conditions (TRCA, 2009);
- Don River Watershed Plan Implementation Guide (TRCA, 2009);
- Don River Watershed Plan, Beyond Forty Steps (TRCA, 2009);
- Humber River Watershed Plan (TRCA, 2008);
- Humber River Watershed Plan Implementation Guide (TRCA, 2008);
- Humber River State of the Watershed Reports (2007);
- Humber Watershed Scenario Modeling and Analysis Report (TRCA, 2008);
- Listen to Your River: A Report Card on the Health of the Humber River Watershed (TRCA, 2007);
- Humber River Fisheries Management Plan (MNR and TRCA, 2005);
- Humber Watershed Scenario Modeling and Analysis Report (TRCA, 2008);
- Humber Watershed Report Card (TRCA 2013);
- TRCA's SWM Criteria Document (TRCA, August 2012);
- Approved Assessment Report: Toronto and Region Source Protection Area (TRCA, January 2012);
- MESP Requirements in Support of Secondary Plans (TRCA, September, 2007)

- Evaluation, Classification and Management of Headwater Drainage Features (TRCA / CVC, January 2014);
- MOEE Hydrogeological Technical Information Requirements for Land Development Applications, dated April 1995;
- TRCA Guidelines for Review of SWM Pond Location with Respect to Groundwater Conditions;
- TRCA / CVC Low Impact Development SWM Planning and Design Guide (2010);
- Significant Wildlife Habitat Guidelines (OMNR 2002);
- Geotechnical Engineering Design and Submission Requirements (TRCA, November 2007);
- Technical Guide for River & Stream Systems: Erosion Hazard Limit (MNR, 2002);
- SPC Accepted Tier 1 Water Budget, TRSPA Watersheds (TRCA, September 2010);
- SPC Accepted Groundwater Quality Vulnerability Analysis Highly Vulnerable Aquifer Delineation (CTC Source Protection Region, May 2010);
- Regional geological mapping; and,
- MOE water well records and PTTW database.

3.2. Subwatershed Study Components

A SWS work plan includes five (5) study components:

1) Regional Storm Assessment & Flood Impact Mitigation Strategy;
2) Erosion Assessment;
3) Hydrogeology;
4) Water Balance; and,
5) Natural Heritage / Ecology.

The below sections provide a summary of the scope of each study component.

3.2.1. Regional Storm Assessment & Flood Impact Mitigation Strategy

As part of the SWS scope, the hydrologic modelling will be updated to reflect the existing and proposed development condition within Block 27, and the portions of Blocks 21 & 28 which are tributary to the Upper West Don River (**Figure 2-4**). The updated hydrologic model will be adjusted determine the potential flood impacts to the Subwatershed Area as a result of the proposed development. The scope is as outlined below:

- Collect and review existing hydrology modelling and reports pertaining to the Upper West Don Subwatershed Area. It is understood that there is a Visual OTTHYMO (VO) model for the Upper West Don Subwatershed Area;
- Update / verify existing conditions hydrology model as necessary, through the refinement of the existing drainage patterns in the Study Area defined above using best available topographic information. Specifically the update is anticipated to verify and update the development of the Block 27 area to existing conditions;
- Update VO2 hydrology model to reflect regulatory flood flow conditions consistent with TRCA standards;
- Discretize proposed development area for future conditions land use and drainage patterns;

- Update VO2 hydrology model to reflect future conditions including proposed land use and proposed SWM controls;
- Prepare a comparison which identifies the flow impacts of the regional regulatory event at key nodes in the Upper West Don Subwatershed;
- Collect and review existing hydraulic models, mapping, and reports pertaining to the Upper West Don Subwatershed Area. It is understood that there is a HEC-RAS models for the Upper West Don Subwatershed Area;
- Update / verify existing conditions hydraulic model as necessary, through the refinement of the existing VO hydrology model;
- Field verify, as necessary crossing locations for culvert size, invert, material, overflow elevation(s);
- Update the HEC—RAS hydraulic model using updated flows derived from the future conditions hydrology update;
- Prepare a flood mapping figure which identifies existing and future (existing, 2031, and 2051) conditions flood mapping to determine potential downstream lands of potential impact resulting from future development;
- Identify flood vulnerable sites, structures, and areas impacted as a result of the proposed future development;
- Prepare Flood Site Analysis which will compare the existing and future flood conditions which may identify frequency of flooding, frequency of overtopping, flood elevation / depth changes, property impacted, structures impacted, and identify if additional risk is anticipated or expected;
- Prepare a mitigation strategy for any downstream flood impacts including, source controls, end of pipe solutions, conveyance improvements, removal of obstructions, and crossing improvements;
- Identify any recommended projects for downstream improvements including cost estimates; and,
- Confirm recommended Flood Control criteria for future development lands.

3.2.2. Erosion Assessment

In order to establish the appropriate erosion control criteria for the proposed development areas, an erosion threshold analysis including field investigation, continuous modelling, and evaluation of various control methods is required for the upper portion of the Upper West Don River Subwatershed. Through discussions with the TRCA this analysis will be limited to the southern limit to the small confluence within Block 26 just downstream of the proposed Block 27 development area. This will require the development of a continuous model for the evaluation of the frequency in which erosive flows are experienced within the Subwatershed. The detailed scope is as follows:

- Complete a Fluvial Geomorphological Characterization of the existing channels in order to define representative reaches and classify the stability of the active channel (i.e. determine the most sensitive reaches). The work will include:
  - Identification of relevant stream reaches;
  - Conduct rapid Geomorphic Assessments for each reach;
  - Complete all required geomorphic field work to support threshold development at anticipated SWM Pond locations; and,
  - Analyze erosion thresholds where required for anticipated SWM pond outlets.

- Develop of a continuous hydrology model for the purposes of preparing an erosion analysis;
- Undertake an existing and proposed conditions erosion analysis to evaluate the frequency and duration that flows exceed the erosion thresholds in the key locations downstream of the proposed development locations;
- Prepare a mitigation strategy to limit erosion downstream of the proposed development by limiting the frequency and duration of erosive flows; and,
- Confirm recommended Erosion Control criteria for future development lands.

3.2.3. Hydrogeology

Through continued coordination, the TRCA indicated that the hydrogeological component of the SWS area should be focused on the Block 27 site and should present a high level assessment of existing hydrogeological conditions based on a desktop study of existing information, including the information collected in support of the Block 27 hydrogeological investigation.

In addition to a characterization of existing conditions, the study should include preliminary identification of potential development constraints (e.g., groundwater receptors to be protected) and opportunities (e.g., areas where enhanced infiltration may be feasible) that should be considered in more detail at the MESP phase.

A summary of the objectives for this component of the SWS and the available information are described below.

- Describe site stratigraphy and hydrostratigraphy based on available information (e.g., results from Block 27 hydrogeological investigation, geological mapping, TRCA reports);
- Estimate range of values for hydraulic properties (i.e., hydraulic conductivity and infiltration rates) of stratigraphic units based on published reports and the Block 27 hydrogeological investigation;
- Describe general horizontal and vertical groundwater flow patterns based on information from the Block 27 hydrogeological investigation, MOE water well records, and other published reports, including a description of shallow and deep groundwater systems;
- Broadly identify areas of groundwater recharge and discharge, including preliminary identification of potential groundwater-supported natural features and baseflow contributions to any tributaries of the West Don River that flow through the site. This would include a review of: data from the Block 27 hydrogeological investigation (e.g., depth to groundwater; and estimated vertical gradients); any existing nearby gauging stations; and topography. Current knowledge of fisheries conditions, such as warm water, cool water, and cold water classifications, will be considered in the assessment;
- For the identified surface water features that may be groundwater-supported, describe potential impacts to these features that may result from changes to the local groundwater regime as a result of development (e.g., recharge reduction, alteration of groundwater flow);
- Describe the current understanding of local groundwater quality, based on the Block 27 hydrogeological investigation, other published reports, and previous experience with the local hydrostratigraphic units;
- Estimate average annual recharge rates for the site based on the results of the hydrological water balance analysis;

- Review MOE water well records within 500 m of the site and the PTTW database to identify potential groundwater uses. Describe how groundwater uses may be impacted by development; and,
- Preliminary identification of opportunities and constraints for development, such as potential areas for enhanced infiltration measures and/or areas where SWM measures, such as ponds, may not be appropriate. The assessment will also include preliminary identification of potentially sensitive groundwater receptors that may potentially be impacted by some forms of development (e.g., reduction in groundwater recharge or impacts to groundwater flow pathways) that may require mitigation measures to ensure their continued function post-development.

3.2.4. Water Balance

Through continued coordination, the TRCA indicated that the Water balance component of the SWS should focus on the Block 27 site and should present a high level assessment of overall Block 27 water balance as well as identify what features that are to be preserved that may require recharge. The study should include preliminary identification of potential opportunities (e.g., areas where recharge may be feasible) that should be considered in more detail at the MESP phase.

The scope is as follows:

- Calculate existing four season water budget within the Block 27 Study Area;
- Identify seasonal water budgets using a standard spreadsheet approach for the study area, including natural features reliant on surface water contributions (as identified in Environmental work). Calculations will be completed to compare pre-development and post development conditions;
- Results will be used to recommend feasible mitigation strategies to maintain functions of natural areas to the extent feasible in this future urban setting; and,
- Coordinate with the Headwater Drainage Feature Assessment to establish the features that may be reliant on surface water inputs and recharge with the goal of confirming and/or augmenting the monitoring strategy to be undertaken as part of the MESP process of the Block Plan.

3.2.5. Natural Heritage Assessment / Ecology

Based on the information available, as described above in Section 3.1.3, existing natural-heritage conditions will be described, including aquatic and terrestrial features and functions. This summary will be augmented with information obtained from the City's NHN Study and other relevant sources such as the TRCA and the Ontario Ministry of Natural Resources (OMNR). Particular consideration will be given to the background information documented in the Don River Watershed Plan and its various supporting studies (listed above in 3.1.6);

- A detailed characterization of the natural heritage setting of the study area will be made based on a combination of existing field data (e.g., TRCA flora and fauna records; Beacon 2010 data as described above in 3.1.3) and supplemental / updated field data to be obtained in 2014 as described below);
- Natural heritage information for those undeveloped lands within the Upper West Don Subwatershed Area that lie external to Block 27 (i.e., immediately to the north [Block 28] and northeast [Block 21]; **Figure 2-4**) will be obtained from secondary sources (TRCA data, 2014 roadside observations, City's NHN Study, aerial photography, etc.);

- The characterization of existing conditions will be assessed in the context of the results of the City's NHN Study (anticipated to be publicly available in spring 2014) and this collective information will be used to identify a local Natural Heritage System (NHS);
- The NHS (forests, streams, HDF's, etc.) will integrate the findings of the companion hydrological and hydrogeological investigations described above and these data will be used to gain a good understanding of the functional relationships between surface and ground water and wetlands, and fish habitat; and,
- The NHS will have consideration for the position of the study area in the context of the overall landscape setting of the Upper West Don Subwatershed and identify linkages (ecological and hydrological) both internal and external to the Subwatershed (to the adjacent Humber River Watershed to the west). The following is a summary of additional updated natural heritage information that will be required in support of the SWS as well as the subsequent MESP.
- Coordinate appropriate information and observations with the Purpleville Creek SWS as needed to identify linkages between the watershed boundaries.

Headwater Drainage Feature (HDFA) Assessments:

- Complete HWDFA work initiated by Beacon Environmental for several watercourse features on a property that was not previously sampled in 2010 but is now a participating landowner;
- Re-assess 2010 HDFA findings in accordance with the latest (January 2014) CVC / TRCA HDFA protocol;
- Confirm / establish what features may require preservation and maintenance of surface water flows for the purposes of confirming and/or augmenting the monitoring strategy to be undertaken as part of the MESP process of the Block Plan; and,
- Prepare data compilation, assessment and reporting.

Breeding Bird Surveys:

- To update 2010 data given that several species of grassland birds have been designated as provincially threatened since the time of the previous surveys.

  In the event that any avian Species At Risk (SAR) are encountered during 2014 surveys, the Ministry of Natural Resources will be contacted to ensure that the appropriate SAR protocols are followed and that the applicable requirements of the *Endangered Species Act* are satisfactorily addressed.

Ecological Land Classification (ELC) Mapping and Community Descriptions:

- The ELC mapping of Block 27 prepared in 2010 is still relevant and provides an accurate and up-to-date depiction of vegetation communities. Updated ELC investigations will be carried out on any new participating properties within Block 27. On adjacent private lands within Blocks 21 and 28 where site access is not available, vegetation communities will be mapped to broad ELC Community Class or Community Series level (e.g., FO, and FOM).

Top-of-Bank (TOB) and Feature Delineation:

- Preliminary Top-of-Bank / Feature Limit delineation has been completed by Beacon Environmental and Cole Engineering in portions of Block 27. Site reconnaissance of the study area to confirm the presence of features will be carried out in conjunction with TRCA and City staff in 2014 but actual feature limit staking and surveying will not occur until the MESP stage.

4.0 SWS Outcomes, Integration, and Deliverables

Given the extensive work that had been completed to date, there are a number of inputs that are available through the Block 27 team to help inform the SWS process. Furthermore, this process is intended to inform the Secondary Plan and Block Plan processes for the Block 27 New Community Area. As such, there are several outcomes of the SWS that are expected to help inform future studies through the planning process. To help clarify these outcomes and convey the work that has been completed, a summary table has been provided to summarize the works completed, works required and the anticipated outcomes. The summary table can be found at the end of this TOR as **Table 4-1**.

4.1. Study Integration

Several components of the SWS will require information exchange and coordination to ensure consistent and integrated recommendations and conclusions. As part of this process, it is imperative that the various study components and coordinated. To ensure this integration, the final deliverable will be a consolidated report which addresses each of the five (5) components of the study and will include discussion within the relevant sections which are impacted by the other study components.

4.2. Subwatershed Study Deliverables

SWS findings will be documented in a consolidated report including supporting models, analyses, and individual study component results included as technical appendices. Each of the study components will be coordinated with the relevant TRCA and City staff through their preparation and completion of the draft findings. The draft consolidated report will be submitted to the TRCA and City for review and comment prior to its finalization.

4.2.1. Meetings

Throughout the completion of SWS tasks, meetings will be held with the TRCA and City staff to discuss technical matters including hydrology and hydraulic modeling details, future land use assumptions, and, results of analyses. The number, timing and focus of individual meetings will be determined as SWS work advances.

Table 4-1 – Summary of Block 27 Subwatershed Study Terms of Reference

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Regional Storm Assessment and Flood Impact Mitigation Strategy	▪ City-Wide Storm Drainage / SWM Master Plan Class Environmental Assessment Study (MPCEA) currently being completed by the City; ▪ Don River Watershed Plan, Beyond Forty Steps (TRCA, 2009); ▪ Existing Don River Visual OTTHYMO Hydrology Model; ▪ Existing Don River HEC-RAS Hydraulic Model and associated mapping; and, ▪ TRCA's SWM Criteria Document (TRCA, August 2012).	▪ Update existing conditions hydrology and hydraulic models to establish baseline flood conditions for comparison including field verification as necessary; ▪ Update hydrology and hydraulic modelling to reflect future conditions; ▪ Prepare a comparison which identifies the flow impacts of the regional regulatory event at key nodes in the Upper West Don Subwatershed;	▪ Updated hydrologic model reflecting the regulatory flood flow conditions of the proposed development. ▪ Updated hydraulic model. ▪ Determine the potential flood impacts to the Subwatershed Area as a result of the proposed development.

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Regional Storm Assessment and Flood Impact Mitigation Strategy (Cont'd)	▪ Phase II Drainage Study / Flood Vulnerable Sites – Areas 1-6 & 8 (2014);	▪ Prepare a flood mapping which compares existing and future conditions to determine potential impact resulting from future development; ▪ Identify flood vulnerable sites, structures, and areas impacted as a result of the proposed future development; ▪ Prepare Flood Site Analysis which will compare the existing and future flood conditions; ▪ Prepare a mitigation strategy for any downstream flood impacts; ▪ Identify recommended projects for downstream improvements including cost estimates; and, ▪ Confirm recommended Flood Control criteria for future development lands.	▪ Confirmed recommended Flood Control criteria for future development lands; and, ▪ Recommendation of a mitigation strategy for any downstream flood impacts including, source controls, conveyance improvements, removal of obstructions, and crossing improvements.
Erosion Assessment	▪ Existing Don River Visual OTTHYMO Hydrology Model; ▪ TRCA's SWM Criteria Document (TRCA, August 2012); and, ▪ TRCA / CVC Low Impact Development SWM Planning and Design Guide (2010).	▪ Geomorphic characterisation of the receiving downstream reaches for the purposes of establishing erosion thresholds; ▪ Develop a continuous hydrology model for the purposes of preparing an erosion analysis; ▪ Undertake an existing and proposed conditions erosion analysis to evaluate the frequency and duration that flows exceed the erosion thresholds in the key locations downstream of the proposed development locations; ▪ Prepare a mitigation strategy to limit erosion downstream of the proposed development by limiting the frequency and duration of erosive flows; and, ▪ Confirm recommended Erosion Control criteria for future development lands.	▪ Determine recommended erosion control criteria to limit erosion downstream of the proposed development.

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Hydrogeology	▪ The "Hydrogeological Investigation for the Block 27 Residential Development" prepared by Cole Engineering in support of the Block Planning process for Block 27. ▪ Approved Assessment Report: Toronto and Region Source Protection Area (TRCA, January 2012); ▪ SPC Accepted Tier 1 Water Budget, TRSPA Watersheds (TRCA, September 2010); ▪ SPC Accepted Groundwater Quality Vulnerability Analysis Highly Vulnerable Aquifer Delineation (CTC Source Protection Region, May 2010); ▪ TRCA Don River studies and report cards; ▪ TRCA Humber River studies and report cards; ▪ Regional geological mapping; ▪ MOE water well records and PTTW database; and, ▪ MOEE Hydrogeological Technical Information Requirements for Land Development Applications, dated April 1995.	▪ Review available geological information (e.g., Block 27 investigation borehole logs, geological mapping, and TRCA reports). ▪ Review available information on hydraulic properties (e.g., Block 27 slug tests, other published reports); ▪ Review groundwater level information from Block 27 investigation, MOE water well records, etc; ▪ Review local groundwater quality information, including Block 27 investigation findings and other published reports; ▪ Review baseflow and water level data from Block 27 investigation and nearby gauging stations and compare to: topography; estimated vertical gradients, knowledge of fisheries conditions; and other potential indicators of groundwater discharge; ▪ Compare assessment of groundwater recharge and discharge areas with results of Hydrology Update and Natural Heritage Assessment to inform seasonal water balance; ▪ Review MOE water well records within 500 m of the site and the PTTW database; and, ▪ Compare findings of the Hydrogeology study (e.g., recharge and discharge areas) to potential future land uses.	▪ Characterization of site stratigraphy and hydrostratigraphy. ▪ Description of the estimated range of values for hydraulic properties (i.e., hydraulic conductivity and infiltration rates) for identified stratigraphic units; ▪ Description of general horizontal and vertical groundwater flow patterns, including a description of shallow and deep groundwater systems; ▪ Description of the current understanding of local groundwater quality; ▪ Broad identification of areas of groundwater recharge and discharge, including preliminary identification of potential groundwater-supported natural features and baseflow contributions to any tributaries of the West Don River that flow through the site. Integration with finding from Hydrology Update and Natural Heritage Assessment; ▪ For the identified natural features that may be groundwater-supported, description of potential impacts to these features that may result from changes to the local groundwater regime

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Hydrogeology (Cont'd)			as a result of development (e.g., recharge reduction, impacts to flow pathways). ▪ Estimation of average annual recharge rates for the site; ▪ Identification of potential groundwater uses. Describe how groundwater uses may be impacted by development; and, ▪ Preliminary identification of opportunities and constraints for development, such as potential areas for enhanced infiltration measures and/or areas where SWM measures, such as ponds, may not be appropriate. Preliminary identification of potentially sensitive groundwater receptors that may require mitigation measures to ensure their continued function post-development.
Water Balance Strategy	▪ Geotechnical Investigation report prepared by Soil Engineers Ltd. dated January 2011 and copies of the topographic survey information of the Block 27 area prepared by Schaeffer and Dzaldov Bennett Ltd.; ▪ Ontario Soil Survey Mapping; ▪ Existing Natural Heritage Conditions Block 27 (Teston Green), 2014;	▪ Identify pre and post development seasonal water budgets using a standard spreadsheet approach for the study area; ▪ Coarse water balance requirements and recommendations on the Block 27 lands; ▪ Identify natural features reliant on surface water contributions;	▪ Identify overall water budget deficits ands provide direction for further study at MESP stage; ▪ Identify features that may be reliant on surface water inputs; and, ▪ Identify additional monitoring data required for MESP stage.

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Water Balance Strategy (Cont'd)	▪ Hydrogeological Investigation for the Block 27 Residential Development" dated November 2012; ▪ SPC Accepted Tier 1 Water Budget, TRSPA Watersheds (TRCA, September 2010); ▪ City-Wide Storm Drainage / SWM Master Plan Class Environmental Assessment Study (MPCEA) currently being completed by the City; ▪ TRCA's SWM Criteria Document (TRCA, August 2012); and, ▪ TRCA / CVC Low Impact Development SWM Planning and Design Guide (2010).	▪ Recommend feasible mitigation strategies to maintain functions of natural areas to the extent feasible in this future urban setting for future investigation at the MESP stage.	
Headwater Drainage Feature Assessment	▪ HDFA was completed for six (6) Don River tributaries in Block 27 in 2010; ▪ Fish sampling (where flow conditions allowed) and aquatic habitat assessments also carried out on these tributaries in 2010; ▪ Assessment followed protocol in 2009 CVC / TRCA interim guidelines; ▪ Copy of assessment provided to City and TRCA in 2013; ▪ Additional HDFA investigations were carried out at several spot locations in Block 27 by R.J. Burnside in 2013. This work was done in accordance with 2013 CVC / TRCA draft guidelines (final January 2014) as part of Phase 2 of the City's NHN Study; and, ▪ Raw data and photographs provided to Beacon but no completed assessment has been provided to date.	▪ Additional HDFA to be carried out on two (2) Don tributaries (within a previously non-participating property) and a single Humber feature in Block 27 using 2014 protocol; and, ▪ In the absence of field data for features on adjacent properties in Blocks 21 and 28 (within the Upper Don Subwatershed), characterization will be made from roadside observations and air photo interpretation.	▪ Updated HDFA Report incorporating 2010, 2013 and 2014 data; ▪ Determination of appropriate management approach and recommendations for Block 27 headwater drainage features based on the results of the assessment; ▪ Identification of headwater drainage features that require full protection and will remain *in situ*, conservation, provided that their functions are maintained or replicated, or mitigation; ▪ This information will be used to identify the elements of the local Natural Heritage System (NHS) for the study area and inform the approach to SWM.

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Breeding Bird Surveys	▪ Some spot locations of breeding birds within and adjacent top Block 27 were made by TRCA in 2006. These data have been requested from TRCA but not yet provided; ▪ Breeding bird surveys were carried out by Beacon within Block 27 on five dates in June 2010; ▪ All parts of the subject property and all representative habitats (open field, wet meadow, thicket and woodland) were surveyed; ▪ A total of 49 species were observed by Beacon in 2010, one of which (Barn Swallow) is provincially Threatened; and, ▪ No 2013 breeding bird surveys were carried out by North-South Environmental on Block 27 as part of Phase 2 of the City's NHN study.	▪ Further field surveys will be carried out in select areas of meadow habitat in Block 27 in summer 2014 focusing on grassland birds and Barn Swallow; and, ▪ In the absence of permission to enter other properties in Blocks 21 and 28, observations of grassland/meadow habitats will be made from adjacent roadsides.	▪ Updated existing natural heritage conditions report; ▪ Identification of actual and potential habitat for Species At Risk (SAR); and, ▪ This information will be used to identify the elements of the local Natural Heritage System (NHS), specifically areas that provide significant Wildlife Habitat and SAR habitat.
Vegetation Surveys	▪ Vegetation surveys of the subject property were conducted on five dates in summer 2010 and mapped and described according to the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al. 1998). ▪ Over 110 distinct vegetation units and a total of 214 plant species were identified within Block 27.	▪ ELC community descriptions and mapping is current for most of Block 27 and does not require updating. ▪ However, ELC and a floral inventory will be carried out on a property that was not a participating landowner in 2010 but is now.	▪ Updated existing natural heritage conditions report. ▪ This information will be used to identify the elements of the local Natural Heritage System (NHS), specifically significant woodlands and wetlands.
Breeding Amphibian Surveys	▪ Seven (7) locations within Block 27 were surveyed for breeding amphibians in 2010. ▪ A total of four (4) frog species were recorded at two (2) of the seven (7) locations, both in the northeast corner of the subject property (**Figure 2-2**).	▪ No additional field surveys proposed except as required as part of updated Headwater Drainage Feature Assessments on new participating properties. ▪ Consolidation of 2010 and 2013 data to assess use of site by breeding amphibians.	▪ Updated existing natural heritage conditions report. ▪ This information will be used to identify the elements of the local Natural Heritage System (NHS), specifically areas that provide Significant Wildlife Habitat.

Study Task	Existing Information	Work To Be Completed	Expected Outcome
Breeding Amphibian Surveys (Cont'd)	▪ Additional breeding amphibian surveys were carried out by North-South Environmental in the NE corner of Block 27 as part of Phase 2 of the City's NHN study.	▪ Amphibian data for the study area on file with TRCA (2006 / 2007 spot surveys) will be accessed and evaluated along with the foregoing.	
Landscape Connectivity Analysis	▪ In the identification of constraints and opportunities related to the future development of Block 27, consideration has been given to the landscape level connectivity to the north and northeast provided by provincial Greenbelt System. ▪ Opportunities to strengthen the linkage function of the Greenbelt (both internal and external to Block 27) through habitat restoration and enhancement have also been examined on the Block 27 portion in a preliminary fashion. ▪ Relationship between watercourses on Block 27 and off-site reaches both downstream and upstream have also been examined, particularly in the context of fish habitat and HDF function.	▪ Further assessment is needed to identify existing and potential linkage opportunities more generally in the context of those portions of Blocks 21 and 28 that lie within Upper Don Subwatershed.	▪ This landscape level analysis will be used to identify connectivity within the local Natural Heritage System (NHS).

Study Timelines

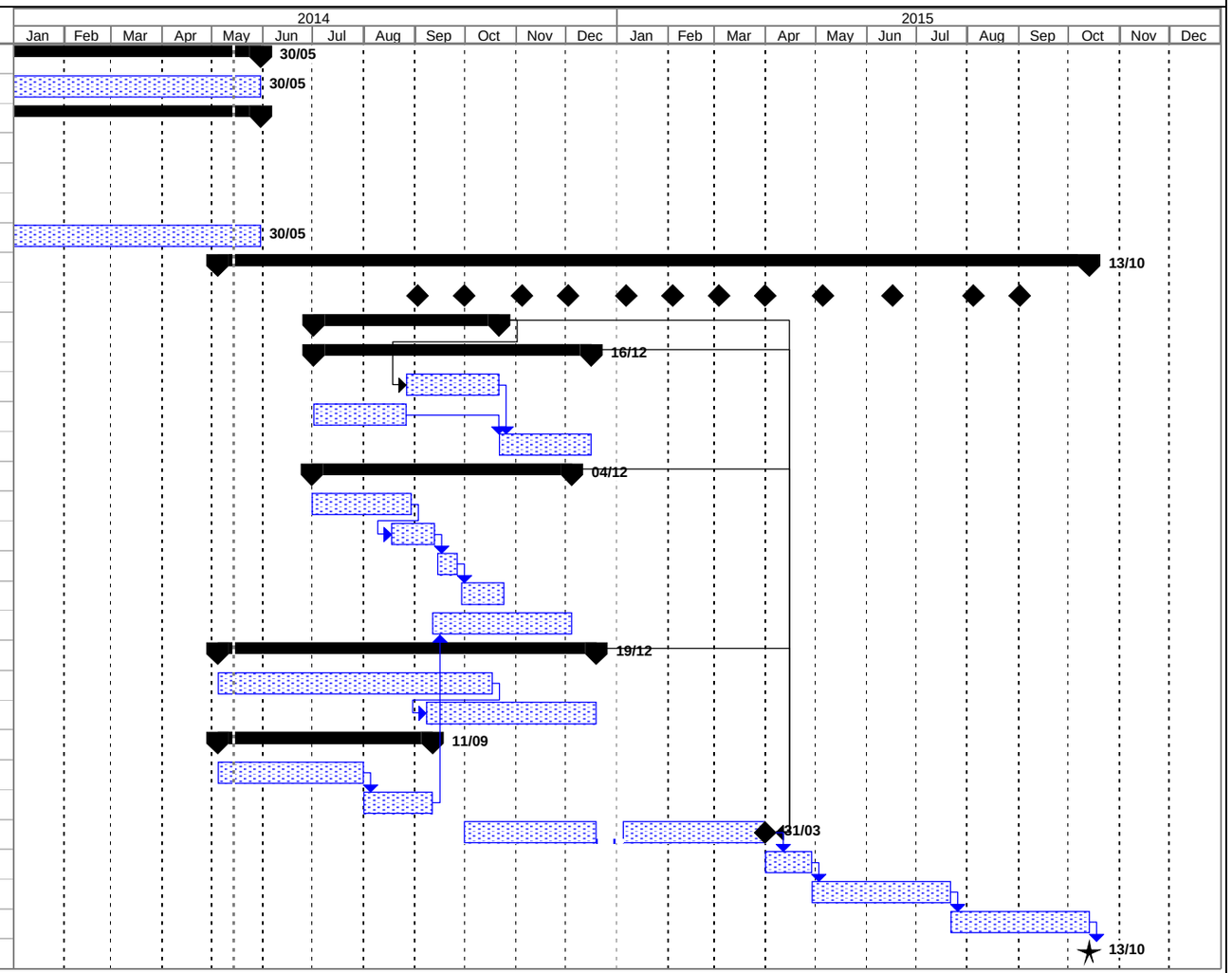
Block 27 (Teston Green) New Community Area
City of Vaughan

TESTON GREEN

COLE ENGINEERING
Experience Enhancing Excellence

Study Timelines

ID	Task Name	Start	Finish
1	**Background Studies:**	**Mon 22/03/10**	**Fri 30/05/14**
2	**City of Vaughan SWM Master Plan**	Tue 24/05/11	Fri 30/05/14
3	**Landowner Background Environmental Studies:**	**Mon 22/03/10**	**Fri 30/05/14**
4	Hydrogeological Study	Thu 12/08/10	Fri 30/11/12
5	Geotechnical Investigation	Thu 12/08/10	Mon 31/01/11
6	Natural Heritage Study	Mon 22/03/10	Mon 28/02/11
7	City of Vaughan Natural Heritage Network Study	Mon 02/01/12	Fri 30/05/14
8	**Block 27 (Teston Green) Subwatershed Study:**	**Mon 05/05/14**	**Tue 13/10/15**
9	**TAC Meetings**	**Wed 03/09/14**	**Wed 02/09/15**
22	**Regional Storm Assessment & Flood Impact Mitigation Strategy**	Wed 02/07/14	Tue 21/10/14
23	**Erosion Assessment:**	**Wed 02/07/14**	**Tue 16/12/14**
24	Develop Continuous Hydrology Model	Wed 27/08/14	Tue 21/10/14
25	Fluvial Field Investigation Work, Analysis, and Reporting	Wed 02/07/14	Tue 26/08/14
26	Modelling and Mitigation Strategy	Wed 22/10/14	Tue 16/12/14
27	**Hydrogeology:**	**Tue 01/07/14**	**Thu 04/12/14**
28	Field Survey	Tue 01/07/14	Fri 29/08/14
29	Site Characterization	Mon 18/08/14	Fri 12/09/14
30	Constraints and Opportunities (i.e. recharge areas)	Mon 15/09/14	Fri 26/09/14
31	Analysis and Reporting	Mon 29/09/14	Fri 24/10/14
32	Water Balance	Fri 12/09/14	Thu 04/12/14
33	**Natural Heritage / Ecology:**	**Mon 05/05/14**	**Fri 19/12/14**
34	Field Data Collection	Mon 05/05/14	Fri 17/10/14
35	Data Analysis, Mapping, and Reporting	Mon 08/09/14	Fri 19/12/14
36	Headwater Drainage Feature Assessment:	**Mon 05/05/14**	**Thu 11/09/14**
37	Additional Field Investigation Work	Mon 05/05/14	Thu 31/07/14
38	HDFA Gap Filling	Fri 01/08/14	Thu 11/09/14
39	**Study Integration and Coordination**	Wed 01/10/14	Tue 31/03/15
40	**Draft Consolidated Report**	Wed 01/04/15	Tue 28/04/15
41	**Agency Review and Comment**	Wed 29/04/15	Tue 21/07/15
42	**SWS Revisions / Agency Coordination / Report Finalization**	Wed 22/07/15	Tue 13/10/15
43	Final SWS	Tue 13/10/15	Tue 13/10/15



Project: L10-189

Task | Progress | Summary | External Tasks
Split | Milestone | Project Summary | External Milestone

May 2014

ATTACHMENT 3

Subwatershed Study and Master Environmental Servicing Plan

TERMS OF REFERENCE

Block 41, Purpleville Creek
City of Vaughan

May 6, 2014

Subwatershed Study and
Master Environmental Servicing Plan
TERMS OF REFERENCE

Table of Contents

List of Figures, Tables and Appendices

1.0 INTRODUCTION AND PURPOSE

The City of Vaughan Official Plan designates Blocks 27 and 41 as New Community Areas. Official Plan Schedule 1 illustrates the location of these areas. It is the City's policy that New Community Areas are planned as complete communities with a mix of uses and densities that meet the minimum requirements set out in the Growth Plan and the York Region Official Plan.

The City is initiating the preparation of a secondary plan for the Block 41 New Community Area. Consistent with Official Plan policy, a Subwatershed Study (SWS) will be prepared concurrent with the preparation of the secondary plan. As well, the Block 41 Owners are preparing a comprehensive Block Plan Report to support the Block Plan application including the preparation of a Master Environmental Servicing Plan (MESP). Discussions have been held with representatives of the City of Vaughan, the Toronto Region Conservation Authority (TRCA) and Block 41 Owners regarding the required work plans for the SWS and MESP for the Block 41 lands. Based on these discussions, this Terms of Reference has been prepared to set out SWS and MESP study requirements in support of the Block 41 secondary plan and block plan respectively.

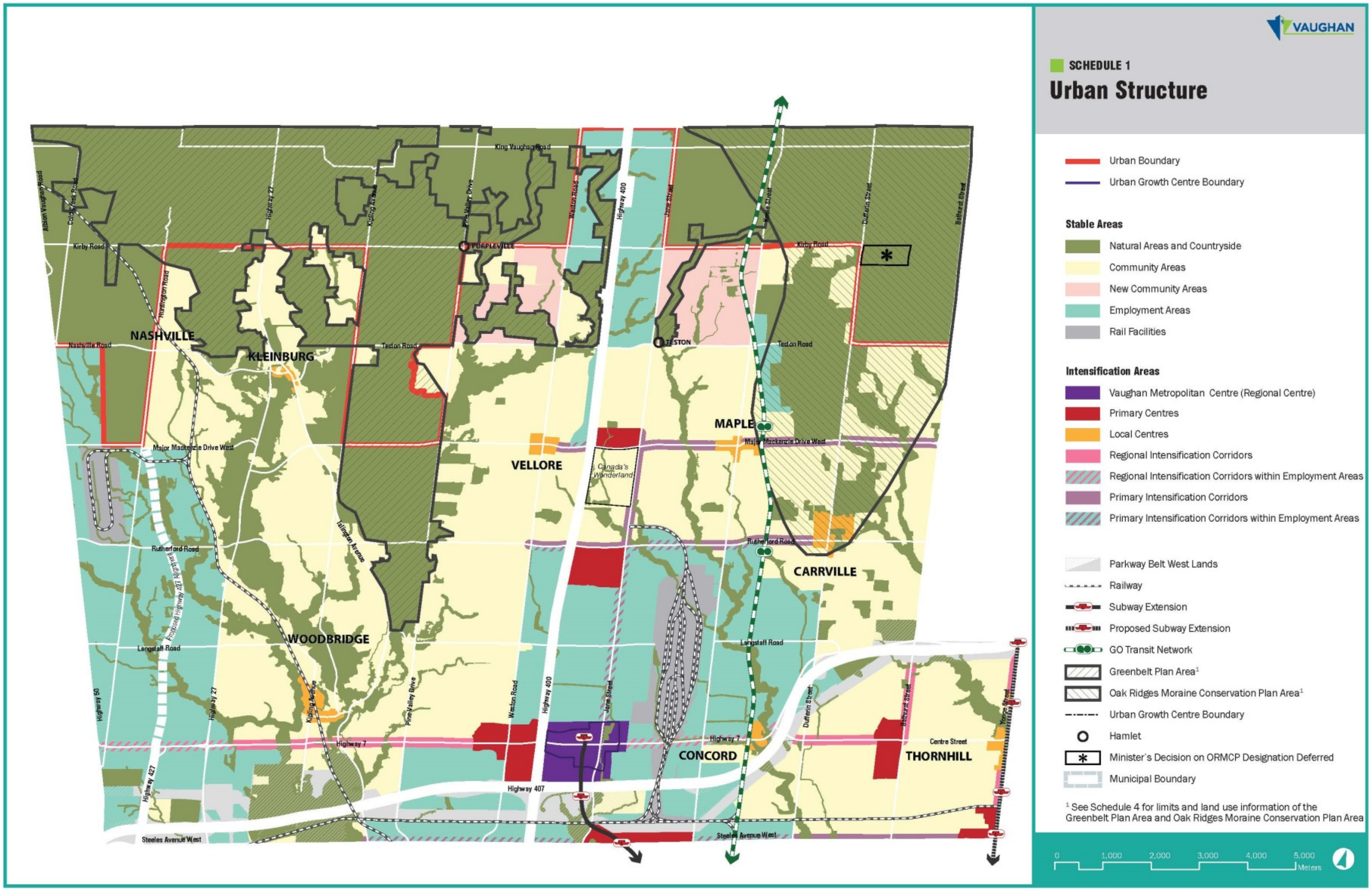
2.0 STUDY AREA

The Block 41 New Community Area is located within the area bounded by Kirby Road in the north, Weston Road in the east, Teston Road in the south and Pine Valley Drive in the west. Figure 1 illustrates the location of Block 41. This Block contains areas of existing development, TransCanada Pipeline Ltd. lands and easement, portions of the provincial Greenbelt and active agricultural areas. The Block is approximately 428ha in area. Approximately 172ha (40%) of the block is Greenbelt and 57ha (13%) of the Block is existing development located outside the Greenbelt.

Figure 2 notes lands within the Block represented by owners participating in the preparation of the SWS and MESP for this Block. As shown, a large percentage the Block (outside of existing development) are participating Block 41 owners.

Block 41 lies within the Purpleville Creek, a subcatchment of the Humber River watershed. Figure 3 illustrates the location of Block 41 within the Purpleville Creek subwatershed. As shown, surface drainage from the Block 41 lands flows into two valley/stream systems draining to the East Tributary of Purpleville Creek. Figure 3 also illustrates the location of adjacent block plan areas within the Purpleville Creek subwatershed including Blocks 34 East, 34 West, 35 East, 35 West, 42, and small portions of Blocks 27, 28 and 33 East. The SWS Study Area, defined as shown on Figure 3, extends beyond the Block 41 lands to include other portions of the Purpleville Creek subwatershed for select SWS tasks.

The Study Area for the MESP work focuses on the Block 41 lands only. Sections 4.0 and 5.0 define specific Study Areas for various SWS and MESP tasks.


VAUGHAN
SCHEDULE 1
Urban Structure
Urban Boundary
Urban Growth Centre Boundary
Stable Areas
Natural Areas and Countryside
Community Areas
New Community Areas
Employment Areas
Rail Facilities
Intensification Areas
Vaughan Metropolitan Centre (Regional Centre)
Primary Centres
Local Centres
Regional Intensification Corridors
Regional Intensification Corridors within Employment Areas
Primary Intensification Corridors
Primary Intensification Corridors within Employment Areas
Parkway Belt West Lands
Railway
Subway Extension
Proposed Subway Extension
GO Transit Network
Greenbelt Plan Area[1]
Oak Ridges Moraine Conservation Plan Area[1]
Urban Growth Centre Boundary
Hamlet
Minister's Decision on ORMCP Designation Deferred
Municipal Boundary
[1] See Schedule 4 for limits and land use information of the Greenbelt Plan Area and Oak Ridges Moraine Conservation Plan Area
0
1,000
2,000
3,000
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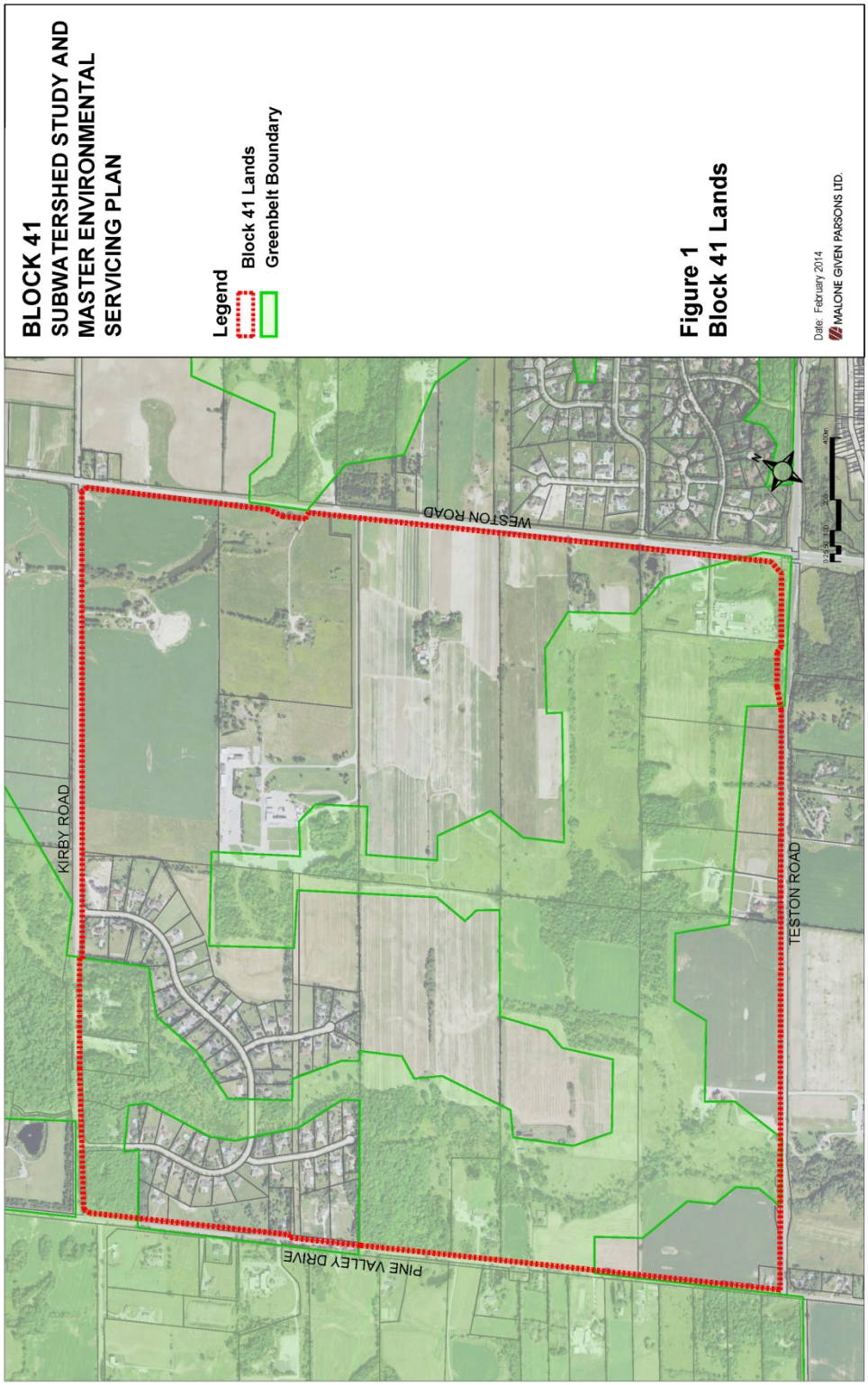
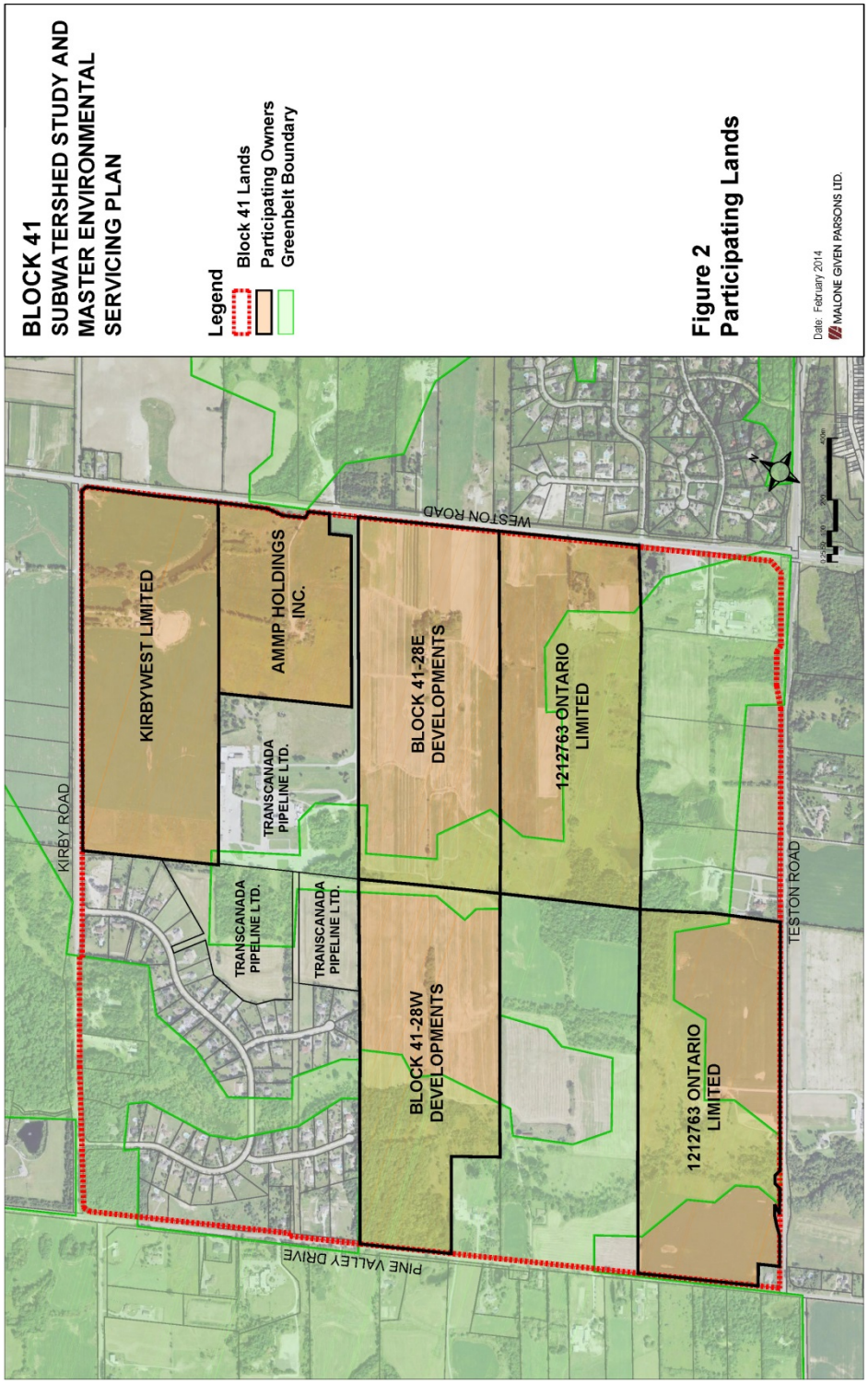
Meters
NASHVILLE
KLEINBURG
VELLORE
MAPLE
CARRVILLE
WOODBRIDGE
CONCORD
THORNHILL
TESTON
KUPPLEVILLE
Canada's Wonderland
King Vaughan Road
Kirby Road
Nashville Road
Teston Road
Major Mackenzie Drive West
Rutherford Road
Langstaff Road
Highway 7
Highway 407
Steeles Avenue West
Highway 400
Highway 427
Highway 50
Highway 27
Weston Road
Jane Street
Dufferin Street
Bathurst Street
Centre Street

May 2012


BLOCK 41
SUBWATERSHED STUDY AND
MASTER ENVIRONMENTAL
SERVICING PLAN
Legend
Block 41 Lands
Greenbelt Boundary
Figure 1
Block 41 Lands
Date: February 2014
MALONE GIVEN PARSONS LTD.
WESTON ROAD
KIRBY ROAD
TESTON ROAD
PINE VALLEY DRIVE


BLOCK 41
SUBWATERSHED STUDY AND
MASTER ENVIRONMENTAL
SERVICING PLAN
Legend
Block 41 Lands
Participating Owners
Greenbelt Boundary
Figure 2
Participating Lands
Date: February 2014
MALONE GIVEN PARSONS LTD.
KIRBYWEST LIMITED
AMMP HOLDINGS INC.
BLOCK 41-28E DEVELOPMENTS
1212763 ONTARIO LIMITED
BLOCK 41-28W DEVELOPMENTS
1212763 ONTARIO LIMITED
TRANSCANADA PIPELINE LTD.
TRANSCANADA PIPELINE LTD.
TRANSCANADA PIPELINE LTD.
KIRBY ROAD
WESTON ROAD
TESTON ROAD
PINE VALLEY DRIVE

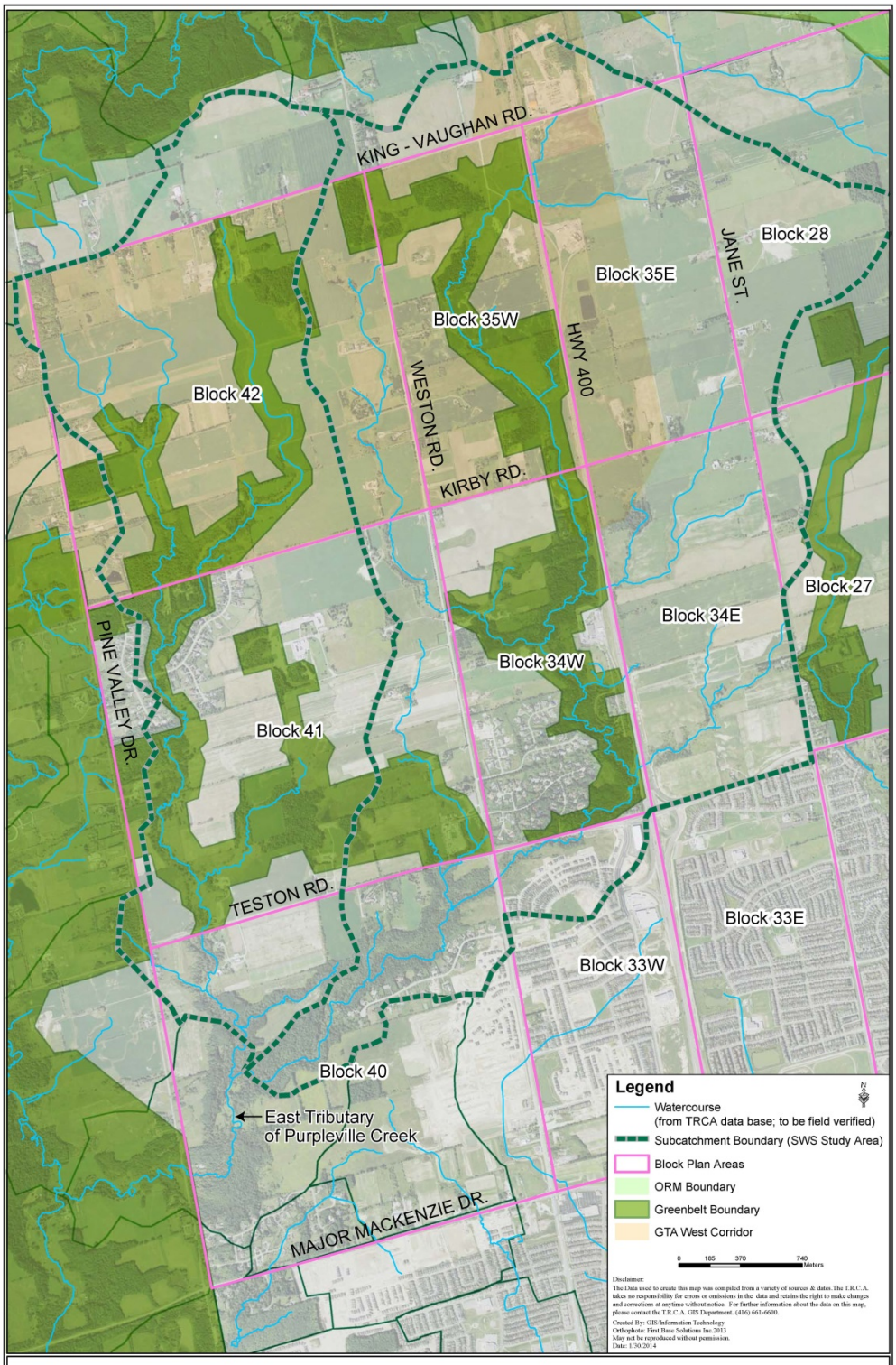


FIGURE 3: PURPLEVILLE CREEK SUBWATERSHED

3.0 STRUCTURE OF SWS AND MESP

Subwatershed studies typically include the characterization of aquatic and terrestrial resources, surface and groundwater systems, assessment of potential land use impacts on existing resources and the identification of management strategies to address a range of watershed management objectives. They provide input to land use studies on natural heritage systems and approaches to surface and groundwater management that affect land use plans and/or servicing approaches. These general requirements for SWS are intended to be tailored to subwatershed-specific conditions and local municipal needs and processes. Recognizing that the City of Vaughan Block Plan and MESP process addresses many of these requirements, specific requirements for the SWS versus the MESP work for the Block 41 lands were discussed with the City and TRCA in December 2013 and February/March 2014. Discussions identified work completed to date by agencies and landowners and its availability for use in SWS or MESP work. This exercise focussed the Block 41 study requirements to a SWS work plan to support the City's secondary plan initiative and a MESP work plan to support the landowners' Block plan application process. It is recognized that MESP level of detail is not a requirement for the SWS, but in the context of this integrated process, it is acknowledged that data being collected in support of MESP studies will be input to the SWS as appropriate.

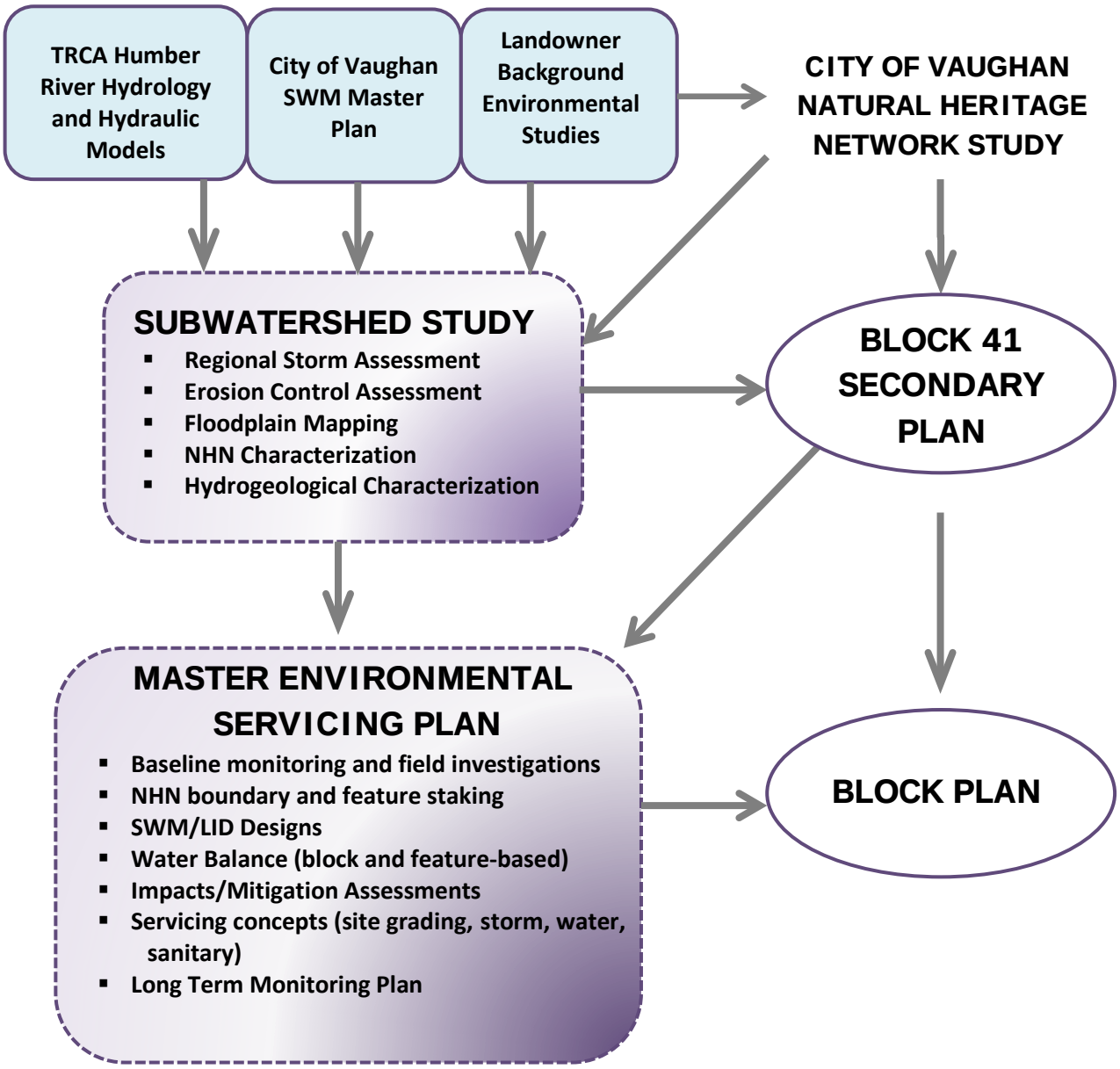
Within the City of Vaughan and the Humber River watershed, ongoing and past studies have addressed many typical inputs to a SWS. Based on agency discussions, because of the availability of data/analyses from others sources, this SWS work plan has been scoped to four specific study components, namely the Regional Storm assessment, erosion assessment, floodplain delineation and a baseline monitoring program. The following reports/studies will provide substantive inputs to the SWS and/or have eliminated the need for inclusion of some typical SWS study components into this SWS.

Figure 4 graphically illustrates the content and relationships of the SWS and MESP to secondary plan and block plan processes. As shown, several existing or ongoing studies will provide input to the SWS and/or the Secondary Plan. These include the City's Stormwater Management Plan and Natural Heritage Network Study, the TRCA's Humber River Hydrology Update and background work completed to date by the Owners. Outcomes of the SWS will provide input to the Block 41 Secondary Plan.

Also as shown in Figure 4, recommendations of the SWS and the Secondary Plan are important inputs to the MESP and the Block Plan. The MESP component of this work plan builds upon the recently approved MESP Terms of Reference for the Block 55 lands in Vaughan.

The SWS component of these TOR will guide the completion of the SWS report. The MESP TOR are included to illustrate the integration of the SWS tasks with MESP study requirements. Since one deliverable of the SWS is the identification of future study needs, the MESP TOR component of this document is draft and will be finalized when results of the SWS are available.

Figure 4
Subwatershed Study/Master Environmental Servicing Plan
Content and Relationship to Planning Documents
Block 41, City of Vaughan



3.1 SUPPORTING STUDIES

3.1.1 Natural Heritage Network Study

In spring of 2012, the City of Vaughan initiated the Natural Heritage Network Study (NHN Study) aimed at building upon the natural heritage system mapping in the City of Vaughan 2010 Official Plan. This four-phase study is assessing the role of the existing natural heritage network in maintaining elements of biodiversity and ecological functions for the long-term, consistent with Section 2.1.2 of the Provincial Policy Statement.

While the NHN Study is considering the City as a whole, the focus of effort is within the central and northern portions of the municipality where the majority of future land use changes are proposed. Given that the Region of York has recently completed an evaluation of Significant Forests and the MNR has completed a wetland evaluation for the East Humber watershed, the City's NHN is focusing on assessing and identifying significant wildlife habitat and the extent and functions of headwater drainage features to develop a comprehensive NHN including recommendations for protecting, managing and enhancing natural features.

Thus far, the City has completed Phases 1 and 2, and is in the process of completing Phase 3. The first two phases involved background data evaluation, GIS mapping and target setting in 2011, followed by Phase 2 activities including targeted field reconnaissance during the spring and early summer 2012 of selected areas (including Blocks 41 and 27) to confirm the extent and quality of natural heritage features on these lands. Phase 3 is currently underway and involves data analysis and the ultimate formulation of the proposed NHN along with recommendations for protecting, managing and enhancing natural features. The proposed NHN will be finalized in spring of 2014 and will then be followed by Phase 4 which will focus on formulating a Land Securement Strategy to ensure a long-term program to maintain and enhance the ecological integrity of the NHN.

The NHN Study conclusions will result in a recommended NHN for the Block 41 and other lands, and provide the necessary natural heritage input to the secondary plan. As a result, the SWS does not include a natural heritage component of study but will recognize and utilize NHN recommendations as appropriate.

MESP work at the Block Plan level will provide additional insight into the quality and extent of natural heritage features, and may result in refinements to the boundaries of the NHN within Block 41. The natural heritage component of the MESP outlines specific tasks to be completed; see Section 5.0.

3.1.2 Humber River Hydrology Update

The TRCA is updating their Humber River watershed hydrologic model through the completion of the "Hydrologic Study of Impacts on Flood Flows and Mitigation of Future Development in the Humber River Watershed". This study is intended to update watershed hydrology to reflect future land use conditions (in municipal Official Plans and the Whitebelt) and assess the appropriateness of applying current stormwater management criteria to future developing areas for return period storm events and if necessary, the Regional Storm. This study may identify

new stormwater management criteria and methodologies for application in the formulation of stormwater management strategies for new development.

The TRCA study is utilizing the Visual OttHYMO (VO3) hydrologic model to update watershed hydrology. The TRCA have advised that this new model, resulting flows for various land use conditions (i.e., existing and future) and recommendations for stormwater management design criteria are expected to be available in early June 2014. The TRCA updated hydrology model will provide a substantial degree of hydrology-related work typical of a SWS. TRCA has confirmed that this model will be made available for the hydrology component of the SWS and MESP. SWS work will refine this model as needed to reflect proposed land uses and the SWM concept for the Block 41 lands to address two specific matters – the management of Regional Storm flows and determination of erosion control criteria for developing areas in the Purpleville Creek Study Area. The extent of the SWS Study Area is illustrated on Figure 3. This work will require dialogue and coordination with the City and other landowners regarding other developing Blocks in this Study Area.

Results of the SWS Regional Storm and erosion assessment work will provide input to the secondary plan and the MESP work plan on storm drainage design.

3.1.3 Purpleville Creek Floodplain Mapping

The TRCA have approved engineered floodplain mapping for portions of Purpleville Creek based on hydrology and hydraulic studies completed in 2004 and base mapping from 2002. Within the SWS Study Area, the extent of available engineered floodplain mapping is limited to areas within Blocks 40 and 34W; none is available for Block 41. This mapping and supporting hydraulic modelling is available from the TRCA for use in this SWS for two purposes – the Regional Storm assessment and delineation of hazard lands in Block 41. The current hydraulic model will be refined as needed to reflect proposed development in the SWS Study Area and extended into Block 41. Floodplain mapping tasks associated with this component of the SWS are:

a) Regional Storm Assessment - Downstream flood risk assessments will be completed as part of the Regional Storm assessment. TRCA modelling will be refined to confirm/update information on flood vulnerability to identify the need for Regional Storm controls or other management/mitigation measures. For further details, see Section 4.1.

b) Delineation of Block 41 Hazard Lands – Existing conditions floodplain mapping for areas within Block 41 will be completed as part of the SWS work plan to provide input to the secondary plan on the extent of hazard lands. For further details, see Section 4.3.

3.1.4 City of Vaughan Master Stormwater Management Plan

The City is completing the preparation of a City-Wide Storm Drainage/Storm Water Management (SWM) Master Plan Class Environmental Assessment Study (MPCEA) to direct the required stormwater management infrastructure improvements to support the build-out of the new Official Plan. The study is city-wide in nature with a specific focus on the West Vaughan Employment, Woodbridge Core Intensification, Yonge-Steeles Intensification, and Kleinburg-Nashville New Community Secondary Planning Areas in addition to areas of intensification based on the City's redevelopment strategy. The study includes an evaluation of SWM opportunities and will provide general guidance for future secondary planning growth

areas identified in the Official Plan. As part of the MPCEA, general guidance and recommendations for the future Block 41 secondary planning area will be provided considering current policies and criteria as well as considerations for future study.

3.1.5 Natural Heritage Assessment and Recommended Natural Heritage System, Fieldgate Block 41 Lands

Ecological surveys, inventories and analyses were completed by some Block 41 owners in 2005/2006, with supplemental site investigations occurring in 2011 and 2013. This work covered the Block 41-28W Developments, Block 41-28E Developments and 1212763 Ontario Limited lands shown on Figure 2. The earlier field work included an extensive suite of inventories that provided a good baseline on the extent and quality of natural heritage features. This included surface water sampling, water temperature monitoring, various wildlife and aquatic habitat surveys and vegetation mapping. Subsequently, in more recent years (2011-2013), additional examination of the quality and extent of headwater drainage features, top-of-bank staking (without agency involvement), and wetland mapping occurred over large areas of the Block 41 lands. See listings of past environmental work below.

2005-2006 Investigations	2011-2013 Investigations
▪ *Winter wildlife surveys* ▪ *Botanical inventories and Ecological Land Classification* ▪ *Surface water quality sampling* ▪ *Surface water monitoring* ▪ *Amphibian breeding surveys* ▪ *Red-shouldered hawk survey* ▪ *Benthic macroinvertebrate sampling* ▪ *Breeding bird surveys* ▪ *Aquatic habitat assessment* ▪ *Trout spawning survey* ▪ *Incidental wildlife observations*	▪ Staked core feature boundaries (i.e., woodland dripline) that are within the proximity of Greenbelt limits ▪ Updated ELC mapping to reflect current conditions ▪ Staked top-of-bank of the Western Tributary valley ▪ Completed an assessment of small non-forested pocket wetlands for the satisfaction of significance criteria under the Greenbelt Plan (i.e., the Natural Heritage Reference Manual) as well as consideration for the policies within the City's new OP regarding wetland significance; and, ▪ Completed Headwater Drainage Assessment during late winter 2011 and spring/early summer 2012. In 2013, participated with North-South Environmental/R. J. Burnside in headwater assessment.

The results of these surveys and analyses were documented in the report entitled, *"Natural Heritage Assessment and Recommended Natural Heritage System"* that was submitted to the City of Vaughan in March 2013 to assist in the ongoing NHN study, and to the TRCA in January 2014. Further site investigation will occur in 2014 in support of the Block Plan work to provide a current data set across the entire Block 41 participating landholdings and to ensure that Species at Risk (SAR) legislation is addressed.

The summary of these findings suggest that the majority of the key natural heritage features and functions within Block 41 are contained within the Greenbelt lands; remaining areas are active agricultural over much of this block. The most significant natural heritage feature is associated with the western tributary of Purpleville Creek and its associated valley which is oriented in a north-south alignment along the western side of the block. Valley and tableland woodlot parcels are associated with Purpleville Creek; there is a large woodlot centrally located as well as small wetland units that are primarily located within the Greenbelt. A portion of the eastern tributary of

Purpleville Creek bisects the northeastern corner of the block and a minor tributary is found in the southeastern corner of the block.

The findings of the foregoing investigations resulted in a proposed natural heritage system for a large portion of the block (where access had been granted). In combination with the current NHN study being conducted by the City, and a more fulsome examination of all participating lands within Block 41 during 2014, the MESP will finalize a sustainable NHN.

3.1.6 City of Vaughan Environmental Management Guide (Draft June 2013)

The City's Environmental Management Guide (EMG) is an update to the original EMG document that was prepared in 1994 in support of OPA 400 to provide direction for the preparation of an EIS or other environmental reports at the scale of the Block Plan and Plan of Subdivision/Site Plan. This draft revised EMG will be finalized through the completion of the City's NHN Study.

The draft EMG identifies, "…*the range of studies and provides guidance regarding the level of detail of submittal information to prepare environmental reports in support of development applications according to environmental policies in Chapter 3 of the City of Vaughan Official Plan.*" The City's OP identifies the EIS and MESP as the main environmental reports to be prepared in support of the policies of the VOP at the block plans stage.

The EMG provides guidance on report content in the form of typical table of contents for EIS/MESP work as part of the Block Plan application. EIS requirements will be addressed as part of the MESP. The EMG will be used to guide the preparation of the Block Plan reports.

3.1.7 Preliminary Servicing Report, Block 41, City of Vaughan

In 2009, Schaeffers Consulting Engineers prepared a servicing study of the Block 41 lands. The objective of this report was to provide sanitary servicing, water supply and road/transportation infrastructure overview for Block 41. It identifies available servicing infrastructure and future servicing opportunities for the Block. This past work will be reviewed and included in the MESP analyses as appropriate.

3.1.8 Other Studies and Reference Documents

There are numerous other studies, plans, guidelines, etc. that will provide input and guidance to the preparation of the SWS and/or MESP work. They include, but are not limited to:

- York Region Official Plan (2010);
- City of Vaughan Official Plan (2010);
- City of Vaughan Phase II Drainage Study/Flood Vulnerable Sites – Areas 1-6 & 8, 2014;
- Species at Risk in Ontario (SARO) List, regulation to the Endangered Species Act, 2007 (ESA);
- Ministry of Natural Resources: Natural Heritage Reference Manual: Second Edition (OMNR 2010);
- West Vaughan Sewage Servicing EA (Region of York, on-going);

- Humber River Watershed Plan (TRCA, 2008);
- Humber River Watershed Plan Implementation Guide (TRCA, 2008);
- Humber River State of the Watershed Reports (2007);
- Humber Watershed Scenario Modeling and Analysis Report (TRCA, 2008);
- Listen to Your River: A Report Card on the Health of the Humber River Watershed (TRCA, 2007);
- Humber River Fisheries Management Plan (MNR and TRCA, 2005);
- MESP Requirements in Support of Secondary Plans (TRCA, September, 2007)
- Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (TRCA, 2013);
- TRCA Guidelines for Review of SWM Pond Location with Respect to Groundwater Conditions;
- TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide (2010);
- Geotechnical Engineering Design and Submission Requirements (TRCA, November 2007);
- Technical Guide for River & Stream Systems: Erosion Hazard Limit (MNR, 2002); and,
- Ministry of the Environment Water Well Records

4.0 SUBWATERSHED STUDY

Subwatershed Study work plan includes four study components – 1) Regional Storm assessment, 2) erosion assessment, 3) floodplain delineation, and 4) natural heritage and hydrogeologic characterization. The following sections of this TOR outline tasks to be completed for each of these four SWS study components.

4.1 REGIONAL STORM ASSESSMENT

The purpose of this assessment is to determine the need for, and if required, the type/size of Regional Storm controls or other potential mitigative measures for future developing areas in the SWS Study Area as defined in Figure 3.

a) Consult with the TRCA regarding recommendations from their updated hydrology study prior to study completion.

b) Obtain and review the TRCA VO3 model for the Humber River watershed (existing conditions, uncontrolled future conditions and future with controls). Meet with TRCA, if necessary, to discuss model parameters and the need for any revisions to reflect land uses in the SWS Study Area. .

c) Obtain and review available mapping and studies addressing hydrology and/or hydraulic matters in downstream areas along Purpleville Creek, including floodplain models, mapping and inventories of flood vulnerable structures.

d) Obtain data on ownership of downstream stream valleys.

e) Subject to access permissions, complete site reconnaissance of Block 41 and downstream areas along creek/valley system to identify/confirm uses and structures.

f) Refine the delineated existing subwatershed boundaries of Purpleville Creek as needed based on completion of fieldwork (culvert locations) and interpretation of topographic mapping. Compare boundaries to TRCA database and determine if changes are needed to hydrologic modelling subcatchment boundaries. Review soils mapping (Ontario Soils Mapping and available borehole data) and refine TRCA model if needed.

g) Consult with the City, landowners and TRCA regarding future land use assumptions to be used in future conditions models.

h) Update existing and future conditions hydrologic models for the SWS Study Area, if needed, to reflect existing drainage boundaries and proposed future land uses in the Purpleville Creek watershed. Compare flows to existing conditions and TRCA modelling results.

i) Review existing Regional Storm floodplain model and mapping along Purpleville Creek and if needed, update hydraulic models to reflect existing and future uncontrolled flows to identify existing and uncontrolled Regional Storm water levels in downstream areas. In addition, there is one area downstream of Block 41 where the review and updating of mapping may be required in the northern portion of Block 40 in the vicinity of Greenbrooke Drive. This area has been flagged by the TRCA as it is not accurately reflected in their current floodplain mapping in 2004. This will be completed through the review of mapping and engineering drawings of development in the northern portion of Block 40. If needed, current topographic mapping of area suitable for use for floodplain mapping will be obtained and the hydraulic model updated to reflect current conditions.

j) Identify if Regional Storm controls are required. If so, identify and evaluate options for Regional Storm controls or alternative approaches to the management of uncontrolled Regional Storm flows. This task will include:

   i. Assess implications of uncontrolled future flows to flood levels in downstream areas to determine the location and frequency of flooding, types of structures and/or uses that could be flooded including the predicted change from existing conditions.
   ii. Confirm the need for the management of Regional Storm flows should increased flows result in unacceptable impacts to downstream areas including flood vulnerable areas, road crossings, or other existing uses in the floodplain. Review impacts of uncontrolled flows to water levels in downstream areas with TRCA and City.
   iii. If impact assessments justify the need for the management of Regional Storm flows and/or remedial measures, identify and assess options including on-site and off-site measures; make recommendations on the preferred approach(es) to the management of Regional Storm flows. Operation and maintenance implications of proposed measures will be addressed. Preliminary costs will also be identified.

4.2 EROSION ASSESSMENT

The following tasks are proposed to be completed to determine stormwater management design criteria (erosion control) for the SWS Study Area.

a) Complete background review of detailed mapping, aerial photography, relevant reports, and policies affecting erosion control requirements.

b) Delineate stream reaches based on a desktop and background review.

c) Complete historical assessment of streams using available aerial photography to assess changes in land use, land cover and channel conditions.

d) Characterize existing geomorphic conditions on a reach basis. Observations will include channel geometry, substrate, bank conditions and riparian cover. RGAs and RSATs along with other tools will be employed to assess stream stability and sensitivity on a reach basis.

e) Collect detailed geomorphic field data in support of the development of stormwater targets for developing areas in the SWS Study Area. The location of the detailed sites will be governed by those areas deemed most sensitive to changes in land use, as well as the proposed location of potential stormwater management facilities.

f) Determine erosion thresholds using a suite of sediment entrainment models. These targets will be used to guide the requirements for stormwater management design.

g) Utilizing PCSWMM, prepare continuous simulation models for existing conditions and uncontrolled future conditions to assess predicted changes to erosion potential in downstream areas without SWM controls in developing areas. Assess exceedances (number and duration) and other indicators of erosion potential including time of exceedance, excess shear stress and cumulative effective work analyses. Based on model results and understanding of stream conditions, characterize existing erosion potential and predicted changes without SWM controls.

h) Prepare a future conditions model with SWM measures in place (storage and/or runoff volume controls) and assess the same erosion potential indicators as noted in item g) above.

i) Based on these model results, identify SWM design criteria for SWM facilities and/or LID measures (e.g., storage and volume control requirements) to be incorporated into development design to maintain, to the extent practical, existing conditions erosion potential.

4.3 FLOODPLAIN DELINEATION IN BLOCK 41

The delineation of hazard lands within Block 41 is to be completed based on extending current TRCA floodplain mapping from its existing locations south of Teston Road through Block 41 stream/valley corridors. The focus of this work is to delineate hazard lands in Block 41 consistent with Provincial Policy Statement, City of Vaughan Official Plan and TRCA requirements. This is necessary for completion of the downstream flood risk assessment as outlined in Section 4.1.

As part of the SWS Work Plan, the following tasks will be completed:

a) Review the extent of the NHN, the results of the headwater drainage feature assessment and catchment sizes to determine the specific extent of modeling and mapping required within Block 41. The TRCA requires that existing conditions floodline mapping be produced for the block along stream/valleys that drain areas greater than 50ha in size. Based on these factors, the exact limits of the floodplain mapping will be determined in consultation with the TRCA.

b) Confirm adequate topographic mapping is available for floodplain mapping. Where necessary, obtain topographic mapping consistent with TRCA requirements and complete field surveys of road crossings and typical valley cross sections. This is expected to include survey of culverts on Teston Road and Weston Road.

c) Extend TRCA existing hydraulic models upstream into Block 41 as needed and plot floodlines to confirm the extent of hazard lands through Block 41. Uncontrolled future flows from the updated hydrology model work will be utilized. Floodlines will be calculated in accordance with TRCA standards for topographic mapping, hydraulic modeling and preparation of floodplain maps.

4.4 NATURAL ENVIRONMENT AND HYDROGEOLOGICAL CHARACTERIZATION

4.4.1 Natural Heritage Characterization

Section 5.2.1 below, provides a detailed account of the suite of ecological surveys and inventories that will assist in determining the extent and quality of natural heritage features within Block 41, and which will form a key part of the MESP. As alluded to in Section 2, some of the detailed natural heritage data collected during the 2014 field seasons will, as appropriate, be used to aid in the characterization at the subwatershed level.

Based on Block 41 inventories and input from the City's Natural Heritage Network Study, characterization of the subwatershed, with particular emphasis on Block 41, will include:

a) Identification of the basis for and preliminary boundaries of the NHN for the Block 41 lands;

b) Identification of headwater drainage features through the use of the City's NHN study findings and/or using ArcHydro mapping and initial screening protocols outlined in the TRCA/CVC *Draft Evaluation, Classification and Management of Headwater Drainage Features Guidelines - Revised April 2013.* Site visits will be held to review features in 2014 and protocols will be applied to identify proposed management approaches, where needed. The SWS work will identify headwater drainage features that will be evaluated further through the MESP work plan;

c) SWS work will include a discussion regarding Endangered Species Act legislation, and will identify a 'go forward' plan for addressing species at risk through the MESP and subsequent stages of the development process. To this end, MESP work will include targeted SAR surveys as needed and these data will assist in characterizing potential SAR habitat within Block 41;

d) A range of other ecological surveys are already underway, or have been completed (such as winter wildlife tracking and winter raptor surveys in February/March 2014), and several other field investigations will occur during the key spring, summer and fall periods in 2014 (as per Section 5.2.1). While this is MESP level of detail, to the extent that these data are available and will aid in characterization of the natural heritage features at the subwatershed level, they will be presented and discussed within the SWS;

e) As part of the SWS, the Block 41 team will consider the preliminary City's NHN findings that identify natural heritage lands within this block and, in conjunction with the characterization of existing conditions through the detailed ecological surveys, will collectively be used to identify a Block 41 Natural Heritage System (NHS). The NHS will have consideration for the position of the block in the context of the overall landscape

setting of the Upper West and East Purpleville Creek Subwatershed and identify linkages (ecological and hydrological) both internal and external to Block 41. This analysis will also rely upon background and secondary sources of adjacent lands (such as may be available from the TRCA and MNR, aerial photography and confirmatory windshield surveys);

f) Utilize the City's NHN findings as preliminary NHS for the lands within the subwatershed but outside of Block 41 for the purposes of the preparation of a land use concept for hydrologic modeling; and,

g) In conjunction with the water resource characterization, identify natural features where feature-based water balance analyses are required at the MESP stage.

4.4.2 Hydrogeological Characterization

The intent of baseline monitoring in Block 41 at the SWS stage is to characterize the environmental conditions and identify key features for further study at the MESP stage (e.g., feature based water balance requirements). During agency discussions on these TOR, requirements for baseline monitoring were discussed for the purposes of characterizing the existing conditions with respect to surface water and groundwater. The TRCA requires 3 continuous years of monitoring data be collected for the water-related baseline monitoring through the SWS and MESP study processes. Data collection in 2014 for surface water and groundwater study components outlined below will form part of the SWS work program; and additional monitoring data will be collected to provide a total of 3 continuous years of data as part of the MESP work program.

With respect to the baseline hydrogeological monitoring program, the following tasks will be completed as part of SWS work, specific to Block 41 only:

a) Consult with TRCA and City to finalize specific monitoring details related to the proposed monitoring plan (as outlined below and on Figure 5). Consultation will confirm monitoring locations and use of continuous dataloggers versus staff gauges in wetlands (based on wetland characteristics) and streams. Wetland screening will be documented and site visits will be organized in early 2014 to confirm these components of the program;

b) Implement the monitoring program from April 2014 to December 2014;

c) Prepare reporting of 2014 monitoring data and interpretation and circulate to TRCA and City for comment; and,

d) Finalize 2014 reporting and confirm extent of monitoring program for 2015 and beyond (to be completed as part of the MESP where required).

Based on the environmental inventory work completed to date, and the completion of an assessment of existing drainage patterns and preliminary wetland screening, a proposed baseline monitoring program has been prepared and circulated to the TRCA and City for comment. The content of the proposed monitoring plan is outlined on Figure 5. The monitoring network and data collection program have been designed in support of both the SWS and MESP studies. For example, a number of the monitoring wells have been located in potential

proposed SWM facility locations to obtain soils and groundwater information in support of the formulation of the MESP SWM Plan. Available information collected in 2014 will be input to the SWS as appropriate, and then monitoring will continue as part of the MESP studies.

The monitoring program includes the installation and monitoring of:

- a network of geotechnical boreholes;
- a network of groundwater monitoring wells including shallow wells for water table monitoring and deeper wells to assess underlying aquifer conditions;
- piezometers and staff gauges to monitor shallow groundwater levels in select* wetland areas and streams or other locations where feature based water balances are required at the Block Plan stage (i.e., monitoring of potential groundwater/surface water interactions);
- temperature loggers in select* streams where surface water enters and exits the Block; and,
- surface water stations along watercourses for flow monitoring and water sampling for quality testing. Rating curves, to be developed at continuous flow stations, are preferably based on a minimum of 5 measurements from different storm events. This data will be used at the MESP stage to confirm hydrology models for erosion control purposes.

* Features to be monitored and equipped with piezometers, staff gauges and/or dataloggers will be determined based on a screening-process in consultation with the TRCA.

Characterization of the hydrogeological conditions for the SWS will include descriptions and identification of:

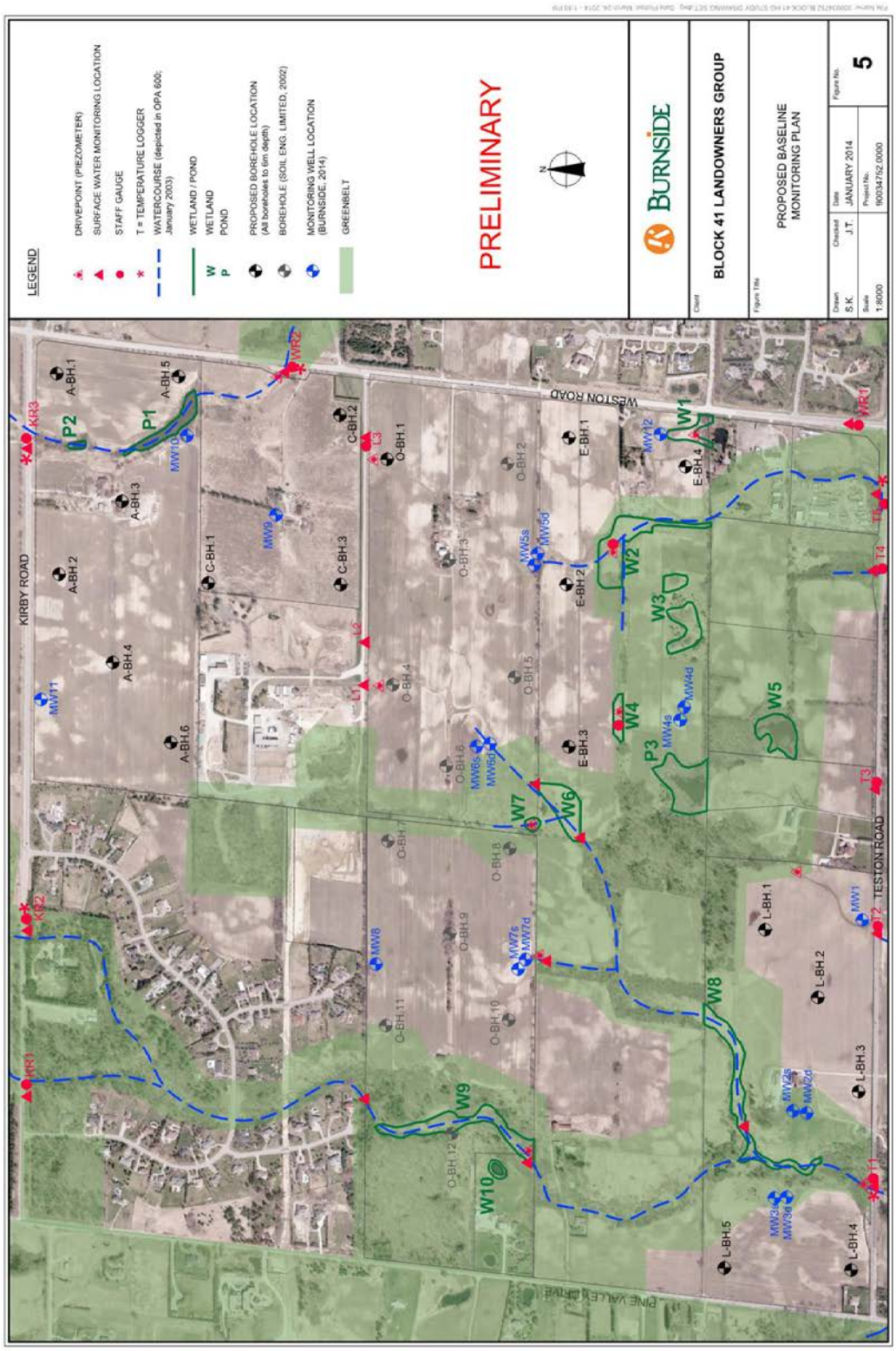
- physiography, topography and surficial soils;
- hydrostratigraphy (major aquifers and aquitards);
- local groundwater use (i.e., water supply wells and aquifer use);
- groundwater levels, hydraulic gradients, and groundwater flow patterns (lateral and vertical including identification of recharge and discharge conditions);
- hydraulic conductivity of surficial soils (infiltration potential);
- groundwater quality;
- potential groundwater/surface water interactions to local features (watercourses, wetlands and woodlots); and,
- surface water flow, quality and temperature.

The SWS will include a preliminary identification of potential development constraints and opportunities related to the hydrogeological conditions in Block 41 that should be considered in more detail at the MESP stage (e.g., areas of high water table, significant groundwater/surface water interaction and potentially sensitive groundwater receptors, areas where enhanced infiltration may be feasible, etc.). The SWS will also include recommendations for any changes to the hydrogeological monitoring locations and/or frequency of monitoring that may be appropriate based on the understanding of the groundwater flow conditions. It will identify monitoring requirements for feature-based water balance analyses.

Based on the large percentage of participating owners in Block 41, there is access available to obtain good monitoring coverage across the Block. Should non-participating landowners

become involved in the development process, the monitoring plan should be adjusted, where appropriate, to include these lands.

Should adjustments to the monitoring plan be required, the TRCA and City should be consulted to ensure there is agreement on any suggested proposed amendments to the program.


LEGEND
DRIVEPOINT (PIEZOMETER)
SURFACE WATER MONITORING LOCATION
STAFF GAUGE
T = TEMPERATURE LOGGER
WATERCOURSE (depicted in OPA 600; January 2003)
WETLAND / POND
W WETLAND
P POND
PROPOSED BOREHOLE LOCATION (All boreholes to 6m depth)
BOREHOLE (SOIL ENG. LIMITED, 2002)
MONITORING WELL LOCATION (BURNSIDE, 2014)
GREENBELT
PRELIMINARY
BURNSIDE
Client
BLOCK 41 LANDOWNERS GROUP
Figure Title
PROPOSED BASELINE MONITORING PLAN
Drawn S.K.
Checked J.T.
Date JANUARY 2014
Scale 1:8000
Project No. 90034752.0000
Figure No. 5
KIRBY ROAD
WESTON ROAD
TESTON ROAD
PINE VALLEY DRIVE
P1
P2
P3
W1
W2
W3
W4
W5
W6
W7
W8
W9
W10
KR1
KR2
KR3
WR1
WR2
T1
T2
T3
T4
T5
L1
L2
L3
A-BH.1
A-BH.2
A-BH.3
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A-BH.6
C-BH.1
C-BH.2
C-BH.3
O-BH.1
O-BH.2
O-BH.3
O-BH.4
O-BH.5
O-BH.6
O-BH.7
O-BH.8
O-BH.9
O-BH.10
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L-BH.5
MW1
MW2s
MW2d
MW3s
MW3d
MW4s
MW4d
MW5s
MW5d
MW6s
MW6d
MW7s
MW7d
MW8
MW9
MW10
MW11
MW12

4.5 INTEGRATION OF ANALYSES

The SWS work program will be completed by a multi-disciplinary team with expertise in a range of natural resource issues including surface water, groundwater, terrestrial, aquatic, fluvial geomorphology, hydrology and hydraulics. The integration of analyses, findings and recommendations is essential to the completion of the SWS. Integration of various work plans between environmental and engineering disciplines will be completed for each study component to ensure that inter-relationships that exist between surface water, groundwater, receiving wetlands and watercourses, aquifers and other NHN features are identified and appropriate mitigative measures and/or future studies needs are identified. Team working sessions will be held to discuss and understand the inter-relationships, identify potential implications to various components of the NHN and make recommendations regarding mitigative measures to protect the NHN over the long-term. Reporting should identify the integration of analyses that occurred at various stages of the study. The study project manager will be instrumental in ensuring the sharing and integration of information, findings and recommendations through the study process.

4.6 MEETINGS AND REPORTING

Throughout the completion of SWS tasks, meetings will be held with the TRCA and City staff to discuss technical matters including hydrology and hydraulic modeling details, future land use assumptions, results of analyses, etc. The number, timing and focus of individual meetings will be determined as SWS work advances.

SWS findings will be documented in a report including supporting models, analyses and input to secondary plans. A draft report will be submitted to the TRCA and City for review and comment prior to its finalization. The SWS will clearly identify analyses completed, integration of work, key findings and recommendations as well as any additional work to be completed at the MESP stage that is not outlined in Section 5.0. Key deliverables to be provided as input to the Secondary Plan include:

a) NHN boundaries and permitted uses in the NHN;

b) Floodplain mapping for Block 41;

c) Recommended management strategy for the Regional Storm;

d) Suggested policy direction regarding stormwater management;

e) Preliminary development constraints or opportunities related to the hydrogeological conditions; and,

f) Identification of additional study requirements at the MESP stage (to those outlined in Section 5.0), if required, or for subsequent stages of the development process.

Table A summarizes each SWS task including work to be completed and expected outcomes/deliverables.

Where acceptable to agencies, digital copies of the SWS will be provided. One (1) hard copy and (6) digital copies of the materials will be provided to the TRCA.

4.7 PROJECT SCHEDULE

A preliminary project schedule is illustrated on the chart found in Appendix A.

Table A – Summary of SWS Tasks and Deliverables

SWS Study Task	Existing Information	Work to be Completed	Deliverable
Regional Storm Assessment	▪ City-Wide Storm Drainage /SWM Master Plan Class Environmental Assessment Study (MPCEA) ▪ TRCA Humber River Hydrology Update ▪ TRCA Floodplain Mapping for part of Study Area ▪ TRCA's SWM Criteria Document August 2012	▪ Obtain and refine existing conditions hydrology and hydraulic models as necessary to establish baseline flood conditions ▪ Update existing and future conditions hydrologic models, if needed, to reflect existing drainage boundaries and proposed future land uses in the Purpleville Creek watershed ▪ Update hydraulic models to reflect existing and future uncontrolled flows to identify existing and uncontrolled Regional Storm water levels in downstream areas v. Assess implications of uncontrolled future flows to flood levels in downstream areas to determine the location and frequency of flooding, types of structures and/or uses that could be flooded including the predicted change from existing conditions. v. Confirm the need for the management of Regional Storm flows should increased flows result in unacceptable impacts to downstream areas including flood vulnerable areas, road crossings, or other existing uses in the floodplain. i. identify and assess options for the management of Regional Storm flows including on-site and off-site measures; make recommendations on the preferred approach(es) to the management of Regional Storm flows.	▪ Updated hydrologic model reflecting the regulatory flood flow conditions ▪ Updated hydraulic model for downstream areas ▪ Recommended management strategy for the Regional Storm
Erosion Assessment	▪ Updated Humber River Hydrology Model ▪ City-Wide Storm Drainage /SWM Master Plan Class Environmental Assessment Study (MPCEA) ▪ TRCA's SWM Criteria Document August 2012	▪ Characterize existing geomorphic conditions on a reach basis and determine erosion thresholds ▪ Prepare continuous simulation models for existing conditions and uncontrolled future conditions to assess predicted changes to erosion potential in downstream areas without SWM controls in developing areas ▪ Assess exceedances (number and duration) and other indicators of erosion potential including time of exceedance, excess shear stress and cumulative effective	▪ Identification of recommended erosion control design criteria for proposed development

SWS Study Task	Existing Information	Work to be Completed	Deliverable
		work analyses ▪ Prepare a future conditions model with SWM measures in place and assess the erosion potential indicators ▪ Identify erosion control SWM design criteria to limit the frequency and duration of erosive flows	
Floodplain Delineation, Block 41	▪ Existing TRCA HEC-RAS model and floodplain mapping	▪ Extend TRCA existing hydraulic models upstream into Block 41 as needed and plot floodlines to confirm the extent of hazard lands through Block 41	▪ Floodplain mapping for developing lands within Block 41 for drainage areas greater than 50 ha in size
Natural Heritage Characterization	▪ City of Vaughan Natural Heritage Network Study ▪ Natural Heritage Assessment and Recommended Natural Heritage System, Fieldgate Block 41 Lands ▪ TRCA/CVC Draft Evaluation, Classification and Management of Headwater Drainage Features Guidelines	▪ Identify the basis for and preliminary boundaries of the NHN ▪ Characterize natural heritage features at the subwatershed level ▪ Identify/assess headwater drainage features ▪ Discuss regarding Endangered Species Act legislation, and identify a 'go forward' plan for addressing species at risk through the MESP and subsequent stages of the development process ▪ Complete targeted SAR surveys to characterize potential SAR habitat in Block 41 ▪ Identify natural features where feature-based water balance analyses are required at the MESP stage	▪ Characterization of the NHN in subwatershed (through use of existing studies) ▪ Identification of the Block 41 NHN based on existing studies and specific site work ▪ Identification of headwater drainage feature management approaches for Block 41
Hydrogeological Characterization	▪ Ministry of the Environment Water Well Records	▪ Implement hydrogeological and surface water monitoring program in 2014 ▪ Interpret monitoring data to characterize existing hydrogeological conditions for the subwatershed study area and Block 41 ▪ Identify preliminary potential constraints and opportunities related to hydrogeological conditions in Block 41 ▪ Identify the extent of hydrogeological and surface water monitoring program for 2015 and beyond (to be completed as part of the MESP where required) ▪ Identify monitoring requirements for feature-based water balance analyses	▪ Characterization of existing hydrogeological conditions for the subwatershed study area and Block 41 ▪ Identification of existing hydrogeological conditions for the subwatershed study area and Block 41 ▪ Confirmation of ongoing monitoring requirements

5.0 MASTER ENVIRONMENTAL SERVICING PLAN

5.1 INTRODUCTION

In accordance with the provisions of the City of Vaughan New Official Plan, the Block Plan process is intended to ensure that all physical, social, environmental and economic aspects of the development of the lands within Block 41 are identified and addressed through a comprehensive planning exercise. Upon completion of the Block Plan and subsequent approval of the Block Plan by the City, the policies of the Official Plan, and the Block Plan will be implemented through the approval of draft plans of subdivision and zoning by-law amendments.

The following extract from Section 10.0 Implementation of the City of Vaughan New Official Plan sets out the general framework for the preparation of Block Plans:

> *"10.1.1.13. That a Block Plan is a comprehensive planning framework that describes how the following policy aspects of development will be addressed:*
>
> *a) the proposed land uses, housing mix and densities;*
> *b) traffic management, including the expected traffic volumes on all collector and local streets to precisely define the requirements for items such as traffic signals, stop signs, turn lanes and transit stop locations, traffic-calming measures, and transportation demand management;*
> *c) the provision of public transit, pedestrian and cycling networks;*
> *d) the provision of public and private services and the detailed approach to stormwater management;*
> *e) protection and enhancement of the Natural Heritage Network, including the detailed evaluation and demarcation of Core Features and Enhancement Areas;*
> *f) the precise locations of natural and cultural heritage features of the area, including built heritage and potential archaeological resources and proposed approaches to conservation and or enhancement;*
> *g) the precise location of any parks, open spaces, schools, community centres, and libraries;*
> *h) the proposed implementation of sustainable development policies as contained in Section 9.1.3 of this Plan; and,*
> *i) phasing of development."*

The Block Plan process is a comprehensive planning framework requiring preparation of a supporting Master Environmental Servicing Plan (MESP) that will describe how the environmental and municipal servicing aspects of development will be addressed. The MESP will address the feasibility of providing municipal services such as roads, sanitary sewers, storm sewers and water supply for the Block 41 lands. The MESP will also describe the manner in which grading and stormwater management measures will be implemented for the Block Plan. Direction from the draft EMG will be utilized, as appropriate, and incorporated into MESP work

and reporting. This requires the integration of several environmental disciplines to ensure that inter-relationships that exist between surface water, groundwater, receiving wetlands and watercourses, aquifers and other NHN features are identified and appropriate mitigative measures are identified. Team working sessions will be held to discuss and understand the inter-relationships, identify potential implications to various components of the NHN and make recommendations regarding mitigative measures to protect the NHN over the long-term. Similarly, integration of MESP work with other Block Plan studies will be carried out as needed.

The MESP is proposed to be completed using a two (2) phased approach comprised of the following phases:

- ***Phase 1:*** Overview of Existing Conditions and Preparation of Opportunities and Constraints Mapping; and,
- ***Phase 2:*** Analysis and Recommendations.

The Study Area for all MESP work plan components outlined in the following sections is the Block 41 lands shown on Figure 1.

5.2 MESP WORK PLAN

5.2.1 Phase 1: Overview of Existing Conditions and Preparation of Opportunities and Constraints Mapping

Phase 1 information pertaining to existing conditions and preparation of opportunities and constraints mapping will be collected through fieldwork, review of existing studies/reports, various analyses and consultation with the approval agencies. Phase 1 will provide input to the preparation of the Block Plan land use concept and Phase 2 MESP work. Phase 1 work includes fieldwork and analyses to:

a) Compile and review existing studies, plans, mapping, etc.;

b) Summarize existing policies, guidelines, legislation affecting MESP study components;

c) Identify existing storm drainage patterns and external drainage impacting the Study Area;

d) Review and verify existing conditions hydrology model prepared as part of the SWS based on three years of monitoring data;

e) Characterize all hydrologic features (watercourses, swales, natural areas providing flood storage attenuation, depression storage, recharge areas, seepage areas or springs) utilizing data from existing environmental studies and 2014 fieldwork. Complete the headwater drainage features assessment utilizing the TRCA's Interim Guidelines for the "Evaluation, Classification, and Management of Headwater Drainage Features" (2013);

f) Calculate existing annual water budget within the Study Area;

g) Calculate meander belt widths along stream and valley corridors and the 100 year erosion limits along valley corridors;

h) Identify where detailed slope stability assessments are required and complete long term stable top of slope analyses where needed. Slope conditions will be modeled and

stability will be assessed. The stable slope inclination corresponding to a minimum factor of safety of 1.5 should be determined.

i) Undertake a background review of the following existing reports and available geological information to thoroughly understand the geological and hydrogeological setting:

- MOE water well records and local groundwater use;
- Surficial soil, quaternary, and bedrock geological maps;
- Available geotechnical reports;
- Hydrogeological mapping available from the TRCA and other agencies including existing hydrogeological models;
- Regional Scale Source Water Protection studies that may include aquifer vulnerability mapping, recharge and discharge area mapping, summary of groundwater quality information and water budget calculations; and,
- Natural features mapping.

j) Characterize the existing geological and hydrogeological setting. Results from the baseline monitoring program outlined in Section 4.4 will be used to build upon the current understanding of geology and groundwater systems determined from the review of past studies. The main objectives of this undertaking are to:

- Identify site stratigraphy and hydrostratigraphy;
- Identify areas of groundwater recharge, and discharge;
- Determine hydraulic properties of stratigraphic units including those units that transmit groundwater to natural features such as watercourses and wetlands;
- Delineate groundwater flow patterns;
- Identify surface water and groundwater supported natural features;
- Quantify baseflow contributions to streams and/or wetlands in the Study Area; and;
- Identify potential surface water infiltration opportunities based on soils information, depth to water table and aquifer vulnerability.

k) Conduct a baseline water supply well survey to identify local groundwater uses and users. The information should be used to support the development of a baseline aquifer monitoring program. Organizations currently undertaking similar studies will be contacted to investigate the potential for data sharing. If possible, baseline water supply well survey information from neighboring properties will be used to augment the number of properties to be included in the baseline well survey. The refined area will be determined after coordinating with neighboring studies. Remaining private water wells within 500m of the Block boundaries will be surveyed to determine typical groundwater usage in the area. Residents will be requested to fill out a questionnaire and well details will be collected. Water levels will be measured in accessible wells (with owners permission) and select wells will be sampled for microbiological parameters, nutrients and general water quality parameters. With permission from owners, representative wells will be instrumented with automatic water level recorders to gather detailed information on changes in groundwater levels due to water use and climatic conditions;

l) Complete 2014 ecological inventories including:

i. Winter wildlife tracking surveys – surveys will be undertaken following suitable snowfall conditions to assess the types of mammals using the Block and their movement patterns;

ii. Winter raptor surveys – these will assess potential roosting, foraging and nesting habitat of wintering birds of prey;

iii. Complete updated ELC surveys – these will occur on all participating lands to ensure current vegetation mapping is available.

iv. Breeding bird surveys – conventional breeding surveys will occur across the block and, depending on the habitat evaluation through the ELC assessment, targeted surveys for grassland birds (e.g., Bobolink and Eastern Meadowlark) may occur utilizing MNR protocols. As well, a survey of structures will be completed to determine the potential use by Barn Swallow;

v. SAR assessments – based on the information in the MNR's Screening Letter, specific effort will assess potential presence of Butternut, Milksnake, Snapping Turtle, and Short-eared Owl within this block;

vi. Spring/Summer Headwater Drainage Assessment 2014 – assessment will occur across the block to ensure that all drainage features are characterized using current standards;

vii. Watercourse temperature monitoring – data loggers will be established at selected watercourse locations between April and October 2014 to evaluate temperature variation (and maintenance of flow) during the cooler and warmer months;

viii. Breeding amphibian surveys – nocturnal surveys will be completed within suitable habitat areas that have the potential to undergo direct or indirect impacts from adjacent development within Block 41;

ix. Benthic macroinvertebrate assessment – sampling will occur at approximately six watercourse locations to assess for the presence and quality of benthic invertebrates. In addition to surface water samples, the invertebrate data will provide an indication of surface water quality over time within the block; and,

x. Staking of natural heritage features – arrangements will be made with the TRCA, City of Vaughan and the Ministry of Natural Resources (MNR) where required to delineate the boundaries of natural heritage features (e.g., dripline limits, top-of-bank, and wetland boundaries) at appropriate locations within the Block. Given the size of the block, the focus of these efforts will be on those locations proximate to proposed development areas. Stakings should be completed as soon as possible to establish the limit of features, buffers and the development limits. MNR's involvement is only required for wetlands.

m) Identify the extent of Redside Dace habitat as per Ontario Regulation 242/08 along the western tributary within Block 41. Consult with MNR regarding the extent of occupied and recovery habitat areas defined by MNR. Based on fieldwork, determine any other regulated areas based on the definitions of contributing habitats;

n) Existing natural heritage/ conditions in Block 41 will be described, including aquatic and terrestrial features and functions. This will include:

i. All pertinent information relating to the data collection will be summarized including dates and times of field visits, names of surveyors, and weather conditions;

ii. Protocols for the various surveys will be documented and mapping will be prepared identifying the location of all sampling/survey efforts;

iii. ELC mapping will be prepared identifying vegetation communities and other important features on and adjacent to the property and this will include a description of vegetation and wildlife within ELC units (to the extent possible). Mapping will also be prepared identifying significant species and feature locations; particularly those that are criteria for the NHN targets; and,

iv. MESP team members will review and identify inter-relationships between surface water, groundwater and environmental features to address specific issues such as:

- surface and subsurface soils analysis, including groundwater conditions and inter-relationships with environmental features such as watercourses and wetlands (i.e., sources of water to feature);
- identification of local landform types;
- catchment boundaries and topographic conditions within surface water features, including wetlands;
- completion of wetland screening to identify the need for wetland specific water balance analyses and subsequent completion of water balance calculations/recommendations to manage water sources to environmental features;
- infiltration capabilities of the site with respect to appropriate SWM and LID measures recommendations.

v. Key ecological features and functions will be identified and analyzed and consideration will be given as to whether any refinements to the NHN (additions or minor deletions) are warranted based on current site data. This will include the following:

- identify key features and ecological functions, including the natural heritage features identified in the PPS, key natural heritage features identified in the Greenbelt Plan and their functions, both on the property and, to the extent possible using aerial photography, on adjacent properties that may be affected by development;
- identify key features and/or functions that contribute significantly to the ecological integrity or importance of the NHN;
- identify features (e.g., certain vegetation communities that support concentrations of significant species, structures, habitat elements) that would qualify as significant habitat.

o) Prepare Opportunities and Constraints mapping including:

- Watercourses and headwater drainage features;
- Existing flood limits and associated setbacks;
- Erosion limits, meander belt widths and associated setbacks;
- Staked top of bank, long term stable top of bank, wetland and dripline boundaries and associated buffers;
- Preliminary stormwater management concept including facility locations; and,
- NHN limits including the Greenbelt boundary, natural heritage features, hydrologic features and minimum vegetation protection zones. .

This mapping will be provided to the Planner for the Block Plan to integrate into the proposed land use concept, and to other Block Plan studies for consideration when siting potential uses in the open space system (i.e., infrastructure, trails, etc.).

5.2.2 Phase 2: Analysis and Recommendations

The following sections describe the scope of work to be completed to assess potential impacts of the Block Plan land uses and develop related management and implementation strategies. The completion of tasks outlined in Sections 5.2.2.1 and 5.2.2.2 will replace any requirements for Functional Servicing Plans to support any draft plans of subdivision for any participating landowners.

5.2.2.1 Servicing and Grading Plans

The proposed Servicing and Grading Plans will address site grading and municipal servicing requirements such as roads, sanitary sewers, watermains and storm sewers. The servicing and grading design will be developed including the following tasks:

a) Grading

- Prepare preliminary grading plans and cross-sections to demonstrate grading, road and servicing design across the block taking into considerations all constraints and opportunities. This will include preliminary internal road alignments and grading design to support the current and future drainage patterns; and proposed SWM and servicing plan;
- Identify/describe grading where proposed in or adjacent to features or buffers; and,
- Where future roads are proposed to cross the NHN, prepare preliminary profiles of road crossings.

b) Sanitary Sewers

- Identify existing external sanitary servicing infrastructure near the property and complete a desktop analysis of available capacity;
- Calculate estimated sanitary flow generation rates associated with the proposed land uses identified in the Block Plan;
- Identify the preliminary internal sanitary and storm sewer alignments and depths for the spine sewer network. Preferred sanitary and storm outlet locations and connection point(s) to be identified; and,
- Identify external servicing requirements. Preferred sanitary pumping station location and sanitary forcemain alignment and connection point(s) to be identified.

c) Water Supply and Distribution System

A proposed Water Supply and Distribution Analysis will be prepared addressing the following:

- Review the background information to assess the available system head/pressure near the proposed watermain connection locations;

- Identify the existing water distribution network required to service the Block 41 lands;
- Calculate the estimated fire and peak daily domestic water demand associated with the proposed land uses identified in the Block Plan;
- If possible, conduct two (2) hydrant flow tests/pressure monitoring on the existing surrounding water distribution network to assess the system head/pressure near the proposed watermain connection locations;
- Complete a hydraulic analysis utilizing the City/Region existing water model, review the anticipated water demands within the Study Area and update the model to assess the impacts on the existing watermain network;
- Provide recommendations for improvements to the external watermain network, if necessary, based on the findings of the water model results;
- Identify external water distribution network requirements in coordination with through the City of Vaughan Water/Wastewater Master Plan. Preferred watermain alignment and connection point(s) to be identified.

5.2.2.2 Stormwater Management Plan

A proposed Stormwater Management Plan for the Block Plan will be prepared to address the following:

a) Review the Regional Storm assessment completed as part of the SWS and determine if any updates are required based on the availability of more detailed information including but not limited to future land use. If warranted, verify the recommended SWS approach to the management of Regional Storm flows;

b) Evaluate and recommend the use of alternative SWM practices including Low Impact Development (LID) measures (i.e., lot level, conveyance and end-of pipe solutions) to identify practices to be incorporated into development plans. Complete conceptual design of LID measures including identification of preliminary land areas required (location and size). The Humber River Watershed Plan specifically recommends that stormwater management measures to mitigate the increases in runoff volume from new impervious surfaces be incorporated into development plans.

c) Conceptual major and minor system design identifying drainage areas contributing to each SWM facility and external drainage area contributions;

d) Apply SWM design criteria recommended in the TRCA and City reports and SWS and complete conceptual design of SWM practices, identifying the location, type, function and preliminary sizing of recommended measures as well as outfall locations to watercourses considering the sensitivities and significance of natural features. This will include plans for each SWM facility presenting preliminary facility grading (existing and future grades), side slopes, storm sewer inlet locations, outfall locations, maintenance

access, preliminary water level fluctuations and preliminary road grades to identify/demonstrate appropriate SWM block sizes. SWM facility conceptual design will take into consideration existing soil and groundwater levels at facility locations;

e) Identify seasonal water budgets for the study area, including natural features reliant on surface water contributions (as identified in the SWS). Calculations will be completed to compare pre-development and post development conditions; results will be used to develop mitigation strategies to maintain functions of natural areas to the extent feasible in this future urban setting. Feature-based water balance models will be prepared for those areas where screening (to be completed in consultation with the TRCA) identifies the need for this work. Monitoring data describing existing conditions hydroperiods will be reviewed and utilized as feasible in these analyses to verify modeling.

f) Fluvial geomorphological evaluations will be incorporated into servicing, stormwater management and transportation (valley crossing) designs; and,

g) Stormwater management recommendations should also use, where appropriate, overall principles established in the City of Vaughan's Development Design Guidelines, Subdivision Design Manual and Subdivision Design Standards and minimize future maintenance requirements, where possible.

5.2.2.3 Hydrogeological Assessment

A Hydrogeological Assessment will be prepared to address the following:

a) Potential impacts to local groundwater resources and groundwater supported features during construction;

b) Conceptually evaluate the potential need for dewatering activities during the installation of services. Should dewatering be required, the potential impacts on the natural flow regime and potential impacts to nearby water supply wells and natural features will be assessed;

c) Characterize the regional and local scale hydrogeological setting and the linkages between the groundwater and surface water systems;

d) Identify groundwater-dependent natural features and characterize their relationship with the local surface water/groundwater flow conditions;

e) Identify potential impacts resulting from development on local groundwater flow patterns; on infiltration and recharge; on discharge patterns; and the effects on existing well users and the natural environment, including reduction in infiltration, impacts to natural flow system(s), and changes to groundwater and surface water quality;

f) Evaluate potential risks to determine if there is an acceptable level of risk to the groundwater and surface water quality;

g) Assess potential impacts to existing well head protection zones that may result during and post-construction and increases to the aquifer vulnerability.

h) Provide recommendations and measures to be considered both during construction and post-development to mitigate impacts to local groundwater resources. This may involve a "during and post-development" monitoring program and a comprehensive adaptive management plan. The comprehensive adaptive management plan will have methodologies to measure and mitigate any negative impact that may arise during construction and post-development.

5.2.2.4 Geotechnical Considerations

A grading plan based on sound technical data should be recommended to minimize or eliminate the impact of the development and associated activities on valley slopes, and ensure that the development will be safe for a design period of 100 years. This work will include:

a) Provide preliminary cross-sections of proposed grading along the buffer;

b) Identify all grading in the buffer and retaining walls if proposed and slope stability implications if warranted, with consideration for the overall objective of avoiding grading and retaining walls in or immediately adjacent to the natural heritage system;

c) Complete a geotechnical assessment of grading to the valley slope, if needed, including slope failures and soil settlement due to overburden pressure;

d) Identify any pond berm and associated retaining structures and the implication to valley slopes due to the construction of the berm. Geotechnical assessment of pond berm designs (seepage, settlement and slope failure potential) may be required on a case by case basis;

e) Comment on /evaluate erosion and slope stability implications for all stormwater management outfalls; and,

f) Confirmation that roads and road embankments (with the exception of road crossings of valleys) are placed outside the long term stable top of slope and required buffers.

5.2.2.5 Integration and Assessment of Potential Development Impacts and Mitigation Measures

a) Potential direct and indirect impacts will be identified including an analysis of short-term and long-term direct and indirect impacts related to the proposed development such as construction, runoff, access, grading, lighting, noise, and the introduction of new homeowners adjacent to the NHN. A number of factors will be considered in assessing potential impacts such as the following:
   - the spatial extent, magnitude, frequency and duration of the impacts;
   - the extent and degree to which adjacent lands will be affected;
   - potential impacts on specific features and functions;

- to the extent possible, the analysis will also evaluate possible future and cumulative impacts of the proposed development (e.g., impacts that could be magnified over time, or impacts that could be magnified because of interaction of one impact with another, etc.).

b) Identification of Mitigation Measures and Residual Impacts - This analysis will include discussion of recommended actions and measures to be incorporated into development design. Discussion will demonstrate how the proposed development and mitigation measures identified will not result in negative impacts on the natural features or on the ecological functions for which the area is identified, and will include proposed measures to enhance the integrity and connectivity of the NHN. Residual impacts (i.e., those impacts that would remain after mitigation measures have been implemented), if any, will be identified. The assessment of residual impacts shall consider whether there is the potential for cumulative impacts resulting from the development. The impact assessment should clearly identify residual impacts with discussion about their significance, severity and longevity.

5.2.2.6 Recommended Management Strategies

The recommended management strategies will summarize the recommendations from all sections within the MESP. As well, the need and content of long term monitoring programs and contingency plans will also be identified

Based on the information considered in the MESP, the feasibility of providing municipal servicing and associated management measures for Block 41 will be identified. Environmental Impact Study (EIS) requirements will form part of the MESP.

5.2.2.6 Recommended Implementation Strategies

The recommended implementation strategies will identify how the management strategies will be implemented. Recommended strategies will include the identification of MESP recommendations that affect planning applications and the need for additional studies to support subsequent stages of the development process including draft plan considerations (i.e., future conditions of draft plan approval), site plan considerations (i.e., future conditions of site plan approval), zoning considerations, design criteria and phasing considerations.

Permitting requirements of the TRCA and other agencies should be noted in the MESP. The TRCA has advised that portions of Block 41 is regulated by the TRCA pursuant to the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation 166/06, as may be amended. Permits from the TRCA will be required for any regulated activities with the regulation portion of the block.

5.3 MEETINGS AND REPORTING

Through the completion of the MESP analyses, meetings will be held with TRCA and City staff as needed to discuss technical matters, as needed. Site visits will be organized to stake the limits of features in 2014.

MESP findings will be documented in a report including supporting models, analyses and input to the Block Plan. A draft report will be submitted to the TRCA and City for review and comment prior to its finalization. Key deliverables for input to the Block Plan include:

a) Opportunities and Constraints mapping including:
   - Watercourses and headwater drainage features;
   - Existing flood limits and associated setbacks;
   - Erosion limits, meander belt widths and associated setbacks;
   - Staked top of bank, long term stable top of bank, wetland and dripline boundaries and associated buffers;
   - Preliminary stormwater management concept including facility locations; and,
   - NHN limits including the Greenbelt boundary, natural heritage features, hydrologic features and minimum vegetation protection zones; and,
   - Opportunities for NHN enhancement.

b) Servicing and grading plans;

c) SWM Strategies for the management of water quality, quantity and water balance;

d) Identification of mitigative measures to be incorporated into development design to address potential development impacts and protect the NHN;

e) Long term monitoring plan; and,

f) Further study needs at subsequent stages of the development process.

Where acceptable to agencies, digital copies of the SWS will be provided. One (1) hard copy and (6) digital copies of the materials will be provided to the TRCA.

APPENDIX A

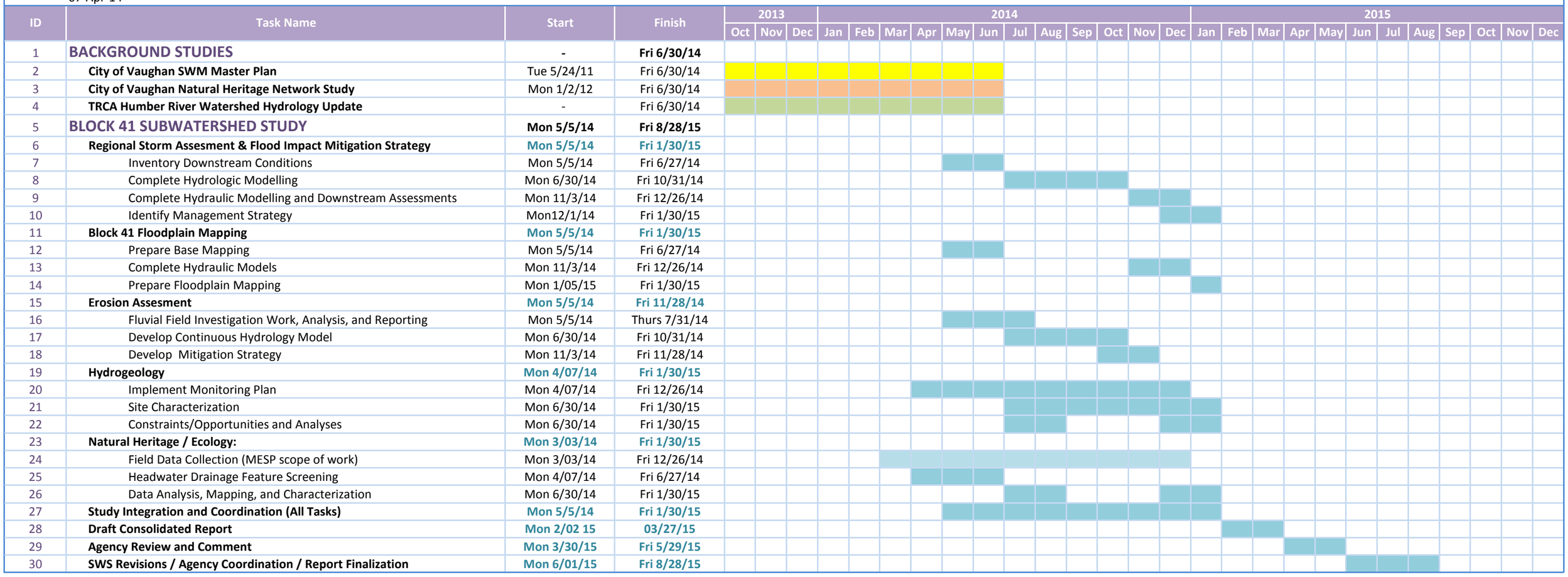
Block 41 New Community Area Subwatershed Study Timelines

Appendix A: Block 41 New Community Area, City of Vaughan

SUBWATERSHED STUDY TIMELINES

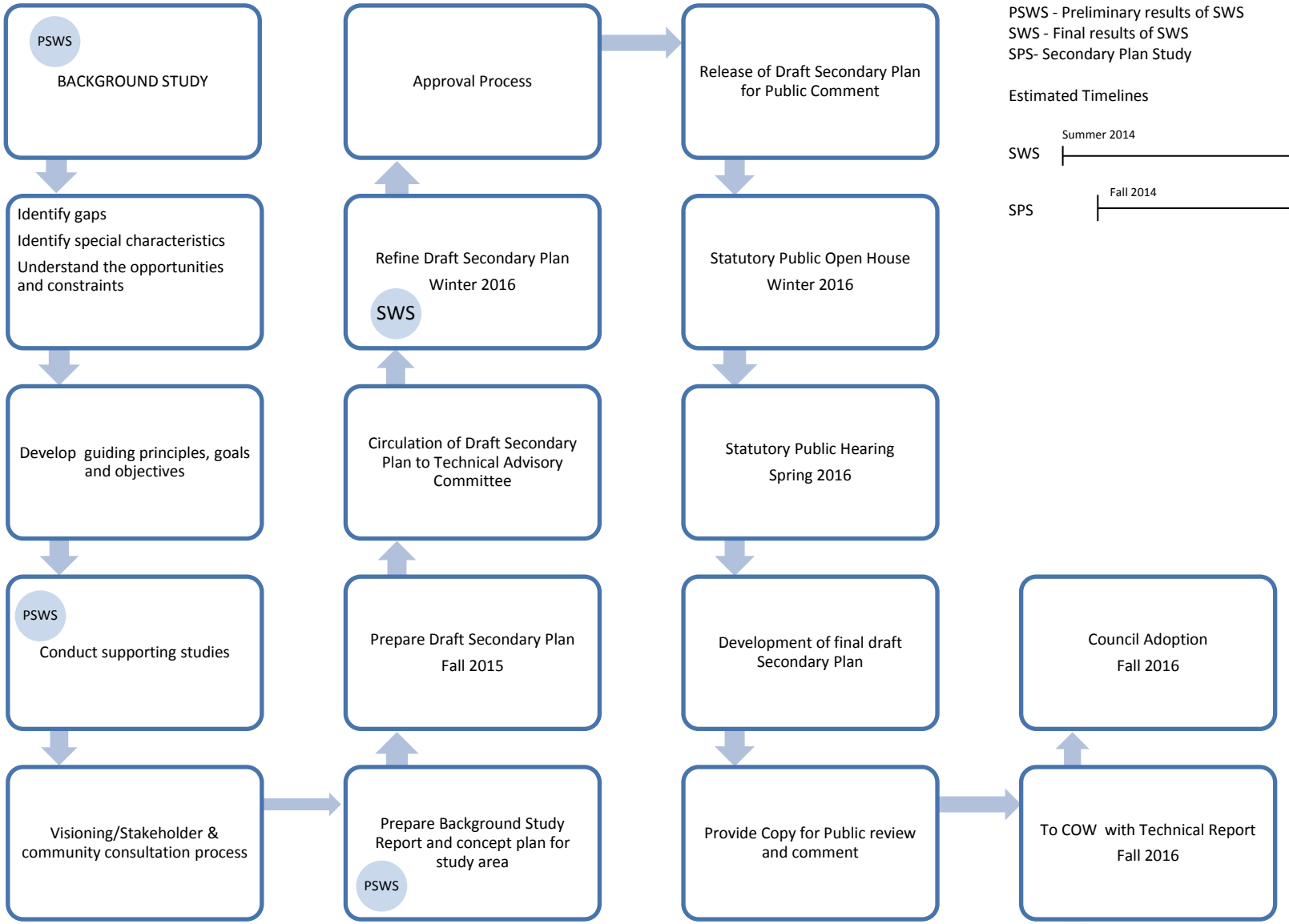
07-Apr-14

ID	Task Name	Start	Finish
1	**BACKGROUND STUDIES**	**-**	**Fri 6/30/14**
2	**City of Vaughan SWM Master Plan**	Tue 5/24/11	Fri 6/30/14
3	**City of Vaughan Natural Heritage Network Study**	Mon 1/2/12	Fri 6/30/14
4	**TRCA Humber River Watershed Hydrology Update**	-	Fri 6/30/14
5	**BLOCK 41 SUBWATERSHED STUDY**	**Mon 5/5/14**	**Fri 8/28/15**
6	**Regional Storm Assesment & Flood Impact Mitigation Strategy**	**Mon 5/5/14**	**Fri 1/30/15**
7	Inventory Downstream Conditions	Mon 5/5/14	Fri 6/27/14
8	Complete Hydrologic Modelling	Mon 6/30/14	Fri 10/31/14
9	Complete Hydraulic Modelling and Downstream Assessments	Mon 11/3/14	Fri 12/26/14
10	Identify Management Strategy	Mon12/1/14	Fri 1/30/15
11	**Block 41 Floodplain Mapping**	**Mon 5/5/14**	**Fri 1/30/15**
12	Prepare Base Mapping	Mon 5/5/14	Fri 6/27/14
13	Complete Hydraulic Models	Mon 11/3/14	Fri 12/26/14
14	Prepare Floodplain Mapping	Mon 1/05/15	Fri 1/30/15
15	**Erosion Assesment**	**Mon 5/5/14**	**Fri 11/28/14**
16	Fluvial Field Investigation Work, Analysis, and Reporting	Mon 5/5/14	Thurs 7/31/14
17	Develop Continuous Hydrology Model	Mon 6/30/14	Fri 10/31/14
18	Develop Mitigation Strategy	Mon 11/3/14	Fri 11/28/14
19	**Hydrogeology**	**Mon 4/07/14**	**Fri 1/30/15**
20	Implement Monitoring Plan	Mon 4/07/14	Fri 12/26/14
21	Site Characterization	Mon 6/30/14	Fri 1/30/15
22	Constraints/Opportunities and Analyses	Mon 6/30/14	Fri 1/30/15
23	**Natural Heritage / Ecology:**	**Mon 3/03/14**	**Fri 1/30/15**
24	Field Data Collection (MESP scope of work)	Mon 3/03/14	Fri 12/26/14
25	Headwater Drainage Feature Screening	Mon 4/07/14	Fri 6/27/14
26	Data Analysis, Mapping, and Characterization	Mon 6/30/14	Fri 1/30/15
27	**Study Integration and Coordination (All Tasks)**	**Mon 5/5/14**	**Fri 1/30/15**
28	**Draft Consolidated Report**	**Mon 2/02 15**	**03/27/15**
29	**Agency Review and Comment**	**Mon 3/30/15**	**Fri 5/29/15**
30	**SWS Revisions / Agency Coordination / Report Finalization**	**Mon 6/01/15**	**Fri 8/28/15**



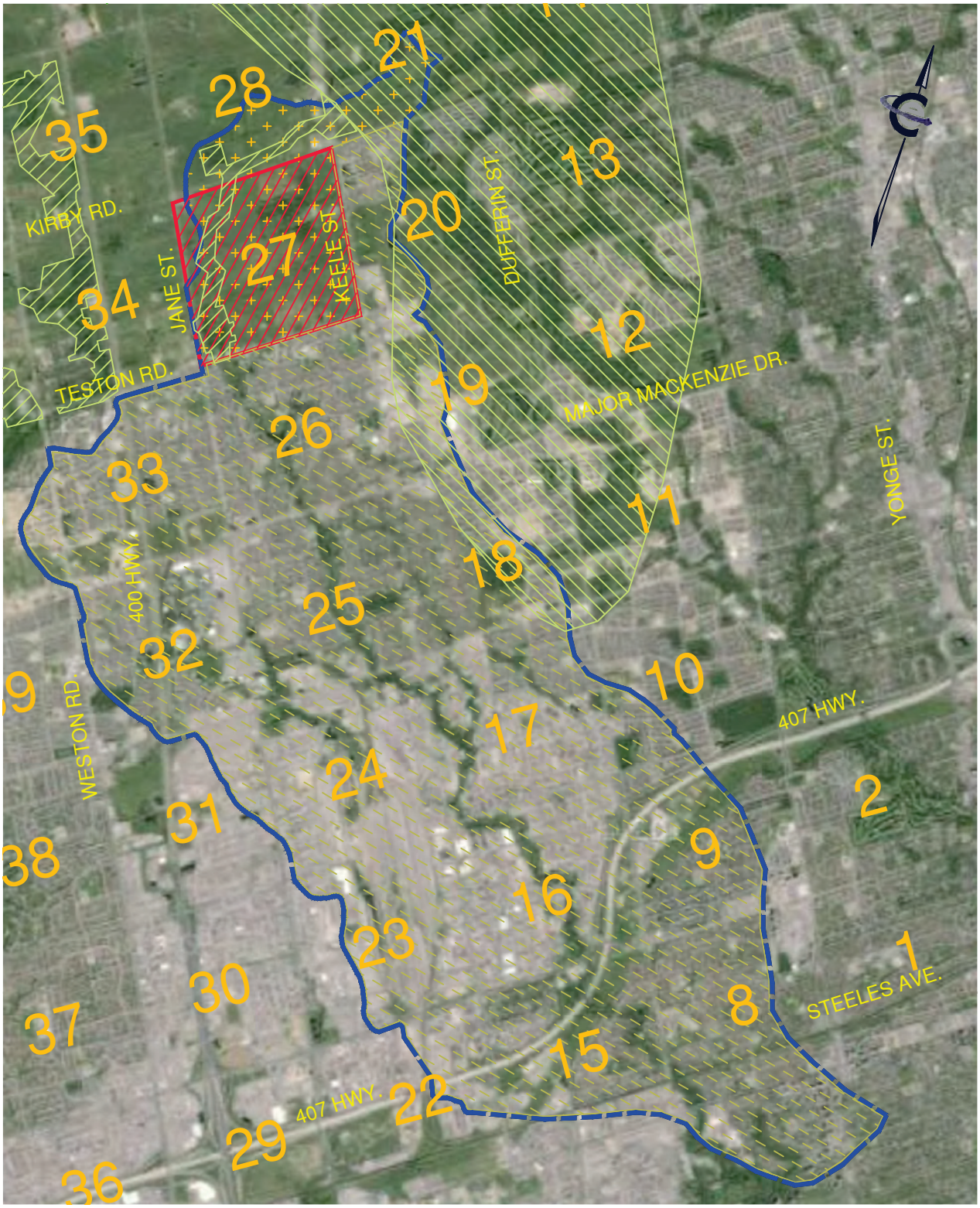
Note that schedule assumes a preliminary land use concept is available for modeling analyses by August 30/14

SECONDARY PLAN DEVELOPMENT PROCESS



ATTACHMENT 4

Block 27 Subwatershed Study Area



LEGEND

- BLOCK 27
- EXISTING URBAN LANDS
- REMAINING UNDEVELOPED LANDS
- GREENBELT PLAN AREA
- OAK RIDGES MORAINE PLAN AREA
- UPPER WEST DON SUBWATERSHED

Attachment 5

COLE ENGINEERING
70 VALLEYWOOD DRIVE, MARKHAM, ON L3R 4T5
T:416.987.6161 / 905.940.6161 F:905.940.2064

BLOCK 27 SUBWATERSHED STUDY
UPPER WEST DON SUBWATERSHED AREA

DATE: MARCH 2014	PROJECT No.: L10-189
SCALE: N.T.S.	FIGURE No.: 2-4

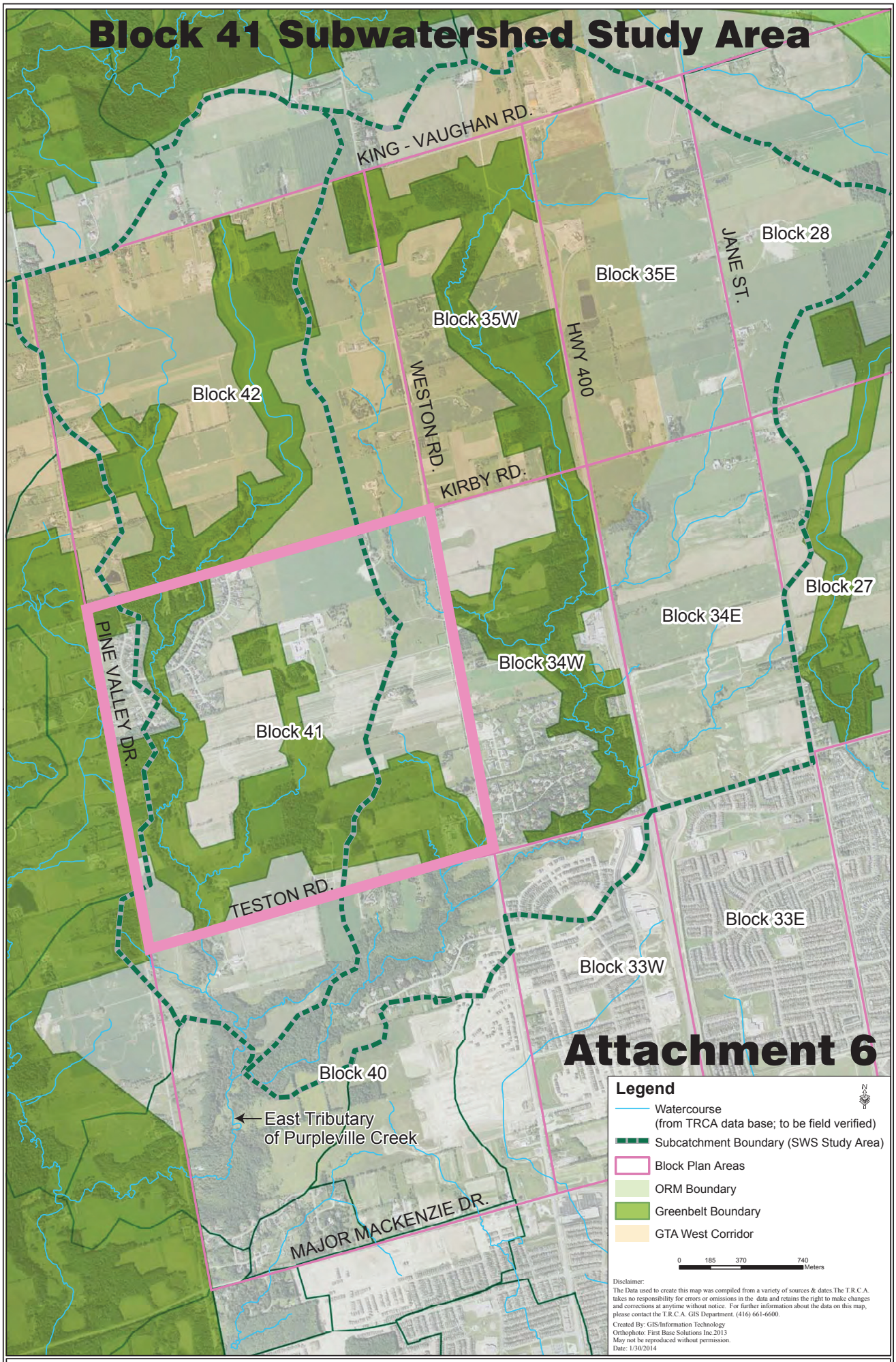


FIGURE 4: PURPLEVILLE CREEK SUBWATERSHED

COLE ENGINEERING

Experience Enhancing Excellence

May 8, 2014
Our Ref: L10-189

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1

Attention: Mr. John MacKenzie
Commissioner of Planning

Dear Mr. MacKenzie:

Re: Funding of Teston Green (Block 27) Subwatershed Study

We understand that the City of Vaughan OP 2010 requires the preparation of a Subwatershed Study (SWS) prior to or concurrent with the preparation of the Secondary Plan for the Teston Green Community (Block 27).

This letter confirms that the Block 27 Landowners Group Inc. agrees to fund the Upper West Don River SWS for the Teston Green Community (Block 27) in accordance with the Terms of Reference approved by the Toronto and Region Conservation Authority (TRCA) and the City of Vaughan. The SWS will be prepared by Cole Engineering and Beacon Environmental at an estimated cost of $220,000 including expenses. The Block 27 Landowners Group Inc. also agrees the pay the TRCA review fee of $90,000 including expenses in accordance with their letter dated April 28, 2014.

We look forward to the successful completion of the Subwatershed Study concurrently with the preparation of the Secondary Plan by the City of Vaughan which is expected to commence in 2014 and be completed in 2016.

Yours truly,

COLE ENGINEERING GROUP LTD.

Gerry Lynch, P. Eng.
Project Manager

c.: Block 27 Landowners
Carolyn Woodland, TRCA

S:\2010 Projects\D-LD(L10)\Subdivision\L10-189 Block 27 Landowners Group Eng - Vaughan\Corresp\Letters\MacKenzie SWS Financing 05.08.14.doc

ATTACHMENT 8

MALONE GIVEN PARSONS LTD.
140 Renfrew Drive, Suite 201
Markham, Ontario L3R 6B3
Tel: 905-513-0170
Fax: 905-513-0177
www.mgp.ca

May 9, 2014

MGP File: 11-2003

Mr. John Mackenzie, M.Sc(Pl), MCIP, RPP
Commissioner of Planning
CITY OF VAUGHAN
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
John.mackenzie@vaughan.ca

Dear Sir,

RE: Block 41 Subwatershed Study (SWS) Funding Agreement

This letter is to confirm that the Block 41 Landowners Group Inc. will be funding the required Subwatershed Study (SWS) for the Block 41 New Community Area in accordance with the Terms of Reference approved by the Toronto and Region Conservation Authority (TRCA) and the City of Vaughan. The Block 41 Landowners Group Inc. expects the fees for the Subwatershed Study (SWS) to be between $450,000 to $500,000. The Block 41 Landowners Group Inc. also agrees to funding the $90,000 (inclusive of expenses) costs for the TRCA as outlined in their letter dated April 28, 2014.

We look forward to the successful completion of this Subwatershed Study.

Yours very truly,
MALONE GIVEN PARSONS LTD.

Don Given, MCIP, RPP
President
dgiven@mgp.ca

cc. Block 41 Landowners Group Inc:
Block 41-28E Development, R. Mangotich (rickm@fieldgatedevelopments.com)
Block 41-28W Development, R. Mangotich (rickm@fieldgatedevelopments.com)
1212763 Ontario Limited (Weston), R. Mangotich (rickm@fieldgatedevelopments.com)
1212765 Ontario Limited (Pine Valley), R. Mangotich (rickm@fieldgatedevelopments.com)
Kirbywest Ltd., E. DeMeneghi (elvio@lormelhomes.com, kim@lormelhomes.com)
AMMP Holdings, B. Pillitteri (rpillitt@gmail.com)
Carolyn Woodland, Director of Planning and Development, TRCA (cwoodland@trca.on.ca)
Anna Sicilia, Senior Policy Planner, City of Vaughan (anna.sicilia@vaughan.ca)