



REPORT

REPORT TO: Mayor R. Bonnette & Members of Council

REPORT FROM: Steve Burke, Manager of Planning Policy

DATE: May 2, 2012

REPORT NO.: PDS-2012-0038

RE: Southwest Georgetown Integrated Planning Project – Terms of Reference

RECOMMENDATION:

That Report PDS-2012-0038 dated May 2, 2012 regarding the Terms of Reference for the Southwest Georgetown Integrated Planning Project be received;

AND FURTHER THAT the proposed Southwest Georgetown Integrated Planning Project - Terms of Reference, forming Schedule Two to this report, be approved;

AND FURTHER THAT a Financial Agreement between the Town and the Southwest Georgetown Landowners Group, confirming funding for completion of the Southwest Georgetown Integrated Planning Project, be put in place before initiation of the Project;

AND FURTHER THAT once the aforementioned Financial Agreement is in place, the Manager of Purchasing be authorized to release a Request For Proposal for the Southwest Georgetown Integrated Planning Project in accordance with the Terms of Reference set out in this report;

AND FURTHER THAT staff report back to Council on the results of the Project Consultant selection process;

AND FURTHER THAT a Southwest Georgetown Integrated Planning Project web page be created, and launched through newspaper and e-blast notice, as part of an overall Community Engagement Strategy, in order to broadly communicate the commencement and progress of the project to the residents and businesses of the Town of Halton Hills;

AND FURTHER THAT a copy of this report be forwarded to the Region of Halton, Conservation Halton, Credit Valley Conservation, Town Advisory Committees, the Halton Hills Chamber of Commerce, Halton Hills Hydro, and the Southwest Georgetown Landowners Group, for information.

BACKGROUND:

Report Purpose:

The purpose of this report is:

- to provide Council with a proposed Terms of Reference for the Southwest Georgetown Integrated Planning Project (IPP) for consideration;
- to obtain Council approval of the Terms of Reference, in order that a Request For Proposals can be issued to retain a qualified consultant team to undertake the Project; and,
- to obtain direction to initiate efforts to make the residents and businesses of Halton Hills aware of the Southwest Georgetown Integrated Planning Project, in order to facilitate broad-based and meaningful community engagement in the Project.

Sustainable Halton

In December 2009, the Region of Halton completed a multi-phase comprehensive planning exercise known as Sustainable Halton, through the adoption of Regional Official Plan Amendment (ROPA) No. 38. ROPA 38 achieved conformity with the Growth Plan for the Greater Golden Horseshoe, through implementing the Preferred Growth Option, and related population and employment for the Region to the 2031 planning horizon. This included an allocation of an additional 20,000 people to Halton Hills, and a 490 hectare expansion to the Georgetown Urban Area. Subsequently, to achieve conformity with the Growth Plan and ROPA 38, the Town adopted Official Plan Amendment (OPA) No. 10 in June 2010 designating a Future Residential/Mixed Use Area adjacent to the Georgetown Urban Area.

Official Plan

The Town's Official Plan is the overall guiding land use planning document for Halton Hills. As amended by Amendment No. 10, the Official Plan complements the Strategic Plan in terms of the articulation of a vision for managed growth.

Section D6.3 of OPA No. 10 sets out the objectives for the planning of the Future Residential/Mixed Use Area to:

- a) accommodate moderate population and population-related employment growth to the 2031 planning horizon;

- b) ensure that the new development area is integrated into the fabric of the existing community of Georgetown;
- c) ensure that the new development area is developed as a *complete community*, with compact pedestrian-friendly neighbourhoods, a mix of housing types, community facilities, commercial centres, and open spaces;
- d) ensure a high standard of urban design; and,
- e) adhere to the community design principles for new communities contained in the Official Plan.

OPA No. 10 also specifies the planning process to be undertaken for the Future Residential/Mixed Use Area. Prior to the approval of any development within this area, the preparation of a Secondary Plan is required, according to the policies of the Official Plan, to the satisfaction of Council.

Work Program for Future Residential/Mixed Use Area

OPA No. 10 identified a Future Residential/Mixed Use Area to accommodate an additional population of 20,000 between 2021 and 2031 (see map attached as Schedule One to this report), including:

- **Southwest Georgetown:** a 1,000 acre concession block, bounded by 15 Side Road, Trafalgar Road, 10 Side Road, and Eighth Line/Main Street;
- **Southeast Georgetown:** an approximately 125 acre property between Georgetown and the Hamlet of Norval, bounded by Tenth Line, 10 Side Road, and the boundary of Norval; and,
- **Stewarttown Expansion:** The inclusion of the Hamlet of Stewarttown within the Georgetown Urban Area, together with a minor expansion bounded by the existing hamlet boundary and the Greenbelt Plan boundary.

The Town's work program for the Future Residential/Mixed Use Area has been designed to be comprised of a separate process for each of the above sub-areas. The rationale for this project design is based upon the following factors:

- Non-contiguity and geographic separation between the three sub-areas;
- Geographic location of the three sub-areas in different watershed/subwatershed areas;
- Size of the latter two sub-areas when compared to Southwest Georgetown, resulting in an expectation that the complexity of planning issues faced, and the range of planning solutions needed, will be substantially different for Southwest Georgetown as compared to the other 2 sub-areas;
- Distinct planning contexts for the latter two sub-areas, such as transportation corridor protection for the Southeast Georgetown

lands, and compatibility with the existing community of Stewarttown for the Stewarttown Expansion lands.

Stewarttown

The Stewarttown Expansion Area will be the subject of a separate scoped planning exercise, which takes advantage of the work already completed and in progress for the Black Creek Subwatershed Study, and includes a review of the land use policy framework for the former Hamlet of Stewarttown in its entirety, given that OPA No. 10 has incorporated the former Hamlet of Stewarttown, in addition to the Stewarttown expansion lands, into the Georgetown Urban Area.

Southeast Georgetown

The Town's work program is based on the expectation that the planning of Southeast Georgetown should await the completion of planning and environmental assessment work for the Norval West By-pass transportation facility, as recommended in the Council-endorsed Halton-Peel Boundary Area Transportation Study. Therefore, it is anticipated that this area will be the subject of a separate comprehensive planning exercise commenced at a later date.

COMMENTS:

Council Vision

Through the Town Strategic Plan process, Members of Council have expressed a desire to create a significantly different community and neighbourhoods in the Future Residential/Mixed Use Area than has developed in Halton Hills to date. Aspects of such a community that were identified include: that new communities and neighbourhoods must be more people-friendly, more community-oriented, cleaner, greener, and more sustainable. New communities/neighbourhoods must be more walkable, more cycling-friendly, less dependent on cars, have more "people-gathering" places and not simply retail plazas, have different styles of parks, and be based on more compact urban design; in order to encourage greater social interaction and closeness for those who live in the communities/ neighbourhoods.

Terms of Reference – Southwest Georgetown Integrated Planning Project

Guided by the policy framework of the Halton Hills Official Plan (as amended by Official Plan Amendment No. 10), the Town Strategic Plan, as well as Regional Official Plan Amendment No. 38, a Terms of Reference has been developed to guide the preparation of a Secondary Plan for the Southwest Georgetown Future Residential/Mixed Use Area. The four year, multi-phase project addresses important planning considerations such as broad-based community engagement, community visioning, subwatershed planning, sustainability, urban design, heritage conservation, natural heritage system protection, fiscal impact, housing and community infrastructure, servicing and storm water management, energy management and development phasing.

Broad-based Community Engagement/ Community Visioning

The Terms of Reference includes, as one of the critical initial steps, the development of a Community Engagement Strategy to achieve meaningful public engagement and participation in the development of a land use vision and plan for the Southwest Georgetown Future Residential/Mixed Use Area.

The Strategy will address the identification of community groups with an interest in the planning of the Southwest Georgetown Future Residential/Mixed Use Area, as well as innovative ways to engage the broader community. Engagement opportunities to be considered include focus groups, design charettes, workshops, web-based portals, Community Visualization tools, youth art and essay contests and the use of social media, as well as other innovative mechanisms to engage existing community groups. This would involve such groups as the Halton Hills Cultural Round Table, Sustainable Halton Hills, and the Halton Hills Chamber of Commerce.

A key related component of the IPP will be a Community Visioning exercise. This exercise will involve multiple opportunities for all residents of Halton Hills, and other interested stakeholders, to actively participate in developing an overall Vision and Guiding Principles for the Future Residential/Mixed Use Area, which will form the basis for Land Use Concepts, detailed Land Use Alternatives, and finally the development of a Secondary Plan.

Integrated Secondary and Subwatershed Planning

The Terms of Reference has been designed to integrate the Secondary Planning and Subwatershed Planning processes, in order to ensure that the Subwatershed Plan provides technical support to the Secondary Plan land use planning process.

It is intended that the Subwatershed study be completed prior to or in conjunction with the approval of the Secondary Plan for the Southwest Georgetown Future Residential/Mixed Use Area, in order that the Subwatershed Plan can outline the preferred storm water and environmental management strategy for the Secondary Plan Area. Also, the Secondary Plan studies can then evaluate in greater detail the implementation of the recommended Subwatershed Plan in order to facilitate the land use infrastructure planning process. The Terms of Reference for the Subwatershed Study forms Appendix A to the IPP Terms of Reference, attached as Schedule One to this report.

Phases/Tasks:

The Integrated Planning Project is organized into 6 phases and component tasks/studies as shown below. The sequencing and timing of the various tasks will be subject to the Detailed Work Program to be completed in Phase 1.

Phase 1 – Project Initiation

- Project Charter;
- Detailed Work Program;
- Community Engagement.

Phase 2A – Community Visioning and Information Gathering

- Background Analysis and Issue Identification;
- Community Visioning Exercise.

Phase 2B – Subwatershed and Natural Heritage System Planning

The Subwatershed Study (SWS) process consists of preparation of a Background Report and four SWS phases:

- SWS Phase 1 – Characterization;
- SWS Phase 2 - Impact Assessment;
- SWS Phase 3 – Implementation; and
- SWS Phase 4 - Monitoring.

A Subwatershed Plan, including a Natural Heritage System Plan, and serving as a guide to other environmental policies of the Secondary Plan, will be the product of SWS Phase 3. SWS Phase 4 will be completed subsequent to the approval of a Secondary Plan for the subject lands.

Phase 3 – Detailed Planning Study

- Sustainable Planning, including energy management;
- Urban Design;
- Resource Management;
- Community Infrastructure and Housing;
- Transportation Planning;
- Fiscal Impact;
- Physical Infrastructure/Service/Storm Water Management.

Phase 4 – Land Use Alternatives

- Development of Land Use Planning Alternatives;

Phase 5 – Preferred Land Use Alternative

- Development of Preferred Land Use Alternative;
- Growth Management/Development Phasing.

Phase 6 – Development of Secondary Plan

- Initial Policy Formulation;
- Final Policy Formulation.

Composition and Role of the IPP Steering Committee and Project Team

The Terms of Reference propose the following membership for the IPP Steering Committee, in order to meet the objective of broad-based community and landowner representation:

- Mayor (ex-officio);
- 2 Regional Councillors (Wards 1&2; Wards 3&4);
- 2 Local Councillors (Wards 2, 3 or 4) (1 alternate);
- 1 Town Sustainability Advisory Committee representative (1 alternate);
- 1 Halton Hills Hydro representative (1 alternate);
- 1 Heritage Halton Hills representative (1 alternate);
- 1 Town Environmental Advisory Committee representative (1 alternate);
- 1 Trails and Cycling Committee representative (1 alternate);
- 1 Halton Hills Chamber of Commerce or Georgetown BIA representative (1 alternate);
- 1 Mayor's Youth Action Committee representative (1 alternate);
- 1 Georgetown Senior's Centre representative (1 alternate);
- 1 Georgetown resident representing local service groups (1 alternate);
- 1 Halton Hills citizen at large (1 alternate);
- 3 representatives of the Southwest Georgetown Landowners Group.

The role of the Steering Committee as outlined by the Terms of Reference is as follows:

- Meet on a regular basis to monitor the progress of the study;
- Review and provide feedback at various stages of the process on work completed to date;
- Assist with issue identification and resolution;
- Liaise with their respective organizations or community of interest, both to ensure broad community awareness of the project, and to obtain broader community input.

The role of the Project Team is to provide overall Corporate guidance to the project, and they will meet to monitor the progress of the project, either at Senior Management Team meetings or special meetings as may be required to resolve issues. The Project Team will be comprised of the Town's Senior Management Team, supported by Planning Policy staff.

The Policy Division of the Town of Halton Hills Planning, Development and Sustainability Department will be responsible for managing the IPP, together with a Project Manager identified by the Project Consultant, in consultation with the Project Team. Staff responsibilities will include: support to the Project Team, coordination of a Technical Advisory Committee and Steering Committee, as well as a Subwatershed Steering Committee and Subwatershed Technical Advisory Committee; coordination of the Community Engagement Strategy; management of financial resources, ensuring compliance with the Terms of Reference; ensuring participation of all stakeholders; chairing Technical and Steering Committee Meetings; coordinating communications; and coordinating with other Town studies as appropriate.

RELATIONSHIP TO STRATEGIC PLAN:

The Strategic Plan sets out a broad vision for the community contained in nine strategic directions. This report relates extensively to the following Strategic Directions:

- Foster A Healthy Community
- Preserve, Protect and Enhance our Environment
- Foster a Prosperous Economy
- Preserve, Protect and Promote Our Distinctive History
- Achieve Sustainable Growth
- Provide Sustainable Infrastructure & Services
- Provide Responsive, Effective Municipal Government

In particular, issues addressed in this report relate to Strategic Direction G - **Achieve Sustainable Growth**, and the Goal to ensure that growth is managed so as to ensure a balanced, sustainable, well planned community that meets the needs of its residents and businesses, and the following Strategic Objectives:

- G.1** To provide for a moderate scale of growth that is in keeping with the Town's urban and rural character.
- G.2** To ensure that new urban areas are appropriately sized and phased relative to planned growth to 2031 and in conjunction with required infrastructure improvements.
- G.3** To manage the pace of growth so that it is commensurate with the Town's ability to accommodate community infrastructure.
- G.4** To promote a 'growth pays for itself' philosophy.
- G.5** To ensure that new growth contributes in a positive manner to the Town's short and long term economic and fiscal viability and sustainability.
- G.9** To ensure that new population growth takes place by way of identifiable, sustainable, healthy and complete communities and neighbourhoods that reflect excellence in urban design.
- G.11** To ensure the efficient use of urban land and infrastructure in existing communities and new growth areas.
- G.12** To explore with the public and private sectors the use of innovative financial strategies to minimize the fiscal impacts of growth on existing development.

In October 2011, through Report PDS-2011-0078, Council endorsed a Strategic Action Plan, containing a 'Top Ten' list of priorities to focus on for the 2010-2014 Council term.

The sixth priority on the list was entitled Future Residential Area Planning, and included the following components:

- Prepare a Secondary Plan for the Georgetown Future Residential/Mixed Use Area;
- Proactively promote opportunities for private sector participation in front-ending emerging growth related infrastructure requirements, recognizing that there will still be municipal costs;
- Explore the adoption of 'Sustainable Development Guidelines' for development of new growth areas, intensification and redevelopment, for the various forms of development (e.g. subdivisions, site plans, buildings);
- New growth needs to provide enough revenue to prevent a tax increase due to new service requirements;
- Investigate strategies to protect built heritage resources through the comprehensive planning of new development areas.

FINANCIAL IMPACT:

Council has previously approved Capital Project No. P11001 – Georgetown Urban Expansion Secondary Plan with a capital budget of \$1,000,000.00 (\$1 million). This project is eligible for funding under the Town's Development Charge By-law. The IPP is proposed to be financed 10 percent by the Town and 90 percent by the Southwest Georgetown Landowners Group, through a front-ending financial agreement, in exchange for development charge credits at the building permit stage.

COMMUNICATIONS IMPACT:

Broad-based community engagement is an integral component of the Terms of Reference for the Southwest Georgetown Integrated Planning Project. In order to initiate the community engagement process at the earliest opportunity, it is recommended that a web page be created and launched, through newspaper and e-blast notice, in order to broadly communicate the commencement and progress of the project to the residents and businesses of the Town of Halton Hills, as part of an overall Community Engagement Strategy for the project.

SUSTAINABILITY IMPLICATIONS:

Sustainable Planning is one of the integral components of the proposed Terms of Reference for the Southwest Georgetown Integrated Planning Project. This component of the Project involves assessing the sustainability initiatives that would be appropriate to work towards as part of the secondary plan development process, drawing as appropriate from the Mayor's Green Plan and the Integrated Community Sustainability Plan currently being developed.

This would include an assessment of the feasibility of District Energy solutions for Southwest Georgetown, and any other viable energy management and conservation alternatives, as well as a strategy to maximize water conservation. This task would be coordinated with the preparation of the Community Energy Plan by the Town. Also included is the application, as appropriate, of the Town's pending Green Building Standard, to the planning of Southwest Georgetown. The LEED-ND (Neighbourhood Design) model, and any other appropriate models, would also be examined to assess their appropriateness for planning of the Southwest Georgetown Future Residential/Mixed Use Area.

The deliverables would be an Energy Management and Conservation Strategy, a Water Conservation Strategy, an Air Quality Assessment in keeping with Regional guidelines, and Sustainable Neighbourhood Development Guidelines.

CONSULTATION:

Planning staff consulted with the Senior Management Team, and Region of Halton staff in preparing the IPP Terms of Reference. Planning and Infrastructure Services staff consulted with Region of Halton and Conservation Authority staff in the preparation of the Subwatershed Study Terms of Reference, as well as representatives of the Southwest Georgetown Landowners Group.

CONCLUSION:

The undertaking of the Southwest Georgetown Integrated Planning Project is identified in Council's 2010-2014 Strategic Action Plan, and is included in the Town's approved Capital Budget. The Project is also necessitated by the policy direction of the Growth Plan for the Greater Golden Horseshoe, Regional Official Plan Amendment No. 38 and Halton Hills Official Plan Amendment No. 10.

This report has outlined a proposed Terms of Reference for the Southwest Georgetown Integrated Planning Project for the consideration of Council. It is recommended that:

- the proposed Southwest Georgetown Integrated Planning Project - Terms of Reference, forming Schedule Two to this report, be approved;
- a Financial Agreement between the Town and the Southwest Georgetown Landowners Group, confirming funding for completion of the Southwest Georgetown Integrated Planning Project, be put in place before initiation of the Project;
- once the aforementioned Financial Agreement is in place, the Manager of Purchasing be authorized to release a Request For Proposal for the Southwest Georgetown Integrated Planning Project in accordance with the Terms of Reference set out in this report;
- staff report back to Council on the results of the consultant selection process;

- a Southwest Georgetown Integrated Planning Project web page be created, and launched through newspaper and e-blast notice, in order to broadly communicate the commencement and progress of the project to the residents and businesses of the Town of Halton Hills, as part of an overall Community Engagement Strategy for the project.

Respectfully submitted,

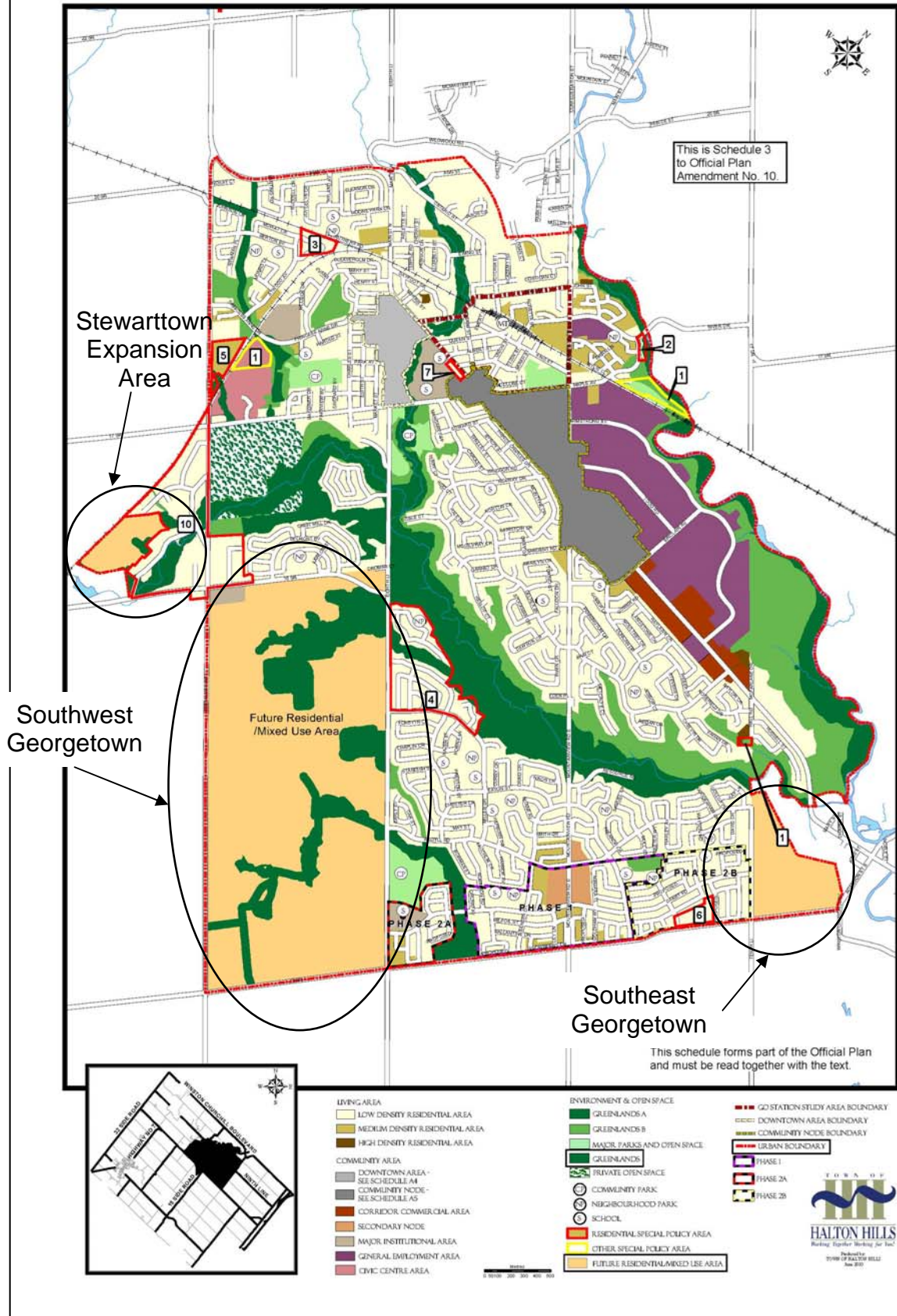
Steve Burke, MCIP, RPP
Manager of Planning Policy

John Linhardt, MCIP, RPP
Director of Planning, Development
and Sustainability

Dennis Y. Perlin
Chief Administrative Officer

SCHEDULE A3

TOWN OF HALTON HILLS OFFICIAL PLAN
GEORGETOWN LAND USE



Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project Terms of Reference

1.0 The Georgetown Future Residential/Mixed Use Area

The Town of Halton Hills adopted Official Plan Amendment No. 10 on June 28, 2010. OPA No. 10 identified a Future Residential/Mixed Use Area to accommodate an additional population of 20,000 between 2021 and 2031, including:

- **Southwest Georgetown:** a 1,000 acre concession block bounded by 15 Side Road, Eighth Line/Main Street, 10 Side Road and Trafalgar Road;
- **Southeast Georgetown:** an approximately 125 acre area situated between Georgetown and the Hamlet of Norval, bounded by Tenth Line, 10 Side Road, and the Hamlet of Norval; and,
- **Stewarttown Expansion:** The inclusion of the Hamlet of Stewarttown within the Georgetown Urban Area, together with a minor approximately 80 acre expansion area, bounded by the existing hamlet boundary and the Greenbelt Plan boundary.

This Terms of Reference applies only to the Southwest Georgetown portion of the Future Residential/Mixed Use Area while the latter two areas will be the subject of separate planning exercises (see **Schedule One**).

2.0 Background

2.1 Council Vision

Through the Sustainable Halton process, Members of Council have expressed a desire to create a significantly different community and neighbourhoods in the Future Residential/Mixed Use Area than has developed in Halton Hills to date. Aspects of such a community that were identified include: that new communities and neighbourhoods must be more people-friendly, more community-oriented, cleaner, greener, and more sustainable. New communities/neighbourhoods must be more walkable, more cycling-friendly, less dependent on cars, have more “people-gathering” places and not simply retail plazas, have different styles of parks, and be based on more compact urban design; in order to encourage greater social interaction and closeness for those who live in the communities/neighbourhoods.

2.2 Strategic Plan/Strategic Action Plan 2010-2014

In early 2011, Halton Hills Council commenced a review of the Town Strategic Plan to 2031 for the 2010-2014 Council term. This review resulted in the approval

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of a revised plan in June 2011. Upon approval of the revised Town Strategic Plan, Council completed a strategic planning session with the purpose of identifying a set of priority strategic actions to be addressed in the current term of Council. These 'Top Ten' priorities form the 2010-2014 Strategic Action Plan. Strategic Action 6 – Future Residential Area Planning, as specified below was amongst those ten priority actions:

6	Future Residential Area Planning
A.	Prepare a Secondary Plan for the Georgetown Future Residential/Mixed Use Area;
B.	Proactively promote opportunities for private sector participation in front-ending emerging growth related infrastructure requirements, recognizing that there will still be municipal costs;
C.	Explore the adoption of 'Sustainable Development Guidelines' for development of new growth areas, intensification and redevelopment, for the various forms of development (e.g. subdivisions, site plans, buildings).
D.	New growth needs to provide enough revenue to prevent a tax increase due to new service requirements;
E.	Investigate strategies to protect built heritage resources through the comprehensive planning of new development areas.

2.3 Citizen Satisfaction Survey

The 2011 Halton Hills Citizen Satisfaction Survey is useful in terms of identifying the aspects of the Town that citizen's value, highlighted by its' small town atmosphere, friendliness, and quietness. The conclusions of the Survey recommend that caution be taken with plans and initiatives concerning this, and if feasible community approvals should be sought. Important service areas for which attention is required include: recreation programs, senior's programs, town facilities, road maintenance, ActiVan Transit, traffic control, support to businesses, economic development and planning services.

2.4 Integrated Community Sustainability Plan

The Town's Sustainability Advisory Committee is currently developing a 'Town-led, community-owned' Integrated Community Sustainability Plan (ICSP). To date, the committee has developed a draft Vision to guide the ICSP as follows:

In 2060, the urban and rural communities of Halton Hills balance economic prosperity with a deep commitment to the natural environment, while retaining viable local agriculture and small-town feel, and being socially equitable, culturally vibrant and strongly connected.

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Also completed are draft Visions for the four sustainability pillars: economic prosperity; environmental health, social wellbeing, and cultural vibrancy, as well as a listing of focus areas. This work and the ICSP as it develops will result in guiding principles which will be further considered in the context of the Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project.

2.5 Official Plan Amendment No. 10

The Town's Official Plan is the overall guiding land use planning document for Halton Hills. As amended by Amendment No. 10, the Official Plan complements the Strategic Plan in terms of the articulation of a vision for managed growth.

Pertinent sub-sections of Section D6.3 of OPA No. 10 states as follows:

D6.3 FUTURE RESIDENTIAL/MIXED USE AREA

D6.3.1 Objectives

It is the objective of this Plan to:

- a) accommodate moderate population and population-related employment growth to the 2031 planning horizon, as specified in Section A1A of this Plan;
- b) ensure that the new development area is integrated into the fabric of the existing community of Georgetown;
- c) ensure that the new development area is developed as a *complete community*, with compact pedestrian-friendly neighbourhoods, a mix of housing types, community facilities, commercial centres, and open spaces;
- d) ensure a high standard of urban design; and,
- e) adhere to the community design principles for new communities contained in Section F3 of this Plan.

D6.3.3 Comprehensive Planning

Prior to the approval of any development within this designation, the following must be completed:

- a) an amendment to the Regional Official Plan establishing the Regional phasing of development to the 2031 planning horizon, in accordance with the policies of Section F10.4 of this Plan;
- b) a Joint Infrastructure Staging Plan, in accordance with the policies of Section F10.4 of this Plan;
- c) a Secondary Plan, including the establishment of the local phasing of development to the 2031 planning

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- horizon, and according to the policies of Section G3.1 of this Plan, to the satisfaction of Council;
- d) a Block Plan according to the policies of Section G3.2 of this Plan, to the satisfaction of Council;
 - e) appropriate financial plans and agreements, including any necessary front ending agreements, to the satisfaction of the Region and the Town; and,
 - f) appropriate development charge by-laws, to the satisfaction of Council.

D6.3.4 Regional Natural Heritage System

Notwithstanding the policies pertaining to the Greenlands System contained in Section B1 of this Plan, the policies of Section 118 of the Regional Official Plan shall be applicable to the *Greenlands* designation within the *Future Residential/Mixed Use Area* of this Plan.

2.6 Official Plan – Design for New Communities

Section F3 of the Official Plan states as follows:

F3 Design for New Communities

The following community design principles apply to development in greenfield areas:

- a) Residential development shall include a combination of housing types, with a range of densities that implement the housing objectives and policies of this Plan;
- b) High density housing shall be located on arterial and collector roads to ultimately facilitate the establishment of public transit and a pedestrian-oriented environment;
- c) New development areas shall be integrated with existing built-up areas;
- d) New subdivision streets should align in a grid pattern to create appropriately sized development blocks and to promote traffic permeability and street connectivity;
- e) The development of reverse-frontage residential lots shall be minimized through techniques such as window streets and where reverse frontage lots are provided, shall incorporate a substantial landscape buffer to improve the visual amenity of such areas;

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- f) Open space and parkland areas shall integrate with adjacent development areas and provide a range of active and passive recreational opportunities;
- g) New buildings shall be designed and oriented to the street and to street corners to encourage a pedestrian-oriented streetscape;
- h) Where appropriate, employment lands shall be buffered from residential development by a variety of measures such as roads, landscaping, natural heritage areas, and parkland and community facilities;
- i) Non-residential uses shall address the policies in section F2.2.2;
- j) Above ground utilities shall be located to minimize visual and environmental impacts; and,
- k) Collector roads shall be provided approximately mid-block between arterial roads to promote traffic connectivity, and ultimately the establishment of public transit, when feasible.

2.7 Official Plan – Secondary Plans

Section G3.1 of the Official Plan, establishes the following policies with respect to the preparation of Secondary Plans:

G3 SECONDARY PLANS and More Detailed Plans

G3.1 SECONDARY PLANS

The purpose of any Secondary Plan is to establish a detailed development concept for infrastructure and land use in specific areas of the Town, such as new communities or the redevelopment of an existing community. More specifically, it shall be the intent of any Secondary Plan to:

- a) establish clear and appropriate boundaries for the new community or the redevelopment of an existing community;
- b) establish population, housing unit and employment capacity targets, including targets for affordable housing;
- c) establish the most appropriate mix of land uses that recognizes the location of the area and the goals and objectives of this Plan;
- d) ensure that the environment-first objectives of this Plan are met, including policies for the protection and enhancement of natural heritage features and ecological functions;

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- e) ensure that the urban design objectives and policies of this Plan are met;
- f) ensure that adequate transportation networks are/or will be established and that the transportation network is adequately supported by the proposed development pattern;
- g) ensure that adequate water and wastewater servicing is established to serve the anticipated development and that they can be phased in a way that is cost-effective and efficient;
- h) ensure that appropriate Secondary Plan policies, including phasing, servicing and financing policies, are in place to clearly and effectively guide future development within the Secondary Plan Area;
- i) incorporate appropriate policies pertaining to the provision and location of utilities;
- j) establish land use patterns that promote mixed-use, transit-supportive, walkable communities, including identifying the locations for social, cultural, recreational, educational and religious facilities;
- k) establish the location, types and density of residential and employment lands that contributes to the creation of healthy communities through: the appropriate mix and density of housing; strengthening live-work relationships through the balance of residential and employment land uses; and promoting active transportation and the use of public transit;
- l) address land use compatibility in accordance with Regional and Ministry of Environment guidelines;
- m) establish overall development density for the area, and for areas within the Designated Greenfield Area, how this density will contribute to achieving the minimum development density specified in Section D6.2 of this Plan.

Secondary Plans shall be adopted by an Amendment to this Plan and shall generally conform with and implement the intent of this Plan as set out in the Goals, Strategic Objectives and other relevant objectives and policies of this Plan. In the event of a conflict between the policies in this Plan and those contained in Secondary Plans, the Secondary Plan policies shall prevail to the extent of the conflict within the geographic area covered by the Secondary Plan.

New Secondary Plans shall be based on the following studies:

- a) a Subwatershed Study in accordance with Section C7 of this Plan;

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- b) a Functional Servicing Plan that demonstrates the means by which the new community will be appropriately serviced;
- c) Urban Design Guidelines in accordance with Section F2 of this Plan;
- d) A detailed Transportation Study that determines the impact of the development on the surrounding road network and recommends necessary improvements to the transportation network consistent with the goals, objectives and policies of this Plan;
- e) A Fiscal Impact Analysis that demonstrates development shall not negatively impact the Town's financial position;
- f) A Market Impact Assessment that determines the need for additional commercial floorspace, having regard for the planned function of existing commercial designations established by this Plan;
- g) an Air Quality Assessment based on Regional guidelines;
- h) a Community Infrastructure Plan, based on Regional guidelines, describing planning for the provision of public services for health, education, recreation, social and cultural activities, safety, security and the provision of affordable housing; and,
- i) an Agricultural Impact Assessment of the potential impact of urban development on existing agricultural operations, based on Regional guidelines.

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Additional studies may be identified as part of the Terms of Reference for a new Secondary Plan.

2.8 Official Plan – Secondary Plans

Section G3.2 of the Official Plan establishes the following policies with respect to Block Plans, sometimes referred to as Tertiary Plans:

G3.2 BLOCK PLANS

Block Plans are detailed development plans for a defined area that are intended to further coordinate development for a defined area, such as but not limited to, a Secondary Plan area prior to the granting of zoning and subdivision approvals. Such an area may be in one, or a limited number of ownerships, where it is proposed to phase development over a period of time. Council may require the preparation of a Block Plan, in accordance with defined Terms of References and studies, to show:

- a) the various land uses and densities;
- b) the location, dimensions and intersection details of all existing and proposed roads;
- c) the location of existing and proposed water and wastewater servicing, stormwater management ponds and utilities;
- d) the location and the anticipated timing of any schools and community centres;
- e) location, dimensions and areas of lands to be conveyed to the Town for parks and open space purposes; and,
- f) the phasing of development.

Where Council has determined that a Block Plan is required to coordinate the development for a defined area, the approval of draft plans of subdivision and implementing zoning by-laws shall be considered premature. Prior to the completion of a Block Plan to the satisfaction of the Town in consultation with the relevant agencies, lands within the area under consideration may be placed in a Development Zone.

2.9 Final Product

The end-product of the Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project will be a Secondary Plan in accordance with the requirements of the Halton Hills Official Plan as amended by OPA No. 10, and Regional Official Plan Amendment No. 38, to guide future development within this

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area in a comprehensive manner. This planning exercise is to be guided by extensive community engagement and agency consultation, and supported by appropriate background reports as set out in the Terms of Reference.

3.0 Project Scope and Time-frames

The overall intent of the Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project is to develop an appropriate Secondary Plan to guide future development within this area. The Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project is to be completed no later than 3 years after the contract has been awarded.

The Project has been organized into 6 Phases, further divided into a number of Tasks, under which are principal outputs or component Studies. As determined by the Detailed Work Program, the time frame of certain Phases may overlap, and a number of Tasks will take place concurrently. The precise relationship and timing of Phases and Tasks is subject to refinement and confirmation through the development of a Detailed Work Program by the Project Consultant. The Detailed Work Program will be reviewed by the Technical Advisory and Steering Committees, and approved by the Project Team and Council.

4.0 Secondary Planning/Subwatershed Study Integration

The Southwest Georgetown Integrated Planning Project will integrate the Secondary Planning and Subwatershed Planning processes, in order to ensure that the Subwatershed Plan provides technical support to the Secondary Plan land use planning process.

It is intended that the Subwatershed study be completed prior to or in conjunction with the approval of the Secondary Plan for the Southwest Georgetown Future Residential/Mixed Use Area, in order that the Subwatershed Plan can outline the preferred storm water and environmental management strategy for the Secondary Plan Area. Also, the Secondary Plan studies can then evaluate in greater detail the implementation of the recommended Subwatershed Plan in order to facilitate the land use infrastructure planning process.

5.0 Land Use Planning/Environmental Assessment (EA) Integration

The Southwest Georgetown Integrated Planning Project will be designed to integrate the land use and subwatershed planning exercise with Phases 1 and 2 of the Environmental Assessment process under the *Environmental Assessment Act*. This integration will avoid duplication of processes, and ensure meaningful and effective public participation, pertaining to the:

- Transportation Strategy/Plan – the planning and layout of arterial and major collector roads;

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- Functional Servicing Plan – the planning and design of water/wastewater servicing and stormwater management.

It is anticipated that the Secondary Plan will contain specific policies to inform the completion of Phases 3 and 4 of the EA process, prior to the approval of any development applications.

6.0 Project Design

<i>Phase 1 – Project Initiation:</i>

Task 1.1 – Project Charter

This initial task will include the completion and agreement on the contents of a Project Charter between the Town, Region, conservation authorities, and landowners, setting out the agreed upon roles and responsibilities of each stakeholder.

Deliverables, which will be reviewed and approved by Council:

- Project Charter;
- Council Presentation/Report (in conjunction with Tasks 1.2 and 1.3).

Task 1.2 – Detailed Work Program

This task will also involve start-up meetings with the Project Consultant team to review and finalize a detailed work program for the Project, based upon the proposed work program contained in the chosen consultants' proposal.

Deliverables, which will be reviewed and approved by the Project Team:

- Detailed Work Program;
- Council Presentation/Report (in conjunction with Tasks 1.1 and 1.3).

Task 1.3 – Community Engagement

This task will involve the development of a strategy to achieve meaningful public engagement and participation in the development of a land use vision and plan for the Southwest Georgetown Future Residential/Mixed Use Area. Engagement opportunities to be considered include focus groups, design charettes, workshops, web-based portals, and the use of social media.

The Strategy will address the identification of community groups with an interest in the planning of the Southwest Georgetown Future Residential/Mixed Use Area, as

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well as innovative ways to engage the broader community. For examples see Task 2.2.

Also included in the Strategy will be innovative mechanisms to engage existing community groups by going to meetings arranged by them, rather than expecting them to come to Town organized public open houses. This would involve such groups as the Halton Hills Cultural Round Table, Sustainable Halton Hills, Mayor's Youth Action Committee and the Halton Hills Chamber of Commerce.

Deliverables, which will be reviewed and approved by Council:

- Community Engagement Strategy;
- Council Presentation/Report (in conjunction with Tasks 1.1 and 1.2).

<i>Phase 2A – Community Visioning & Information Gathering:</i>

This phase of the project may be initiated prior to the completion of Phase 1, but will not proceed to community engagement until Phase 1 is completed.

Task 2.1 – Background Analysis and Issue Identification

This task entails a review of relevant background material to provide a sound basis for decision-making. Pertinent background material includes, but is not limited to:

- Places to Grow – Greater Golden Horseshoe Growth Plan;
- Provincial Policy Statement (2005);
- Planning Act, R.S.O, c.P.13, as amended to March 30, 2007;
- Region of Halton Official Plan, as amended by ROPA No. 38 and 39;
- Region of Halton Best Planning Estimates, 2011.
- Sustainable Halton Background Reports particularly those pertaining to the Natural Heritage System, land supply, density, and water and wastewater infrastructure;
- Sustainable Halton Water and Wastewater Master Plan – Servicing our Communities and our Environment;
- Sustainable Halton Transportation Master Plan – The Road to Change;
- Region of Halton Comprehensive Housing Strategy;
- Agricultural Impact Assessment Guidelines, Region of Halton;
- Archeological Master Plan, Region of Halton.
- Guidelines for the preparation of Community Infrastructure Plans, Region of Halton;
- Healthy Community Guidelines, Region of Halton;
- Air Quality Assessment Guidelines, Region of Halton;

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- Halton-Peel Boundary Area Transportation Study;
- Halton Hills Official Plan (Consolidated May 2008);
- Official Plan Amendment No. 10 to the Halton Hills Official Plan;
- Planning, Development and Sustainability Council Reports on Sustainable Halton, Regional Official Plan Amendments No. 37, 38 and 39, Town of Halton Hills Growth Plan Conformity and Official Plan Amendment No. 10;
- Mayor's Green Plan;
- Halton Hills Green Development Evaluation Checklist;
- Halton Hills Green Building Standard (Draft);
- Halton Hills Integrated Community Sustainability Plan (Draft);
- Halton Hills Transportation Master Plan Update;
- Halton Hills Recreation and Parks Strategic Action Plan;
- Halton Hills Cycling Master Plan;
- Halton Hills Long Range Financial Plan;
- Halton Hills Heritage Register;
- Sixteen Mile Creek Subwatershed Study/Plan;
- Silver Creek Subwatershed Study/Plan;
- Low Impact Development design standards/guidelines; Credit Valley Conservation;
- Georgetown South Master Drainage Plan;
- Halton Hills Retail Market Demand Study Update (2010);
- Background Reports/Data prepared by Southwest Georgetown Landowners Group, including 4-season environmental monitoring and conceptual land use plan.

Building on the aforementioned material, the successful Project Consultant will prepare a Background Discussion Paper which provides pertinent information on various Provincial, Regional, local, and conservation authority plans and policies, and their implications for the Southwest Georgetown Future Residential/Mixed Use Area.

The Project Consultant, with the support of appropriate Town staff, will present the Background Discussion Paper to the Project Technical Advisory and Project Steering Committees. Any revisions that are necessary to the Discussion Paper flowing from the Committee consultation will then be undertaken prior to proceeding to public engagement.

Deliverables:

- Background Discussion Paper;
- Presentations to the Technical Advisory and Project Steering Committees;
- Newsletter; Website Update; E-mail blast and Twitter/Facebook;

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- Public engagement as determined by the Community Engagement Strategy.

Task 2.2 – Community Visioning Exercise

This task will include multiple opportunities for all residents of Halton Hills, and other interested stakeholders, to actively participate in developing an overall Vision and Guiding Principles for the Future Residential/Mixed Use Area, leading into the development of Land Use Concepts. The Land Use Concepts will form the basis for the development of more detailed Land Use Alternatives. These opportunities will be defined in greater detail through the preparation of a Community Engagement Strategy, but are expected to include the following:

- Information Sessions to present the results of Task 2.1;
- Youth involvement through such tools as art and essay contests, and workshops with interested teachers and students;
- Web-based portals for public input, and the use of Social Media;
- Focus groups, design charettes and workshops, with participation of key community groups and landowners;
- Community Visualization tools (such as 3D modeling or flyovers) that enable participants to electronically visualize alternative land use and urban design concepts.

Deliverables, of which the first two shall be reviewed and approved by Council:

- Vision and Guiding Principles for Secondary Plan;
- Land Use Concepts;
- Presentations to the Technical Advisory and Project Steering Committees;
- Newsletter; Website Update; E-mail blast and Twitter/Facebook.
- Public engagement as determined by the Community Engagement Strategy.

<i>Phase 2B – Subwatershed and Natural Heritage System Planning:</i>

This phase involves the completion of a Subwatershed Plan that allows for sustainable development, which maximizes benefits to the natural and human environments on a watershed basis. The objectives of the Plan will include ensuring the protection of natural heritage features and hydrological functions, and will involve detailed work to confirm the extent of the Regional Natural Heritage System, resulting in appropriate land use policies within the secondary plan.

This study will be conducted in accordance with Section C7 of the Halton Hills Official Plan, and must provide sufficient detail to support the completion of Secondary Plan servicing studies.

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The Subwatershed Study (SWS) process consists of preparation of a Background Report and four SWS phases:

- SWS Phase 1 – Characterization;
- SWS Phase 2 - Impact Assessment;
- SWS Phase 3 – Implementation; and
- SWS Phase 4 - Monitoring.

A Subwatershed Plan, including a Natural Heritage System Plan, and serving as a guide to other environmental policies of the Secondary Plan, will be the product of SWS Phase 3. Phase 4 will be completed subsequent to the approval of a Secondary Plan for the subject lands.

The Subwatershed Study will be the subject of a Detailed Work Plan to be developed based upon a Terms of Reference forming an attachment to this Terms of Reference (**See Appendix A**). This Detailed Work Plan will be developed by the chosen Project Consultant, with the input of Conservation Halton, Credit Valley Conservation and the Region of Halton, and shall be recommended by the Technical Advisory Committee, reviewed by the Project Steering Committee, and be subject to the approval of the Project Team.

The Southwest Georgetown Future Residential/Mixed Use Area is situated within the following subwatersheds:

- Subwatershed 5 (East Branch) of the Sixteen Mile Creek watershed, within the jurisdiction of Conservation Halton;
- Silver Creek Subwatershed (Subwatershed 11 of the Credit Valley watershed, within the jurisdiction of Credit Valley Conservation).

The Subwatershed Study Detailed Work Plan will be designed to utilize existing information, such as the Sixteen Mile Creek Watershed Plan and Silver Creek Subwatershed Plan, while updating the information, and addressing Best Management Practices (BMP) including Low Impact Development (LID). Environmental data or studies completed by the landowners will be reviewed and used as input, where appropriate, to the Study.

This Study will also involve examination and refinement of the landscape scale analysis undertaken by Sustainable Halton to develop a Regional Natural Heritage System, implemented through Regional Official Plan Amendment No. 38, in order to develop mapping and policies for the protection of a natural heritage system within the subject area.

It is intended that the Subwatershed Plan be completed prior to the approval of the Secondary Plan for this area to determine and mitigate any impacts of the proposed development on natural resources and provide protection against the natural hazards of flooding and erosion. As such, the Subwatershed Plan must provide technical support to the Secondary Plan land use planning process.

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The Subwatershed Plan must outline the preferred storm water and environmental management strategy for the Secondary Plan Area. The Secondary Plan Studies must evaluate in greater detail the implementation of the recommended Plan in order to facilitate the land use infrastructure planning process. The objective of the Subwatershed Plan is to provide an overall strategic framework for resource management within any subwatershed area and the external reaches of the various creek systems.

Deliverable(s), which shall be reviewed and approved by Council:

- Subwatershed Plan, including a Natural Heritage System Plan, containing mapping and a policy framework.

Phase 3 – Detailed Planning Study:

Task 3.1 – Sustainable Planning

This task involves assessing the sustainability initiatives that would be appropriate to work towards as part of the secondary plan development process, drawing as appropriate from the Mayor's Green Plan and the Integrated Community Sustainability Plan.

Integral to this task would be the completion of an assessment which investigates the feasibility of District Energy solutions for the Southwest Georgetown Future Residential/Mixed Use Area, and any other viable energy management and conservation alternatives, as well as a strategy to maximize water conservation. Issues to be addressed include the need for an 'anchor tenant' and/or high intensity 'community hub' uses to make a district energy solution feasible. This task will be coordinated with the preparation of the Community Energy Plan by the Town.

Also included in this task is the application of the Town's pending Green Building Standard, as appropriate, to the Southwest Georgetown Future Residential/Mixed Use Area. The LEED-ND (Neighbourhood Design) model, and any other appropriate models, will be examined to assess their appropriateness for planning of the Southwest Georgetown Future Residential/Mixed Use Area.

Deliverables:

- Energy Conservation Assessment/Strategy;
- Water Conservation Strategy;
- Air Quality Assessment in keeping with Regional guidelines; and,
- Sustainable Neighbourhood Development Guidelines.

Task 3.2 – Urban Design

This task involves the development of detailed urban design guidelines that implement the urban design policies of the Official Plan, and in particular Section F3, and where applicable, Section F2 of the Official Plan. These guidelines will serve as the guide for the preparation of tertiary and/or block plans for defined area/neighbourhoods of the Southwest Georgetown Future Residential/Mixed Use Area. This task will be closely coordinated with the preparation of Sustainable Neighbourhood Development Guidelines (Task 3.1), an Active Transportation Strategy (Task 3.5); subwatershed planning and storm water management.

Deliverables:

- Urban Design Study/Guidelines; and,
- Delineation of Tertiary/Block Plan areas.

Task 3.3 – Resource Management

This task involves the examination of the impact of future development of the area on the agricultural operations and resources in the surrounding area, and the development of measures to mitigate those impacts. It also involves the inventory of heritage and archaeological resources (guided by the Region Archaeological Master Plan) in the area, and the development of a strategy to conserve those resources, in accordance with Section F5 of the Official Plan.

Deliverables:

- Heritage Conservation Strategy;
- Agricultural Impact Assessment, in keeping with Regional policies and guidelines.

Task 3.4 – Community Infrastructure and Housing

This task involves the evaluation of the requirements for community infrastructure needed to adequately serve the planned population, in keeping with the Region's Guidelines for the preparation of Community Infrastructure Plans, and in accordance with Sections F7 and F8.1 of the Official Plan. Included in this task is the assessment of the opportunity for the development of a 'community hub' on the Southwest Georgetown lands to complement the existing Gellert Centre and park.

In addition, it involves the preparation of an analysis to address the housing unit and mix requirements (e.g. Best Planning Estimates) of the Regional and Halton Hills Official Plans (Section D1.4.7), as they pertain to the Future Residential/Mixed Use Area.

Deliverables:

- Community Infrastructure Plan, including a Parks and Public Facilities Master Plan, and a land use strategy for the provision of other essential community facilities such as public schools; and,
- Land Budget/Housing Mix Analysis.

Task 3.5 – Transportation Planning

This task involves the evaluation of the requirements for an integrated transportation system for the Future Residential/Mixed Use Area, including a road network, public transit system, strategy for active transportation (walking and cycling) and ‘complete streets’, taking into consideration the Halton Hills and Regional Transportation Master Plans, as well as Section F6 of the Official Plan, where applicable. This task will be closely coordinated with the preparation of a Community Infrastructure Plan (Task 3.4).

This task will also be undertaken in order to meet the requirements of Phases 1 and 2 of the Environmental Assessment (EA) process under the *Environmental Assessment Act*, with respect to the planning and layout of any arterial or major (mid-block) collector roads. Policies will also be included in the Plan to inform the later completion of Phases 3 and 4 of the EA process.

Deliverable(s):

- Transportation Study/Plan, including an Active Transportation Strategy.

Task 3.6 – Fiscal Impact

This task involves the preparation of a fiscal impact assessment, building upon the Long Range Financial Plan, to determine the overall financial contribution and cost implications of the development of the Future Residential/Mixed Use Area, as the basis for the calculation of development charges.

Deliverable:

- Fiscal Impact Assessment/Financial Strategy, as the basis for an update of the Town’s Development Charge By-law.

Task 3.7 – Physical Infrastructure/Servicing/Storm Water Management

This task involves the examination and identification of all required municipal infrastructure related to water and wastewater, utilities and telecommunications, storm water and waste management, in consultation with the Region of Halton, taking into consideration the Sustainable Halton Water and Wastewater Master Servicing Plan, as well as Section F8.2 of the Official Plan. All Class Environmental Assessment schedules for projects within the Southwest Georgetown Future Residential/Mixed Use Area will be identified.

Deliverable:

- Functional Servicing Plan, in accordance with Class Environmental Assessment requirements, water and wastewater servicing, and all Class EA schedules;
- Storm Water Management Plan, integrated with Low Impact Development BMP's.

Phase 4 – Land Use Alternatives:

Task 4.1 – Development of Land Use Planning Alternatives

The purpose of this task is to develop various Land Use Alternatives. Building on the information obtained from Phases 1 to 3, a report shall be prepared outlining the relative merits of different Land Use Alternatives. The Project Consultant, with the support of appropriate Town staff will present the Land Use Alternatives to the Technical Advisory and Project Steering Committees. Any revisions that are necessary to the Land Use Alternatives flowing from the Committee consultation will then be undertaken prior to proceeding to further public engagement as per the Community Engagement Strategy.

This task will include an identification of an appropriate location(s) for the required commercial floor space as determined by the town-wide Retail Market Demand Study Update.

The Land Use Alternatives Report will be subject to further public engagement as per the Community Engagement Strategy, and all public and agency will be summarized and analyzed.

Deliverables, of which the Land Use Alternatives Report shall be reviewed and approved by Council:

- Land Use Alternatives Report, including identification of commercial location(s);
- Presentations to the Technical Advisory and Project Steering Committees
- Newsletter; Website Update; E-mail blast and Twitter/Facebook;
- Public Engagement as per Community Engagement Strategy

Phase 5 – Preferred Land Use Alternative:

Task 5.1 – Development of Preferred Land Use Alternative

Building on the work undertaken in Phases 2 to 4, the purpose of Phase 5 is to develop a Preferred Land Use Alternative for consideration by the Technical and

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Project Steering Committees. Subject to any refinements flowing from the Committee consultation, the Preferred Land Use Alternative will be subject to further public engagement as per the Community Engagement Strategy, before forwarding to Council for consideration and approval.

Deliverables, of which the Preferred Land Use Alternative Report shall be reviewed and approved by Council:

- Preferred Land Use Alternative Report;
- Presentations to the Technical Advisory and Project Steering Committees;
- Newsletter; Website Update; E-mail blast and Twitter/ Facebook;
- Public Engagement as per Community Engagement Strategy;
- Council Presentation/Report.

Task 5.2 – Growth Management/Development Phasing

This task involves the development of an overall local phasing plan for the Southwest Georgetown Future Residential/Mixed Use Area, in accordance with the phasing policies of the Region and Halton Hills Official Plans (Section F10).

Deliverable:

- Infrastructure Staging and Development Phasing Plan.

Phase 6 – Development of Secondary Plan:

Task 6.1 – Initial Policy Formulation

This task involves the preparation of a Secondary Plan for the Southwest Georgetown Future Residential/Mixed Use Area. A draft of the Secondary Plan will be presented to Project Technical Advisory and Project Steering Committees. Any revisions that are necessary to the Secondary Plan flowing from the Committee consultation will then be undertaken prior to proceeding to Town Council to seek authorization for the formal release of the document for public comment.

The Project Consultant, with the support of appropriate Town staff, will present the draft Secondary Plan to the public as per the Community Engagement Strategy.

Deliverables:

- Draft Secondary Plan
- Presentations to the Project Technical Advisory and Project Steering Committees
- Council Presentation
- Public Engagement as per Community Engagement Strategy
- Public Consultation Paper

Task 6.2 – Final Policy Formulation

This task entails revising the Secondary Plan, as appropriate, for purpose of proceeding to a statutory public meeting pursuant to the Planning Act. The Project Consultant will, with the support of appropriate Town staff, summarize and address agency and public comments received on the revised Secondary Plan and provide final recommendations in the form of a report regarding the adoption of a Secondary Plan for the Southwest Georgetown Future Residential/Mixed Use Area.

Deliverables, of which the Final Secondary Plan shall be reviewed and approved by Council:

- Public Meeting Presentation
- Final Report
- Final Secondary Plan
- Council Presentation

7.0 Town Responsibility

The Town of Halton Hills Planning, Development and Sustainability Department will be responsible for securing and providing existing information and supervising the completion of the Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project, in consultation with the Project Team. The Manager of Planning Policy, together with the Senior Planner – Policy, and assisted by other staff as required, will coordinate and supervise the Southwest Georgetown Future Residential/Mixed Use Area Integrated Planning Project, whose responsibilities will be to:

- Coordinate a Project Team comprised of key Town personnel;
- Assemble and coordinate a Project Technical Advisory Committee comprised of representatives from Town Departments, the Region of Halton, conservation authorities, and other public agencies as determined appropriate;
- Assemble and coordinate a Project Steering Committee comprised of selected members of Town Council, Town Advisory Committees, local residents, landowners, and the Region of Halton;
- Coordinate the Community Engagement Strategy;
- Ensure financial resources are well-managed;
- Ensure compliance with the Terms of Reference;
- Ensure participation of all stakeholders;
- Chair Project Technical and Project Steering Committee Meetings;
- Coordinate communications;
- Coordinate with other studies as appropriate.

7.1 Project Team

The members of the Project Team shall include:

- Director of Planning, Development and Sustainability;
- Director of Corporate Services & Treasurer;
- Direction of Recreation and Parks;
- Director of Infrastructure Services & Town Engineer;
- Fire Chief;
- Chief Administrative Officer;
- Manager of Planning Policy;
- Senior Planner-Policy.

The role of the Project Team is to provide overall Corporate guidance to the project, and shall meet to monitor the progress of the project, either at Senior Management Team meetings or special meetings as may be required to resolve issues. Planning Policy staff shall be responsible for bringing issues and recommended actions to the Project Team, and implementing recommendations of the Project Team.

7.2 Project Steering Committee

The members of the Project Steering Committee shall include:

- Mayor (ex-officio);
- 2 Regional Councillors (Wards 1&2; Wards 3&4);
- 2 Local Councillors (Wards 2, 3 or 4) (1 alternate);
- 1 TSAC representative (1 alternate);
- 1 Halton Hills Hydro representative (1 alternate);
- 1 Heritage Halton Hills representative (1 alternate);
- 1 TEAC representative (1 alternate);
- 1 Trails and Cycling Committee representative (1 alternate);
- 1 Halton Hills Chamber of Commerce or Georgetown BIA representative (1 alternate);
- 1 Mayor's Youth Action Committee representative (1 alternate);
- 1 Georgetown Senior's Centre representative (1 alternate);
- 1 Georgetown citizen representing local service groups (1 alternate);
- 1 Halton Hills citizen at large;
- 3 representatives of the Southwest Georgetown Landowners Group.

The role of the Project Steering Committee is as follows:

- Meet on a regular basis to monitor the progress of the study;
- Review and provide feedback at various stages of the process on work completed to date;
- Assist with issue identification and resolution;
- Liaise with their respective organizations or community of interest, both to ensure broad community awareness of the project, and to obtain broader community input.

7.3 Project Technical Advisory Committee

The members of the Project Technical Advisory Committee shall include:

- Manager of Planning Policy, Town of Halton Hills;
- Senior Planner-Policy, Town of Halton Hills;
- Manager of Design and Construction, Town of Halton Hills;
- Manager of Development Engineering, Town of Halton Hills;
- Manager of Finance, Town of Halton Hills;
- Manager of Parks and Open Space, Town of Halton Hills;
- Deputy Fire Chief, Town of Halton Hills;
- Manager of Policy, Halton Region – Legislative and Planning Services or alternate;
- Manager of Watershed Planning, Conservation Halton or alternate;
- Manager of Planning, Credit Valley Conservation or alternate;
- Halton Hills Hydro representative;
- Manager of Planning, Halton District School Board;
- Planning Administrator, Halton Catholic District School Board;

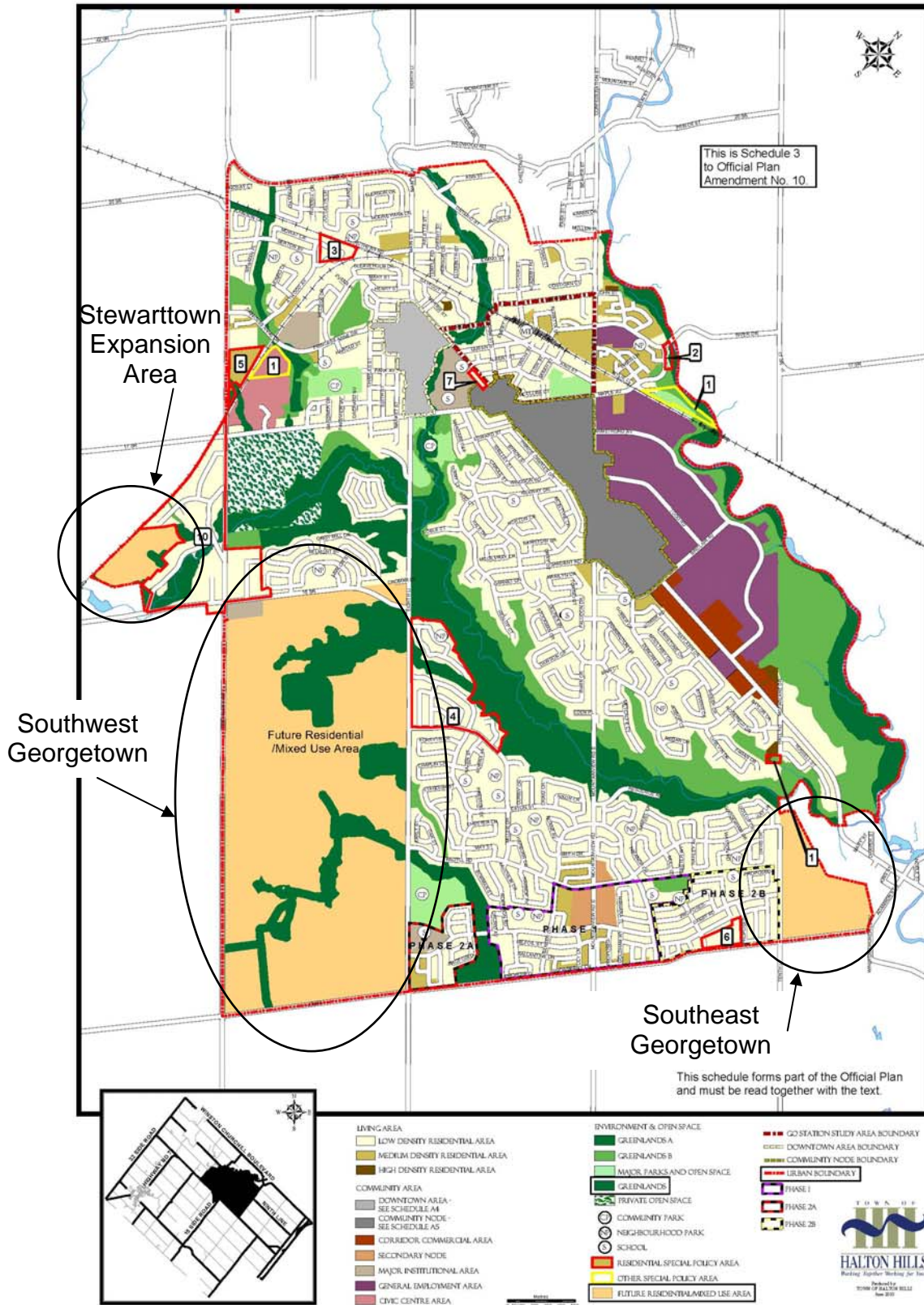
The role of the Project Technical Advisory Committee is as follows:

- Provide comments during the study process
- Assist with issue identification and resolution
- Liaise with their respective organizations to ensure one window input as well as study awareness
- Provide data input
- Meet on a regular basis to monitor the progress of the study.

Schedule One

SCHEDULE A3

TOWN OF HALTON HILLS OFFICIAL PLAN GEORGETOWN LAND USE



APPENDIX A:

**Draft Terms of Reference
Southwest Georgetown Integrated Planning Project
Subwatershed Study**

May 2012

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1.0 OVERVIEW

The purpose of this component of the Southwest Georgetown Integrated Planning Project is to develop a Subwatershed Plan which allows for sustainable development, and which maximizes benefits to the natural and human environments on a watershed basis. The objectives of the Plan will include ensuring the protection of natural heritage features and hydrological functions, and will involve detailed study to confirm the extent of the Regional Natural Heritage System, resulting in appropriate land use policies within the Secondary Plan.

This study will be conducted in accordance with Section C7 of the Halton Hills Official Plan, and must provide sufficient detail to support the completion of Secondary Plan servicing studies.

The Subwatershed Study Detailed Work Plan will be designed to utilize existing information, where appropriate. Other environmental data or studies such as those completed by the Southwest Georgetown Landowners Group will be reviewed and used as input, where appropriate, to the Study.

This Study will also involve examination and refinement of the landscape scale analysis undertaken by Sustainable Halton to develop a Regional Natural Heritage System, implemented through Regional Official Plan Amendment No. 38, in order to develop mapping and policies for the protection of a natural heritage system within the Primary Study Area.

The Subwatershed Study process consists of preparation of a Background Report and four separate phases, with the Subwatershed Plan the product of Phase 3, and Phase 4 occurring subsequent to the completion of the Study process:

- Phase 1 – Characterization;
- Phase 2 - Impact Assessment;
- Phase 3 – Implementation; and
- Phase 4 - Monitoring.

Deliverable(s), which shall be reviewed and approved by Council:

- Subwatershed Plan, including a Natural Heritage System Plan, containing mapping and a policy framework.

1.1 Detailed Work Plan

This Terms of Reference will serve as a framework to guide the preparation of a more Detailed Work Plan by the chosen Project Consultant for the Town. This Detailed Work Plan will be reviewed and approved by the Project Team, in consultation with the Subwatershed Technical Advisory Committee, comprised of staff from the Town of Halton Hills, Region of Halton, Conservation Halton, and Credit Valley Conservation.

1.2 Relationship to the Southwest Georgetown Integrated Planning Project

Pursuant to Section C7.5 of the Halton Hills Official Plan, it is intended that the Subwatershed Study and Plan be completed prior to or in conjunction with the finalization and/or approval of the Secondary Plan for this area to determine and mitigate impacts of the proposed development on natural resources and provide protection against the natural hazards of flooding and erosion. As such, the Subwatershed Study must provide technical support to the Secondary Plan land use planning process.

The Subwatershed Plan must outline the preferred storm water and environmental management strategy for the Secondary Plan Area. The Secondary Plan Studies must evaluate in greater detail the implementation of the final Subwatershed Plan in order to facilitate the land use and infrastructure planning process. The objective of the Subwatershed Plan is to provide an overall strategic framework for resource management within any subwatershed area and the external reaches of the various creek systems.

The Project Consultant for the Town will be responsible for developing a Detailed Work Plan for the Subwatershed Study, in the context of an overall Work Program for the Integrated Planning Project, which ensures that the objectives specified in these Terms of Reference are met.

1.3 Study Area

The Primary Study Area for the Subwatershed Study is the portion of the Future Residential/Mixed Use Area referred to as Southwest Georgetown, bounded by 15 Sideroad to the north, 10 Sideroad to the south, Trafalgar Road to the west and Eighth Line to the east (see **Schedule One**).

The Southwest Georgetown Future Residential/Mixed Use Area is situated within the following subwatersheds (see **Schedule One**):

- Subwatershed 5 (East Branch of the Sixteen Mile Creek watershed), within the jurisdiction of Conservation Halton;
- Silver Creek Subwatershed (Subwatershed 11 of the Credit Valley watershed) within the jurisdiction of Credit Valley Conservation.

As outlined in this Terms of Reference, the focus of this subwatershed study will be the Primary Study Area, however scoped data collection, analysis and impact assessment will be conducted within Subwatershed 5, and to a more limited extent, the Silver Creek Subwatershed (which coincides with about 20 percent of the Primary Study Area and has been the subject of a detailed subwatershed study completed in 2003).

1.3.1 Environmental Investigation of the Future Employment Area within Subwatershed 5

The Project Consultant through the Detailed Work Plan will determine an appropriate scope for the collection of environmental data for the area of Subwatershed 5 within the Future Employment Area identified in Official Plan Amendment No. 10 (shown as 'Expansion Boundary' on **Schedule Two**). This data will serve as input to a Scoped Subwatershed Study for the Future Employment Area (an expansion of the Halton Hills 401/407 Employment Corridor Area) to be completed as part of a future secondary planning exercise for this area.

1.4 Study Goals and Objectives

The overall goal of this Subwatershed Study is to provide recommendations and a strategic framework for the sustainable management of natural resources within and adjacent to the Primary Study Area, given its designation in Regional Official Plan Amendment No. 38 and Halton Hills Official Plan Amendment No. 10 for urban development to the 2031 planning horizon, as determined by the Sustainable Halton comprehensive planning exercise.

The study will provide sufficient detail to support the designation of a sustainable Natural Heritage System, through refinement of the Regional Natural Heritage System, as well as recommendations for a Water Management Strategy to be followed by subsequent Secondary Plan and associated servicing studies. Future development and site specific environmental and servicing management plans must adhere to and implement these recommendations. The results of the Subwatershed Study must ensure that all applicable Provincial, Regional and local land use planning requirements, as well as Conservation Authority regulations, are adhered to.

The strategic goals and objectives for this Subwatershed Study include:

1.4.1 Natural Hazards

Goal:

- To prevent, eliminate or minimize the risks to life and property caused by flooding and erosion hazards.

Objectives

- To ensure that new development does not create new hazards or aggravate existing hazards.
- To ensure new development is located outside and appropriately setback from flooding and erosion hazards

- To implement development standards and land use controls to prevent future development from occurring within areas prone to flooding or erosion hazards.
- To ensure that new development, including infrastructure, incorporates appropriate mitigation measures that are necessary to avoid adverse impacts to natural features, areas and systems.
- To consider cumulative impacts and changing climatic conditions when determining the characteristics and management of flooding and erosion hazards.
- To ensure runoff from development is controlled such that it does not increase the frequency and intensity of flooding, the rate of natural stream erosion or increase slope instability.
- To ensure Creek crossings (e.g. bridges and culverts) are designed appropriately to address potential channel migration without the requirements for armoring or impacting natural channel migration over the 100-year planning horizon.

1.4.2 Water Resources

Goal

- To protect, improve or restore water quality and quantity associated with surface water and groundwater features within and adjacent to and downstream of the Primary Study Area, including their associated ecological and hydrologic functions.

Objectives

- To implement water management measures and infrastructure design that protects, restores and enhances the natural hydrologic cycle and mitigates potential adverse impacts to the natural heritage system.
- To develop robust servicing and stormwater management strategies capable of adapting to changing climatic conditions.
- To ensure fluvial processes and stream morphology are maintained or improved recognizing important habitat attributes (pools, riffles etc.), dynamic channel form and diversity contribute to maintaining a sustainable natural heritage system.
- To implement sustainable management practices, pollution prevention activities and design standards that protect, improve or restore water quality from the accelerated enrichment, contamination and increased

temperatures within streams from development related pressures and activities.

- To encourage the protection, improvement or restoration of tableland and riparian vegetative cover for the protection and improvement of water quality and quantity associated with surface water and groundwater features.
- To ensure natural hydrogeologic functions are protected taking advantage of stream baseflow and groundwater discharge and recharge enhancement opportunities.

1.4.3 Natural Heritage

Goal

- To protect, restore, and enhance the biodiversity, connectivity and ecological and hydrologic functions of natural features, areas and systems throughout, and adjacent as appropriate, to the Primary Study Area.

Objectives

- To ensure natural heritage features and areas, including their ecological and hydrologic functions, are appropriately protected from the potential adverse impacts of development including the use of appropriately sized vegetation protection zones (i.e. buffers).
- To adopt appropriate land use controls and development standards that protect existing natural features and areas and prevents future development from negatively impacting or occurring within the natural heritage system.
- To encourage achieving an ecological gain through the development of the natural heritage system.
- To ensure that significant natural corridors and wildlife linkages are identified, protected or enhanced through the development of the natural heritage system.
- To develop an adaptive environmental management plan, including monitoring and mitigation measures that considers pre, during and post construction and development activities.

1.4.4 Additional Objectives

Additionally, the following with respect to environmental and potential downstream impacts from development should be addressed within the Sixteen Mile Creek

Subwatershed 5, Silver Creek Subwatershed and the Region of Halton Natural Heritage System:

- 1) The aquatic habitat in the creeks within and downstream of the subwatershed areas are maintained or where possible, enhanced.
- 2) Discharges from proposed land uses to the receiving watercourses do not degrade the existing levels of biological diversity and productivity, nor adversely impact on stream forms.
- 3) Any necessary alteration to the stream systems within the subwatershed incorporates the objectives of achieving natural and dynamically stable channel form and appropriate habitat characteristics.
- 4) Existing watercourses and drainage features are identified, and evaluated in sufficient detail, and that appropriate—recommendations/strategies are established to protect, restore and manage these features and their functions.
- 5) A sustainable natural heritage system is established which protects, preserves and where appropriate, enhances the natural environment.
- 6) Groundwater resources and functions are maintained and, if possible, enhanced (including investigation of flow paths and maintenance of these paths where required, considering the aquatic habitat requirements of the stream.
- 7) The quality and quantity of groundwater is not adversely impacted by proposed SWM measures (i.e. infiltration basins) and/or proposed land use. Any proposed servicing does not detrimentally lower the water table or adversely affect the groundwater resources.
- 8) Stormwater runoff is controlled to ensure that peak flow rates and associated flood levels are not increased as a result of the proposed development.
- 9) Retain stormwater onsite to achieve an annual volumetric water balance relative to pre-development conditions, where feasible.
- 10) The prolonged discharge from detention facilities does not increase downstream peak flows or channel erosion or negatively impact stream morphology.
- 11) Water quality and thermal regime of stormflow from the development meets all identified requirements and is maintained or enhanced as compared to existing conditions.
- 12) The stormwater management system will be robust enough to adapt to the changing climate.

- 13) All areas regulated by the Conservation Authorities should be considered in the development of the Natural Heritage System and management strategies, as appropriate.

1.5 The Study Approach

The Subwatershed Study will include:

Subwatershed Characterization

- a. Assessing the existing and potential subwatershed resources (physical, natural, social and economic) using standard methodologies.
- b. Determining the existing land uses and subwatershed resources.
- c. Identifying existing and future constraints and opportunities.

Identification of Subwatershed Opportunities and Targets

- d. Setting targets to be met and identifying opportunities that will be explored.
- e. Establishment of constraint and opportunity mapping

Subwatershed Plan Development and Evaluation

- f. Developing several Subwatershed Plan scenarios to meet the long term subwatershed goals and objectives.
- g. Evaluating the effectiveness of the various subwatershed plans in meeting the subwatershed objectives, targets and enhancement opportunities.

Final Subwatershed Plan

- h. Recommending a Subwatershed Plan and developing implementation strategies and frame work for subsequent studies; example Subwatershed Impact Studies including Stormwater and Groundwater Management Plans and ecological sustainability strategies.
- i. Providing for a monitoring and evaluation program to ensure the plan's success and to verify that predicted performance is achieved and to allow for adaptive management response.

Future site specific Subwatershed Impact Studies, including Stormwater and Groundwater Management Studies will describe in detail the specific measures which will be undertaken to implement the management objectives and meet the targets and further opportunities defined in the Subwatershed Plan.

2.0 STUDY ORGANIZATION

2.1 General

The study will be consistent with the goals, objectives and targets of the Watershed Plans and Regional Official Plan Amendment No. 38 and the Halton Hills Official Plan as amended by Official Plan Amendment No. 10. Recognizing that the Sixteen Mile Creek Watershed Plan was completed in 1995, updated goals, objectives and targets should be established through this study.

The Region, Town and Conservation Authorities have policies in place specifically related to watershed and subwatershed planning. The study will conform to:

- Sections 116.1 and 145(9) and all other relevant sections of the Halton Region Official Plan 2009 (ROPA 38);
- Section C7 - Watershed Planning, and all other relevant sections, of the Halton Hills Official Plan.

2.2 Environmental Assessment Act

The subwatershed planning process may lead to recommendations which include works or undertakings that are subject to the Environmental Assessment Act. The intent of the EA Act is to provide for the protection, conservation and wise management of the environment through planning and informed decision-making. Successful planning under the EA Act consists of five key features:

- consult with all affected parties;
- consider a reasonable range of alternatives to the undertaking and alternative methods of implementation;
- consider all aspects of the environment;
- systematically evaluate the environmental effects of each alternative considered;
- provide clear complete documentation.

The fundamental EA principles shall be incorporated into the subwatershed planning process. The information developed through this planning process should satisfy Phases 1 and 2 of the Municipal Engineers Association (MEA) Class EA requirements. The Project Consultant should review the types of projects that could be anticipated as a result of the subwatershed plan and determine what specific Class EA requirements will need to be incorporated in the plan. The steps are as follows: evaluate alternatives to projects; select preferred options; and incorporate documentation of Class EA requirements into the subwatershed plan.

2.3 Canadian Environmental Assessment Act (CEAA)

The preferred management strategies will also need to be consistent with the requirements of the Federal Fisheries Act and the “no net loss” policy. It is intended that

the subwatershed plan will provide general criteria for construction activities, facilities and structures which will impact, or could, potentially impact, upon fish habitat. Notwithstanding, the direction outlined within this plan, final design plans may still require approval by the various regulating agencies, however the adherence to the design criteria outlined herein will facilitate both planning and design, as well as ultimate agency review.

2.4 Other Legislation

Other legislation that may be relevant to the Subwatershed Study includes, but is not limited to, the Endangered Species Act, the Species at Risk Act, the Conservation Authorities Act, the Fisheries Act, the Migratory Birds Convention Act, the Clean Water Act, the Ontario Water Resources Act, the Lakes and Rivers Improvement Act, and the Water Opportunities Act.

2.5 Public Participation

- a) In order to obtain public input on the formation and evaluation of various water management plans, the Project Consultant will hold three Public Open Houses/Meetings during the course of the study, as follows.
 - i) - Notification of the study.
 - Review of subwatershed Goals and Objectives, work program.
 - To be held during the Background Report review period.
 - ii) - Review of Management Objectives and Plan Alternatives and review of background data collection
 - To be held during the Characterization Report review period.
 - iii) - Review of evaluated alternatives and preferred Plan.
 - To be held during the Draft Final Report review period.

2.6 Subwatershed Steering Committee (SWSC)

The SWSC will be chaired by the Town and have the following representation:

- Town staff – 3
- Region staff – 1
- Conservation Halton staff – 1
- Credit Valley Conservation staff – 1
- Project Steering Committee representative - 1

The purpose of the SWSC will be to oversee the Subwatershed Study consulting team, to review milestone reports, ensure all work is carried out in an appropriate fashion, and to ensure input from the public and SWTAC is considered in the completion of the Subwatershed Study. The SWSC will report to the Southwest Georgetown Integrated Planning Project Technical Advisory Committee through Town Planning staff, and will contain a representative of the Integrated Planning Project Steering Committee.

2.7 Subwatershed Technical Advisory Committee (SWTAC)

The SWTAC will be chaired by the Town and have the following representation:

- Town – 4, includes Chairperson
- Conservation Halton - 4
- Credit Valley Conservation Authority - 2
- Region – 3
- Ministry of Natural Resources and/or Department of Fisheries and Oceans, as required.
- Landowners Peer Review Consultants - 4.

Other agency staff may be consulted and asked to attend SWTAC meetings to provide specialized technical input, as required.

The SWTAC meeting dates will be made available to the general public for attendance purposes.

The purpose of the SWTAC will be to provide technical review and input into the Subwatershed Study.

2.8 Digital Information

- i) All digital information, data, sketches, drawings and reports generated by the Project Consultant for the purpose of this study shall become the property of the Town of Halton Hills, Region of Halton and appropriate Conservation Authority.
- ii) For modeling related data products, digital copies of the model input and output, as well as licensed copies of any proprietary modeling software are to be provided to the Town, Region and appropriate Conservation Authority.
- iii) Digital copies of the written reports are to be provided in both MS Word 2010 and PDF format.
- iv) All mapping products produced for the study shall be georeferenced to real world coordinates and have a standard UTM NAD 83, Zone 17 projection with a NAD83 vertical datum.
- v) Map “layers” produced by the Project Consultant will be topologically correct (i.e. adjacent polygon features will be without gaps/overlaps and share vertices/nodes

where appropriate). Additionally, the Project Consultant should ensure attribute names are not truncated when converting data between file formats.

- vi) New features captured by the Project Consultant using GPS or heads-up digitizing from air photography will have a capture accuracy rating for the feature included as an attribute (e.g., accuracy = +/- 5m).
- vii) A mapping layer index will be provided listing the layer name and providing a description/abstract of the layer's content. Alternatively, if a mapping layer index is not provided, FGDC compliant metadata shall be created for each layer produced by the Project Consultant.
- viii) Digital data will be delivered in one of the following formats: a) ESRI geodatabase v9.3 feature classes or ESRI shape file format. If the Project Consultant utilizes ESRI ArcGIS to produce maps, the matching .mxd will be provided that corresponds to the map figure.
- ix) If software limitations prevent the Project Consultant from meeting these requirements, alternate formats may be considered (e.g., DGN) with the written agreement of the Project Team. The Project Team's GIS staff should be consulted if additional technical details are required to these requirements.
- x) Species information is to be provided to the appropriate Conservation Authority in digital spreadsheet format and significant species must be georeferenced. Ecological Land Classification data sheets are to be provided to the appropriate Conservation Authority in PDF format.

2.9 Reports

- a) After carrying out the background review and initial inventories, the Project Consultant will prepare a **Background Report** which will cover all data sources of information.
- b) After carrying out the assessment, the Project Consultant will prepare a **Characterization Report**. This report will contain but not be limited to:
 - hydrogeologic assessment
 - watershed hydrology (existing)
 - hydraulic assessment report and floodplain mapping
 - existing land use
 - erosion assessment (including fluvial geomorphology report and slope stability analysis)
 - natural heritage features identification and evaluation within and adjacent to Primary Study Area
 - natural heritage functions identification and evaluation within and adjacent to Primary Study Area
 - stream classification, fish community inventory and fish habitat assessment
 - water quality evaluation (including water chemistry and benthics)

- summary of applicable Federal, Provincial, Regional, Municipal and CA policies and legislation that will aid in achieving subwatershed goals and objectives

This report will be completed to the satisfaction of the SWSC in consultation with the SWTAC.

c) After carrying out the Characterization Report the Project Consultant will prepare an **Interim Report**. This report will detail the following:

- Anticipated location and forms of development and key transportation and servicing/utility corridors, maximum impervious coverage associated with each development form; any specific access/safety requirements associated with various transportation corridors (i.e. flood free access or safe access egress per MNR, minimum depth of cover at watercourse crossings for utilities, etc.).
- Potential impacts of future development (Water Quality and Quantity – flooding, erosion, and hydrogeology; Natural Heritage System- changes to extent and/or function of natural features and functions)
- Development of alternate mitigation measures
- Detailed evaluation of the various mitigation measures
- Preliminary Recommendations for preferred management measures
- Digital copies of model input/output

This report will be completed to the satisfaction of the SWSC in consultation with the SWTAC.

d) The Project Consultant will prepare and distribute the Final Report. The **Final Report** will consist of:

- the General Report which describes the final Subwatershed Plan and Implementation and Monitoring Strategy
- the Technical Report which documents the study findings and describes in detail the Plan and Implementation and Monitoring components
- Technical Appendix Reports documenting each of the detailed Inventory and Assessment Studies.
- One digital copy of all GIS mapping collected or developed in the preparation of the subwatershed plan provided with either a master index or metadata.
- All documents and supporting data collection, analysis and models to be supplied to the Town in digital format
- Licensed copies of the Hydrologic and Hydraulic models including all input/output data to be supplied to the Town and appropriate Conservation Authority
- Digital species lists and ELC data sheets to be supplied to the Conservation Authorities

This report will be completed to the satisfaction of the SWSC in consultation with the SWTAC.

e) Report Distribution

- One copy of each interim report will be prepared for each member of the SWSC.

Copies of the Final Report will be distributed as follows:

- Fifteen copies each of the General Report and Technical Report.

2.10 Meetings

The Project Consultant will allow for at least six SWTAC/SWSC meetings and three formal presentations:

- start up
- presentation of work plan
- presentation of the background review, including a walking tour of the Primary Study Area, and proposed field investigation work plan
- Site inspection during the appropriate season(s) with Conservation Authorities, Ministry of Natural Resources, and Fisheries and Oceans Canada to identify natural features (including habitat characterization) to be used in the development of the Natural Heritage System.
- presentation of the Characterization Report
- evaluation of the plan alternatives
- presentation of the Interim Report
- presentation of the plan alternatives
- presentation of Final Report
- final report presentation to Halton Hills Council

2.11 Summary of Study Components

The Subwatershed Study should be comprised of three general phases – Background and Characterization (Phase I); Impact Assessment (Phase II); and Implementation and Monitoring (Phase III). Each study component is summarized below. The first portion of the summary deals with the background review and characterization. The second portion relates to development scenario formulation and impact assessment, and the third recommendations for implementation.

3.0 Hydrology

Background and Characterization

A detailed hydrologic model should be developed and calibrated for the sub-watershed for the existing, and future development scenarios. The model should be a continuous, deterministic, hydrologic model, approved by the SWTAC, with strong physical

representation of surface runoff, base flows, and surface groundwater interaction. At the completion of the study, the Project Consultant will be required to supply the Town of Halton Hills and Conservation Authorities, with a licensed version of the hydrologic model, including program documentation, along with all digital input files, and output files.

Credit Valley Conservation developed flows using GAWSER Model for the Credit River Watersheds and its tributaries. The appropriate catchments of Silver Creek are to be used from this model to establish targets for stormwater management using the unit area flow method.

- Physical feature mapping of the watersheds and subwatersheds, including subwatershed boundaries, upstream catchment areas, watercourses, drainage swales, wetland features and undrained depressions should be developed based on existing mapping and verified in the field. Sub basins should be determined to establish nodes at points of interest. The intent of the modeling is to provide the details required for subdivision planning. The model should be calibrated to provide comparable flows at the sub basin outlet to those determined in the previous watershed studies for both specific design storms and low flows. The model input parameters should be compared to the previous watershed studies and modified to represent the more detailed subwatershed model. The model should then be validated based on local data collected (i.e. measured streamflow and precipitation data, as well as detailed geomorphologic information and local knowledge of past flooding frequencies.) Model setup and calibration will have to be completed to the satisfaction of the SWTAC.

Please see the Analysis section for additional modelling requirements associated with both existing and proposed models.

Background Review and Field Work

Background information on the study area will be collected from all available sources and by field inspection, including but not restricted to the following:

- Previous subwatershed studies and stormwater management studies
- Aerial photos
- Topographic and photo base maps
- Flow records, high water marks, precipitation
- Water use
- Stream flow monitoring
- Develop unit area flows for Silver Creek subwatershed, based on the target flows provided by CVC

Analysis

A hydrologic analysis will be conducted for the existing and future development conditions to determine pre and post-development flows and investigate the impact of post development conditions on: flows, volumes, flood levels, stream erosion, and base flows. This subwatershed plan will recommend an array of runoff control measures to be carried out in Secondary Plan and Subdivision Plan Level Studies to ensure that downstream peak flows are not increased, downstream channel erosion is not increased and that stormwater runoff is appropriately treated to meet water quality targets. The recommendations will need to be defined in sufficient detail to support completion of the subsequent secondary planning level studies.

Tasks to be carried out by the Project Consultant are:

- a) The Project Consultant will, based on background information and field investigation provide a recommendation for the appropriate number of streamflow gauges for review and approval by the SWTAC. The Project Consultant will initiate the streamflow monitoring program as early as possible in the study process and continue the monitoring program throughout the duration of the study. The method of flow measurement will be confirmed during the start-up stage and may consist of:
 - continuous flow gauging and recording,
 - local rainfall recording
 - staff gauges with local high flow observers,
 - collection of high water and debris line data following high flow events,
 - seasonal instream measurement of spot baseflow, particularly in conjunction with water quality sampling and fish and benthic sampling.
- b) The hydrology study will be undertaken in accordance with appropriate Engineering Standards. To fully quantify the impacts of the development and the effectiveness of the various potential stormwater management strategies, hydrologic modeling on the Sixteen Mile Creek is to extend to the confluence of the East and Mid East Branches, immediately north of Britannia Road, subject to confirmation by the Project Consultant through the Detailed Work Plan. Similarly, assessment of the potential impacts within the Silver Creek Subwatershed should be based on information provided in the Silver Creek Subwatershed Study and updated as necessary. It is recommended to complete downstream impact assessment up to a downstream confluence point, or by assessing the impact of development downstream to the point where the developed property is 10% of the total drainage area.
- c) Return frequency flows will be determined based on the existing pre-development conditions. Post-development storm flows will be developed for the proposed future land use scenarios for both uncontrolled conditions and for

controlled conditions with the recommended stormwater management controls in-place.

Return period flow estimates will be made using continuous simulation and frequency analysis for a minimum of 30 years of data. The effectiveness of stormwater management mitigation plans must be confirmed through continuous simulation results and frequency analysis for both peak flow control and erosion mitigation performance. The preferred plan will also be tested relative to the Municipal design storms along with several historical events including the Regional Event and any other design storms provided by the SWTAC (i.e. Regional IDF's).

- d) It is required that an appropriate hydrologic watershed model be used for all subwatershed areas. The model should be a continuous, deterministic, hydrologic model, approved by the SWTAC, with strong physical representation of surface runoff, base flows, and surface groundwater interaction. The Project Consultant is to ensure the model accounts for the following processes:
- soil infiltration
 - soil moisture
 - channel storage
 - full seasonal effects (snow accumulation and melt)
- e) The existing condition watershed model will be verified with available flow records and high water marks and streamflow/rainfall data collected during the study.
- f) The results of the predevelopment modeling will be used to set targets for outflow control rates which will be provided and return period flow rates at key locations as well as weighted flow rates for smaller development areas.
- g) The Project Consultant will assess the impact of development on stream peak flows, cumulative excess shear and flow duration through the establishment of a post development hydrologic model.
- h) Diversions should be minimized; however, should the proponent propose a watercourse diversion or modification of drainage basin boundaries, a low flow analysis must be completed, in addition to the hydrologic analysis outlined above. The purpose of the low flow analysis is to determine the impacts of water takings and land use changes on base flows, and recommend strategies to avoid or mitigate these impacts. The hydrologic model will be used to model low flow conditions. A low flow frequency analysis for key nodes in the subwatershed will be completed for the existing and future development scenarios. An impact assessment of existing water taking permits, unlicensed or potential water takings based on land uses, and the potential for future water taking permits and land use changes will be included in this analysis.

- i) Based on the erosion assessment (described in subsequent sections) and the hydrological assessment, the Project Consultant will develop a stormwater management strategy that meets the study goals and objectives. We note that the sizing of the stormwater management facilities may be completed using event based modeling, provided that post to pre control is also demonstrated by the continuous simulation model. The conceptual design for the stormwater management pond should include calculations and drawings showing SWM pond block sizing, including preliminary grades, design water levels (pond and receiving body outlet), storage volumes, inlet and outlet design and maintenance access provisions.
- j) The Project Consultant will identify opportunities to utilize Low Impact Development methods (LIDs) and assess/quantify their feasibility.
- k) Post to pre quantity control may also be required for the Regional storm. If regional controls are not incorporated into the SWM design, the subwatershed study must carry out an investigation of the potential increase to flood risk to determine what level of control will be required. Such an analysis is to include the increase in risk to life as well as the potential for flood risk to private, Municipal, Regional, Provincial and Federal property under Regional Storm conditions. If the study finds that no increase in risk occurs to downstream landowners or public uses, and the Town and appropriate Conservation Authority accept that finding, the Town in conjunction with the appropriate Conservation Authority will conclude, subject to consideration of any other relevant factor within their respective mandates that control at the Regional Storm level is not required.

Evaluation of risk associated with not establishing Regional storm control may include, but is not limited to:

- All existing development within the Primary Study Area for the watershed under consideration;
- The potential increase in flood risk associated with flood elevations or velocities that may adversely affect all landowners (including individuals, municipal agencies, provincial agencies (MTO, MOE, etc.) and federal agencies), all land uses including road crossings, private access roads, parks, storm sewer outlets, etc., for the watercourse to the confluence of the mid east and east branch of Sixteen Mile Creek, north of Britannia Road. The evaluation may also consider potential for the implementation of mitigation measures to address any increase in risk as an alternative to the requirements to control Regional Storm flows.
- It is understood that not all increases in flood velocity or flood elevation will necessarily lead to an increase in risk.

In addition to these initial scenarios, the Project Consultant must be prepared as part of the testing of alternative plans, to test the sensitivity of flows and volumes to variations in land use density and best management practices.

Impact Assessment

Results of the hydrologic analysis for existing and developed conditions will be used to determine a stormwater management strategy that will mitigate adverse watershed effects, which may include post to pre control of the regulatory storm event.

The fluvial geomorphologic and erosion assessments, in conjunction with the hydrologic analysis will be used to determine the precise amount of control required for all storm events. Stormwater management controls will be based on both continuous and storm event modeling and may also include additional IDF curves or storm events provided by the SWTAC. An evaluation of the erosion threshold exceedance allowance will also be required to determine whether or not the identified optimizations have effectively eliminated erosion risks.

Implementation and Monitoring

Recommendations for control of stormwater will be provided in the form of required storage and discharge relationships per impervious coverage unit area for various storm return periods. Separate unitary storage rate / discharge pairs should also be provided for erosion control. The analysis would include evaluation of the sensitivity of the hydrologic model with respect to impervious cover, and a recommendation with respect to the allowable variation in impervious coverage beyond which re-evaluation of stormwater management strategies should be required.

Priority should be given to the control of runoff increases at source by maximizing infiltration potential through the use of Low Impact Development techniques, where appropriate site conditions warrant. Storm runoff should be treated via a multi-barrier approach, incorporating onsite, conveyance and end of pipe controls to acceptable standards as determined in the MOE's Stormwater Management Planning and Design Manual (2003) or more recent standard. The Project Consultant will prepare a detailed storm water management strategy for future development. Conceptual design will be completed for all end of pipe treatment facilities. Conceptual design should include required storage volumes, flow targets, land area requirements and locations, and incorporate flexibility to account for anticipated climatic changes.

The characterization, analysis and reporting work must be completed to the general satisfaction of the SWTAC.

4.0 Hazard Land Identification

The study should identify the extent of the hazard lands within the Primary Study Area in accordance with MNR and Conservation Authority Guidelines. Hazard lands of key concern for this area include flood hazards, and areas subject to stream erosion and

slope instability. The analysis must be completed to the satisfaction of the Conservation Authorities.

To determine the hazard limit associated with valleys (defined and undefined), both the flooding and erosion hazards are to be considered. The hazard limit is set by the greater of the flood or erosion hazard, plus the applicable development setback based on the appropriate policy and regulatory requirements. It should be noted that additional buffers and/or corridor widths may be needed in consideration of other factors introduced by the study assessment including, but not limited to, the protection of ecological and hydrologic functions such as critical function zones and impacts to adjacent lands.

Background Review and Field Work

Background information on the Primary Study Area will be collected from all available sources and by field inspection, including but not restricted to the following:

- Review of the historical analysis of reaches with attention being paid to land use changes, channel changes, channel changes, and migration rates derived from aerial photographs
- Reach delineation based on scientifically defensible methodology (see CVC's Fluvial Geomorphic Guideline - Fact Sheet IV)
- Preliminary determination of reach sensitivity and overall classification.
- Rapid assessment to evaluate stability of reaches based on acceptable protocols
- Field survey of watercourse cross section and hydraulic structures
- Geotechnical investigation of the site may be required for confined valleys

Background data collection must be in accordance with the requirements set out in the MNR's Technical Guidelines.

4.1 Flood Hazards

Characterization

Verify the existing condition floodplain by confirming the accuracy of existing models. Update the flood hydrology and hydraulics for the existing condition as appropriate. Identify areas subject to flood damage and the consequences of flooding. It will be necessary to develop flood lines for all watercourses not currently included in the existing flood plain mapping within the detailed Primary Study Area and a sufficient up and downstream distance to clearly characterize all hydraulic interactions and identify any future hydraulic impacts associated with the development. The floodplain calculations shall be based on the applicable Provincial Technical Guidelines (i.e., Technical Guide – River & Stream Systems: Flooding Hazard Limit, Ministry of Natural Resources & Watershed Science Centre, 2002). It is intended that the Regulatory Floodplain would be determined through this process. This analysis should be completed for all watercourses, and is to be based on the flows resulting from the

ultimate development scenario. The U.S. Army Corps of Engineers HEC RAS model is acceptable for the hydraulic analysis. For tributaries which have very small drainage areas, floodplain mapping may not be required; however, alternate methods to ensure adequate hydraulic capacity may be needed. Field survey of existing channel and floodplain characteristics and crossing structures will be required.

Analysis

Update floodplain modelling and mapping as described above based on future hydrology, ultimate valley and channel conditions (i.e. full vegetation growth) and any supported proposed modifications to the floodplain system. Post development floodplain modeling and mapping will be required for the entire detailed Primary Study Area and a technically appropriate up and downstream distance. This analysis should be completed in accordance with the standards set out in the MNR Technical Guidelines based on the flows resulting from the ultimate development scenario. The U.S. Army Corps of Engineers HEC RAS model is acceptable for the hydraulic analysis. For tributaries which have small drainage areas and the CA has agreed existing condition floodplain mapping may not be required, alternate methods to ensure adequate hydraulic capacity may be required for post development scenarios.

Impact Assessment

As described in MNR's technical guidelines, field survey or appropriate base mapping will be required to provide cross sectional and profile data associated with the watercourses. Under post development conditions, regardless of the existing condition modeling, the hydraulic properties must be based on planned ultimate channel conditions. The hydraulic model shall demonstrate water levels, storage, and velocities for all design storms including the regulatory storm.

It is recognized that the SWS study may evaluate modifications to the existing flood plain. The Conservation Authorities may support modifications to some features based on the outcome of this study recognizing it should result in an ecological gain to the natural heritage system.

Where modifications to natural features are recommended, the study will incorporate sufficient analysis to ensure that any loss of riparian flood storage or changes which result in potential negative impacts (i.e. increased flooding depth, frequency, duration, velocity or erosion) are avoided over the full range of anticipated flow conditions. Preservation of riverine floodplain stage-storage-discharge must be demonstrated over a full range of return period flood levels and on an appropriate incremental basis in accordance with the directions of the SWTAC.

4.2 Erosion Hazards

Characterization

The erosion hazard limit associated with a watercourse is based on the valley characteristics - confined or unconfined. The stream characterization work (described below), in conjunction with a site walk with Conservation Authority staff and other members of the SWTAC, will be used to determine the watercourse status. Per the Ministry of Natural Resources and Watershed Science Centre's "Technical Guide – River & Stream Systems: Erosion Hazard Limit," (2002), the Erosion Hazard Limit is calculated based on the meander belt for unconfined systems, and the long term stable top of slope (toe erosion and slope stability components) for confined valley systems. During the site walk all confined systems will be identified in the field by Conservation Authority Staff. Please note that in confined systems the physical top of bank does not necessarily coincide with the long term stable top of bank. Geotechnical analysis is required to confirm the location of the long term stable top of slope, which forms the basis of the erosion hazard limit in a confined system. The intent of this study is to establish a reasonably accurate identification of the erosion hazard limit, which may be further refined through further study. In determining meander belt and long term stable slope limits CVC's Fluvial Geomorphic Guidelines (Fact Sheet I to V) and Stability, Erosion, and Development Setback Components Definition and Determination should be followed.

Analysis

- a) The Project Consultant will identify, by field inspection, sites where stream bank erosion and slope instability is present and/or should be considered as part of the erosion hazard.
- b) The Project Consultant will determine historic toe erosion rates and anticipated future toe erosion rates (if localized increases to on-site erosion are deemed unavoidable and acceptable).
- c) Meander belt and slope stability assessments will be completed in accordance with MNR guidelines.
- d) Determine minimum stream corridor based on the erosion hazard using meander belt width and slope stability assessments and other safety factors, as appropriate. The corridor sizing will build upon the procedures followed by CH and CVC in their generic regulation mapping. The intent is to provide a conservative representative corridor width, with the recognition that it would be refined at the EIR stage.

The erosion hazard assessment must be completed by a licensed qualified professional fluvial geomorphologist, geotechnical engineer and/or water resources engineer. Climate change should be taken into account when planning creek block widths.

Hazard land identification and assessment for existing and proposed conditions and the geomorphic erosion assessment must be completed to the general satisfaction of the SWTAC.

5.0 Geomorphologic Assessment

Characterization

One of the objectives is to protect stream morphological and fluvial character; restore, where appropriate and feasible, sinuosity; maintain physical habitat attributes (pools, riffles etc.), diversity and fluvial processes (bedload transport, energy reduction through sinuosity, etc.); and prevent increase in erosion and deposition, through maintenance of hydrological regime. Characterization of each reach within the subwatersheds should be consistent with the CA's Fluvial Geomorphic Guidelines. Based on the morphological attributes of each channel reach, determine the physical and biological health of the watercourses.

Background Review and Field Work

Background information on the Primary Study Area will be collected from all available sources and by field inspection, including but not restricted to the following:

A geomorphic assessment must be completed by a qualified fluvial geomorphologist.

- Determination of drainage network areas divided into subcatchment areas, preliminary calculations of drainage densities and frequencies, stream orders etc.
- Update of the historical analysis of reaches with attention being paid to land use changes, channel changes, and migration rates derived from aerial photographs.
- Reach delineation based on scientifically defensible methodology (see CVC's Fluvial Geomorphic Guideline -Fact Sheet IV)
- Preliminary determination of reach sensitivity and overall classification.
- Rapid assessment to evaluate stability of reaches based on acceptable rapid assessment protocols
- Define erosion thresholds based on scientifically defensible models.
- Detailed site survey of bankfull conditions and channel profile.

Analysis

A geomorphic analysis will be conducted to determine the character and behaviour of the subwatershed. The steps involved in the analysis include:

- a) The Project Consultant will identify, by field inspection, sites where stream bank erosion and slope instability is present and/or should be considered in the impact assessment report.

- b) Complete rapid field assessments while walking the entire subwatershed drainage network, and documenting areas sensitive to erosion, and any significant field conditions, i.e. bank erosion, slumping, woody debris jams, scour pools, depositional areas, age of point bar vegetation, etc. Photographs of significant features will be required.
- c) Describe the form and stability of the system through analysis of historical aerial photographs and standard classification methods as directed by the SWTAC (e.g. Index of Stability (Downs 1995), Rapid Geomorphic Assessment (Ontario Ministry of Environment, 2003) Rapid Stream Assessment Technique (Galli, 1996), or other suitable methods in consultation with the SWTAC).
- d) Analyze downstream trends in channel morphology and factors affecting stream stability, including any historic changes in flow regime.
- e) Evaluate drainage network (density) on a sub-catchment basis, including an evaluation of channel functions, such as the supply, movement and storage of sediment.
- f) Document the location and nature of sediment sources.
- g) Ensure data is collected that enables proper determination of opportunities and constraints, including stream corridor delineation following protocols used in generic regulation mapping and Provincial Policy Statement protocols.
- h) Complete a sensitivity analysis of the headwater channel systems.
- i) Ensure linkages (e.g., relating channel form/stability measures to biological integrity measures) between fisheries, stream morphology and other disciplines are maintained.
- j) Measurements of channel and bank characteristics and bankfull flow conditions should be carried out using standard protocols and known field indicators of the bankfull stage. Please include bankfull channel widths and depths.
- k) Surficial channel bed materials should be analyzed using a modified pebble count method; where surficial materials are too fine for a pebble count, bulk samples should be collected and analyzed using standard sieve and hydrometer techniques.
- l) Sub-pavement materials should be characterized using bulk samples and standard sieve and hydrometer techniques.
- m) An evaluation of the bank vegetation, rooting depths, materials, percentage of cover and in situ shear stress for both banks at each detailed site.

- n) A level survey encompassing the detailed site should then be conducted to provide an idea of the local energy gradient present in the reach.
- o) Installation of a monitoring site with permanent monument pins which can be revisited and re-measured for historical changes in the cross sectional area of the channel.
- p) Detailed cross-section surveys using level surveys and monumented pins should be used for measurement of cross-section change. The detail of the survey should be fine enough to track changes (erosion, aggradation). This method is preferred over the erosion pin method due to the limitations of erosion pins and the potential disturbance caused by the installation of the pins.
- q) The Project Consultant will estimate erosive velocities and identify, using the hydraulic study results, sites that may be subject to erosion under existing and post-development conditions and will undertake a flow duration exceedance analysis based on existing, future and ultimate conditions.
- r) The Project Consultant will identify flow constraints, which may avoid or reduce future bank and bed erosion problems.
- s) Complete hydraulic and geomorphic analyses and empirical relations from collected field data. This would include, but is not limited to bankfull discharge, tractive force, permissible velocity, stream power, sediment transport, and hydraulic geometry relations.
- t) Assess cumulative headwater functions through assessing sediment budgets, linkage with local hydrology and connection to larger scale, including input from supporting disciplines (e.g., TSS data from water quality; flows from hydrology; spot flow data from hydrogeology; habitat input from fisheries).
- u) Determine drainage density targets from CVC 1:10,000 stream layer mapping. Compare against regional values and provide targets on a sub-catchment basis.
- v) Determine maximum stream corridor using meander belt width and other safety factors. The meander belt width delineation will build upon the procedures followed by CH and CVC in their generic regulation mapping. Meander belt widths should be determined at a landscape level. These widths are to be evaluated and refined as appropriate at the detailed design stage.
- w) Define erosion thresholds based on scientifically defensible models. A range of models should be applied to assess model sensitivity and gain a better understanding of the range of erosive conditions. Modeled results should be compared to actual field observations.
- x) For any natural channel design needs and creek crossing refer to appropriate CVC's Geomorphic Fact Sheet.

Impact Assessment

Similarly, in undertaking the impact assessment both the geotechnical and fluvial geomorphic characteristics of the systems must be considered. Where modifications to the existing system are proposed, detailed geotechnical and fluvial geomorphic analysis is expected based on MNR, Conservation Authority and industry standards.

Implementation and Monitoring

This study component should include provisions for recommendations relating to watercourse system attributes to provide guidance for open space blocks and design guidance for the stream rehabilitation opportunities. Climate change should be taken into account when completing the erosion threshold analysis and planning creek block widths.

Undertake an erosion potential analysis based on the erosion data collected to understand the erosion processes that are occurring, identify areas which are highly prone to erosion or where structures may be at risk, and determine the threshold flows for erosion at strategic points in the subwatershed.

6.0 Hydrogeology

Background Review and Field Work

Background information on the Primary Study Area will be collected from all available sources and through field investigation, including but not restricted to the following:

- a) Regional ground water studies (technical reports, pumping tests, geophysical surveys, etc.)
- b) Soils reports and geotechnical investigations
- c) Surficial soils, overburden geology and bedrock geology of the area
- d) Existing well records, groundwater level and quality datasets (e.g.: MOE Water Well Record Information Database and Provincial Groundwater Monitoring Network, geotechnical borehole data, etc.)
- e) Groundwater taking and use (e.g.: MOE Permit to Take Water Database, Water Taking Reporting System Database, etc.)
- f) Complete a house to house private water well survey to document pre-construction water level and water quality conditions
- g) Reports of contamination and complaint files (MOE)

- h) Once the background review is complete, outline data deficiencies and propose field investigation to remedy the data deficiencies
- i) Carryout field investigation, including drilling, installation of groundwater level and quality monitoring equipment and data collection/analysis, as necessary. Spatial and vertical distribution and locations of the monitors for groundwater monitoring should be sufficient to understand groundwater quantity and quality across the site and in vicinity of wetlands, streams and other surface water features dependent on groundwater discharge, and in vicinity of private wells in surrounding areas, especially downgradient of the proposed development
- j) Field investigation should include piezometer installation adjacent to watercourses on the downstream end of any significant changes in grade or slope in the watercourse or where there is existing vegetation in or adjacent to the watercourse that is known to be dependant on the presence of groundwater seepage

Characterization

The subwatershed study characterization report with respect to hydrogeology should be sufficient to help understand geological and hydrogeological conditions in the area, to determine the key characteristics of the bedrock and overburden systems and their functions in terms of controlling groundwater movement, availability, and quality in the area within the regional hydrogeologic setting. An integral component is to assess the interaction between the groundwater and surface water systems and to determine the overall role or function of this interaction in an ecosystem context. An assessment of the site location in relation to the vulnerable areas delineated through Source Water Protection studies for the Halton and Credit Valley Source Protection Areas should also be completed.

The characterization report should include, but not be limited to the following:

- Map of local physiography, topography and overburden and bedrock geology;
- Map of private water well, monitoring well and borehole locations
- Map local groundwater, levels, flows and quality in all aquifers within the area
- Present construction details of available groundwater monitors
- Estimate zone of influence of the proposed development on groundwater and identify all groundwater receptors within and adjacent to the zone
- Identify existing recharge-discharge zones to help understand and maintain/enhance baseflow and instream water temperature
- Identify groundwater recharge areas

- Identify suitable sites for urban stormwater infiltration to avoid contamination of the water table and/or deeper aquifers
- Determine the groundwater contribution to maintaining the existing natural areas (wetlands, environmentally sensitive areas, etc.)
- The Project Consultant will develop a pre and post development monthly water balance model based on the output of the hydrologic model and the hydrogeology of the area. The budget should include a monthly estimate of precipitation, evapotranspiration, runoff and recharge
- Determine groundwater quality in the area prior to development. Recent Source Water Protection studies show increasing trends in chloride, sodium and nitrates in Georgetown municipal wells. Special attention should be paid to these parameters

Analysis and Impact Assessment

The purpose of this assessment is to:

- a) determine the groundwater contribution to baseflow and to the natural systems (wetlands, streams, etc.)
- b) determine the quantity and quality of groundwater resources in pre, during and post construction scenarios
- c) determine potential changes to shallow and/or deep groundwater systems with respect to groundwater quantity and quality due to proposed development including site servicing and the proposed land use change
- d) determine the impact on groundwater levels relating to private wells
- e) determine any impacts on the permitted groundwater takings in the area
- f) determine the extent of the predicted groundwater impacts by the proposed development on the on- and off-site natural features such as: wetlands, streams and other natural areas
- g) determine how to protect groundwater quality from degradation by surface activities or artificial recharge
- h) determine changes to water budget due to proposed development
- i) determine recharge and discharge areas
- j) identify those recharge sites which are suitable for urban stormwater infiltration (i.e. avoid contamination that could impact groundwater receptors).

In order to meet these objectives, the Project Consultant will:

- a) review and assess all available information on the hydrogeology of the area

- b) using existing information, prepare geologic mapping of the aquifer system together with appropriate cross-sections;
- c) prepare hydrogeologic mapping including aquifer distribution, recharge and discharge areas, water table and potentiometric surfaces, flow directions, cross-sections, existing problem areas and permit to take water holders;
- d) calculate water budget and aquifer characteristics;
- e) consider using numerical groundwater flow modelling tools for the assessment;
- f) in conjunction with the findings from the Hydrology section, determine the groundwater contribution to maintaining baseflow and to maintaining the natural systems (wetlands, etc.);
- g) set targets for infiltration runoff to maintain or enhance baseflows;
- h) determine the effect of existing and proposed municipal wells on ground water and surface water quality, quantity and stream baseflow;
- i) determine what areas are susceptible to ground water contamination and recommend what land use or management practices should be applied to these areas;
- j) identify opportunities for urban stormwater infiltration (avoid contamination of regional groundwater table).

Implementation and Monitoring

The impact assessment results will be used to generate development scenarios that incorporate infiltration opportunities and water conservation techniques to enhance or maintain groundwater levels and quality. Consider using numerical groundwater flow modelling tools to simulate these scenarios. Plan underground servicing and building foundations away from major aquifers where possible, and propose construction techniques to minimize or eliminate interference with local aquifers.

Propose and carry out groundwater level and quality monitoring program in the pre, during and post construction scenarios in the aquifer systems.

Propose a plan to manage and protect groundwater resources and recommend a long term monitoring program to evaluate the effectiveness of the plan, and allow for adaptive management measures.

7.0 Water Quality

Background and Characterization

This component is intended to provide a characterization of the existing water quality, including temperature, within the Primary Study Area. This section should note existing sources of pollution and document impacts of existing land use.

Background information and reports will be utilized in the characterization of existing water quality conditions in the Primary Study Area. All relevant documents and data will be collected and reviewed to determine their applicability in assessing the existing water quality conditions in the subwatershed. Data sets to be reviewed include:

- Water chemistry data from Provincial Water Quality Monitoring Network (PWQMN);
- Water chemistry and water temperature data from CVC's Integrated watershed Monitoring Program and Conservation Halton's Long Term Environmental Monitoring Program;
- Silver Creek Subwatershed Study Characterization Report.

Characterization and impact assessment should focus on the Parameters of Concern (POCs) listed in Table 1.

The characterization should include a summary of water chemistry statistics focused on the parameters of concern (Table 1). Trend analysis on background historical datasets should also be completed (e.g. PWQMN datasets). A spatial and temporal characterization should also be completed on water chemistry and thermal data available from background reports in the Primary Study Area (and appropriate downstream locations) to determine data gaps in predevelopment monitoring data.

Identification of monitoring data gaps would help in determining sampling locations and frequency of additional monitoring to establish pre development conditions. The water chemistry sampling needs to include both wet (flow weighted event sampling) and dry grab sampling over multiple seasons. Thermal monitoring will be conducted using continuous temperature loggers.

Predevelopment characterization would include analysis from historical data and monitoring conducted under this study.

Water Chemistry and temperature targets are to be developed to ensure that existing water quality conditions are maintained or enhancement (enhanced where possible).

TABLE 1 WATER QUALITY PARAMETERS OF CONCERN		
Parameter	Sub-Parameter	Watershed Significance
Flow Regime	Flow	<ul style="list-style-type: none"> Water flow rates affect pollutant wash-off and transport Flow variations affect channel stability and fish habitat
Water Temperature	N/A	<ul style="list-style-type: none"> Water temperature targets are necessary to maintain or enhance healthy cold, cool and warm fish communities. Temperature affects many physical and biological water quality parameters Affected by climate change
Nitrogen Species	Nitrates	<ul style="list-style-type: none"> Related to total population discharging treated sewage Related to farming extent and intensity Groundwater, point and non-point sources Nutrient affecting algae growth, potentially toxic to aquatic life and a drinking water issue in groundwater
	TKN	<ul style="list-style-type: none"> Total Kjeldahl nitrogen (TKN) is a parameter that is frequently used as an indicator of industrial pollution and sewage. This parameter includes nitrogen from ammonia, amino acids, polypeptides and proteins
Total Phosphorus	Total Phosphorus and Soluble Reactive Phosphorus	<ul style="list-style-type: none"> Related to total population discharging treated sewage Related to farming extent and intensity Nutrient affecting algae growth Point and non-point sources (Management parameter for point sources – Policy 2)
Chloride	N/A	<ul style="list-style-type: none"> Related to urban population and road density Potentially toxic to fish and a drinking water issue in groundwater Environment Canada recommends road salt to be regulated as a toxic substance
Metals	Copper	<ul style="list-style-type: none"> Relates to specific source depending on metal – background mineral, urban runoff or point source
	Zinc	
Suspended solids	Total Solids Suspended Solids	<ul style="list-style-type: none"> Many pollutants associated with sediment Sediment can affect fish directly and fish habitat Sediment load affects channel erosion

Background Review and Field Work

Background information on the Primary Study Area will be collected from all available sources and by field inspection, including but not restricted to the following:

- a) Water temperature data should be analyzed and presented using the Cindy Chu nomograms found in the following reference:

Chu, C., N.E. Jones, A. R. Piggot and J.M. Buttle. 2009. Evaluation of a Simple Method to Classify the Thermal Characteristics of Streams Using a Nomogram of Daily Maximum Air and Water Temperatures. North American Journal of Fisheries Management 29: 1605-1619.

- b) Other water quality parameters to be assessed include parameter in Table 1.
- c) Water quality samples should be collected at least three times during baseflow conditions and at least four times during wet weather conditions.
- d) Water temperature samples should be collected using properly calibrated water temperature data loggers set to record water temperatures every 15 minutes from May 15 – September 15th. Air temperatures for the corresponding period of time should be collected at the closest air temperature monitoring station.
- e) Analysis of all water quality parameters should be undertaken with reference to federal and provincial water quality objectives for aquatic life. Water quality target should be based on the desired long term condition of the water quality in the creeks within the Primary Study Area.

Analysis

The water quality assessment tasks associated with this study include:

- a) Develop water quality assessment tool to quantify changes in water quality conditions in the Primary Study Area resulting from the proposed development scenarios. Modeling scenarios could include existing conditions (pre-development), various development scenarios and best management practice scenarios. A climate change modeling scenario may also be required to meet study goals and objectives;
- b) Identify pollution sources, loading and source control measures, both short term and long term from different land uses in the Primary Study Area;
- c) Targets for stormwater quality discharge should be determined based on downstream ecosystem needs. It is anticipated that Enhanced Treatment is required;
- d) Incorporate the proposed stormwater management facilities (including end of pipe, LID and pollution prevention techniques) into the post-development model and select the sizes of the facilities to conform to established targets;
- e) Evaluate and recommend thermal mitigation techniques to mitigate impacts from land use changes in the Primary Study Area on in-stream water temperature to meet study goals and targets;
- f) Each of the subwatershed management options shall be evaluated to determine preferred subwatershed strategies. The Subwatershed Team will recommend a comprehensive plan for the evaluation of the management options, which will form part of the subwatershed study. Options such as alternative development forms/patterns, LID, stormwater and general best management practices,

rehabilitation and retrofitting of existing features, should be considered in the subwatershed management options;

- g) Identify preferred development/BMP's.

Impact Assessment

Urban Development leads to a major change in the water budget and the quality of the runoff. Different development scenarios (which may include a predevelopment, future land use, future BMP mitigation and future climate change scenarios) will be evaluated using a Water Quality modeling tool to determine how varying development practices affect the rate and volume of runoff, infiltration and subsequent water quality. The parameters of concern listed above in Table 1 will be included in the model to evaluate the effectiveness of the future land use/ BMP scenarios. Modeling results for each scenario will be evaluated against established water quality targets to rank scenarios based on their ability to satisfy study goals of protecting, restoring and enhancing water quality.

The Subwatershed Team will investigate potential land use impacts and develop strategies to maintain or enhance instream water quality. Actions to address existing point and non-point sources of pollution resulting in degraded water quality will be developed. BMPs for urban stormwater management will be recommended for all new development to address stormwater quality. The proposed BMPs will be in accordance with the requirements of the Ministry of Environment, the Town of Halton Hills and the Conservation Authorities.

The results from modeling scenarios will be integrated with the results from other disciplines to determine the preferred land use and BMP scenario. Assess development scenarios against water quality objectives. Documentation of the testing methods, interpretation of results and presentation of the preferred alternative will be provided in the Phase 2 Impact Analysis Report.

A thermal assessment should be completed to determine best management and mitigation of thermal impacts of urban stormwater.

Implementation and Monitoring

Provide detailed recommendations to protect or enhance water quality through best management practices and stormwater management measures. Establish a water quality monitoring program to monitor progress and adaptive management measures as feasible. This monitoring program should include the collection of the same water quality parameters assessed during the baseline conditions/characterization monitoring. This data collection should be collected using the same methodologies as the baseline conditions monitoring so that all pre-, during-, and post-construction monitoring results are comparable. The methodologies used to collect water quality data should be well

documented and should be repeatable; demonstrated to yield the same results even if collected by different water quality professionals.

8.0 Fish and Aquatic Habitats

Characterization and Background

Initial assessment work would include existing habitat assessment, spawning survey, benthic inventory and fisheries inventory. Identification of stream baseflow sources and investigation of opportunities for baseflow and habitat enhancement. Identify current sources of degradation. The Project Consultant would work closely with Conservation Halton, Credit Valley Conservation, Fisheries and Oceans Canada and the Ministry of Natural Resources when carrying out this assessment work.

Set targets to ensure maintenance or enhancement, where possible, of stream baseflow and temperatures. Recommend practices and techniques to achieve or exceed targets. Applying recommended practices and techniques, investigate the impact of proposed urban development scenarios.

The composition of the benthic invertebrate community is an ecological reflection of the physical and chemical conditions of the watercourse. Various benthic taxa have well documented responses to water quality conditions; as such they are commonly used as early warning indicators for environmental change and are an essential component of integrated watershed monitoring. The purpose of the sampling program is to characterize conditions under current land use, and thus establish base line data against which future land use scenarios can be assessed. This baseline data will also provide the foundation from which future monitoring programs can be developed.

A desktop review of all available current and historical fish community records is to be compiled for the area. Fish habitat conditions will be interpreted using biological (fish and benthic invertebrates), geomorphologic, hydrological, hydrogeological and water quality data from other components in this study. An inventory of barriers to fish migration and existing on line ponds is to be completed. Reconnaissance of all watercourse stretches within the Primary Study Area should include visual surveys for the presence of spawning and refuge areas and important migratory routes.

Headwater drainage features should be classified with respect to their status as permanent, seasonal or ephemeral watercourses. Headwater streams are to be classified/characterized in accordance with the "Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines" (TRCA, 2009).

All parameters related to aquatic habitat (e.g. stream morphology, riparian habitat, groundwater data, benthic invertebrates, fish community, water quality and quantity) should all be collected at the same sampling locations. Once the data is compiled, data can be compared with each other more easily due to the geographic scope of the sampling locations.

Background Review and Field Work

Background information on the Primary Study Area, and downstream of the Primary Study Area, will be collected from all available sources. Background information on the Primary Study Area will also be collected by field inspection, including but not restricted to the following:

The same sampling locations are to be used in collecting the following data parameters:

- Stream morphology
- Water quantity and quality (TSS, SRP, chlorides and water temperature) – See Water Quality section above
- Water temperature - See Water Quality section above
- Benthic invertebrates
- Fish community.

Sampling locations should be chosen where water flow is anticipated to occur in the months of April, May and June, provided that it is anticipated that the Ontario Ministry of Natural Resources will issue fish collection permits for sampling during these months. It is preferable that the locations be situated at sites that have healthy vegetated stream banks if possible, which are not located near existing road crossings. It is preferable that sites be chosen that exhibit both flat and steeper stream reach slopes.

8.1 Benthic Invertebrates Field Monitoring Methodology

Collection of aquatic invertebrate community samples at an appropriate number of locations using the Ontario Benthic Biomonitoring Network Protocol (MOE).

Identification of the invertebrates in the sample should be undertaken to the species level and the data is to be analyzed using the following indices:

- a) % EPT
- b) Shannon Weaver Index
- c) Taxa Richness
- d) Hisenhoff Index
- e) % Oligochaeta
- f) % Chironomidae
- g) % Isopoda
- h) % Gastropoda
- i) % Dipteran
- j) % Insect

The following table is to be used to determine the relative health of the sites:

Water Quality Index	Unimpaired	Possibly Impaired	Impaired
EPT	>10	5-10	<5
Taxa Richness	>13		<13
% Oligochaeta	<10	10-30	>30
% Chironomidae	<10	10-40	>40
% Isopoda	<1	1-5	>5
% Gastropoda	1-10	0 or >10	
% Diptera	20-45	15-20 or 45-50	<15 or >50
% Insect	50-80	40-50 or 80-90	<40 or >90
HFI	<6	6-7	>7
SDI	>4	3-4	<3

Aquatic invertebrate samples should be collected for at least two years prior to development. Each sampling event should occur in the spring months, typically in April or May, when water flow is robust with cool or cold air and water temperatures.

8.2 Fish Community

- Fish community information should be collected in accordance with Sections 1 and 3 of the Ontario Stream Assessment Protocol Manual. Fish community samples should be collected in May or June when there is likely to be a greater abundance of flow, which will make fish sampling more feasible.
- Fish community abundance should be analyzed to provide a comprehensive explanation about the health of the fish community. Efforts should be made to analyze the fish community data with specific references and comparisons drawn to other data sets (e.g. benthic invertebrates, stream morphology, riparian vegetation, hydrogeological data and surface water quantity and quality) collected at the same locations.
- Sampling for fish species presence should be quantitative. It is expected that the Ontario Stream Assessment Protocols would be followed precisely rather than used as a general guideline.

Impact Assessment

Indicate how the proposed development will affect the productive capacity of fish habitat and the health of fish communities within and downstream of the Primary Study Area.

Implementation

Streams should be characterized as green blue and red streams (Please see other relevant SWS's for appropriate definitions). These characterizations should be combined with other study parameters (e.g. geomorphology, hydrology) to form an appropriate constraint ranking for each stream and/or stream reach.

Monitoring

During and after construction monitoring of benthic invertebrate communities, fish communities and fish habitat should be undertaken using the same methodologies outlined for baseline characterization for corresponding parameters.

8.3 Riparian Habitat

- Riparian Habitat along watercourses should be assessed for a distance of 30 metres from each side of the bankfull channel width of the creek.
- Riparian habitat should be identified as vegetated or not vegetated. In areas where this riparian corridor is observed to be vegetated, the vegetation communities are to be assessed using the ELC protocol to the Vegetation Type level.

Upon consultation with the relevant Conservation Authority, Fisheries and Oceans Canada and the Ministry of Natural Resources, the Project Consultant will appropriately characterize all watercourse and drainage features using integrated background data collected in the field from the following disciplines: Water quantity and quality, stream morphology, benthic invertebrate communities, fish community and riparian vegetation assessment.

- a) Identify existing habitat features which are critical for maintenance of the existing fishery.
- b) Identify existing habitat features which may be presently limiting fish production (e.g. Elevated temperatures, sedimentation).
- c) Using the information obtained, suggest opportunities to enhance fish production as development proceeds. (e.g. infiltration of stormwater, removal of on-stream ponds or structures, placement of spawning gravel over upwelling areas)
- d) Examine fisheries problems and opportunities created under a variety of subwatershed development scenarios.
- e) Through interaction with other disciplines develop a preferred approach which documents habitat maintenance and enhancements.

9.0 Terrestrial Ecology - Natural Heritage Features and Areas

Characterization and Background

1. Undertake a comprehensive, multi-season field investigation of the Primary Study Area to identify and evaluate all natural heritage features and areas, including but not limited to wetlands, forests, successional habitats, grasslands, wildlife travel corridors/ecological linkages, habitat of species at risk, woodlands, valleylands, wildlife habitat, as well as Environmentally Sensitive Areas (ESA's) or other features/areas that may be located within or adjacent to the Primary Study Area. The investigation component should identify both the form and functions (ecological and hydrologic) of the existing natural heritage features/areas as well as the ecological interactions between and among them in sufficient detail to allow for local boundary adjustments through the assessment and implementation phases in keeping with the Regional Natural Heritage System framework established through ROPA 38.
2. Review current evaluation methodologies and confirm approach with SWTAC for use in the subwatershed study as necessary. In particular, any unevaluated wetlands will need to be evaluated using the OWES.
3. Set detailed technical objectives and targets for appropriate preservation, protection and enhancement of natural features and their functions, which will need to be met by the proposed urban development, including any buffer/setback requirements and associated restoration. Specify the best management practices that should be considered to meet these targets. The natural areas should be maintained, restored or, where possible, improved by the proposed management practices.

Background Review and Field Work

Background information on the Primary Study Area will be collected from all available sources and by field surveys, including but not restricted to the following:

- Compilation of natural heritage information from existing sources (e.g. NHIC, Aurora District MNR, Conservation Halton and Credit Valley Conservation species databases, provincial atlas projects, Halton Natural Areas Inventory); master species lists to combine results from background reports with field assessments. Of particular note is the Region of Halton's *Natural Heritage System Definition and Implementation Report*.
- Acquire any necessary permits for sampling (e.g. ESA permit, Wildlife Scientific Collector's Permit) well in advance of planned field season
- Conduct wetland evaluation and assessments according to the OWES and review/utilization of any available evaluations completed by the Ministry of Natural Resources and Conservation Authority.
- Assess significant wildlife habitat (See Methodology – Appendix B).

- Assess significant woodlands (See Methodology – Appendix B)
- Assess species at risk (See Methodology – Appendix B)
- Conduct fish and fish habitat inventories assessment (see above section)
- Identify potential pollution point sources to the stream, i.e. storm outfalls, old dump sites
- Identify enhancement opportunities for all environmental components
- Carry out multi-season inventory of flora and fauna to address any information gaps noted during the background review of previous studies and inventories and update background information as necessary. Undertake targeted surveys for birds, amphibians, reptiles, plants, odonates, butterflies and mammals.
- Conduct ELC of all natural features to Vegetation Type
- Identify existing ANSI's and ESA's
- Review of current study evaluation methodologies and based on consultation with stakeholders, provide recommendations for any necessary revisions to the previous evaluation methodology for use in the subwatershed study and additional information needs.
- A table should be included with the date, time, personnel and purpose of all field work conducted.

Background information from the broader study area should also be consulted to provide an appropriate landscape context.

Analysis

The Project Consultant will:

- a) Review previous studies on the natural heritage systems and areas. The Halton Natural Areas Inventory (2006) and information from CVC should be used to determine species' local status within respective watersheds.
- b) Identify and map all natural and semi-natural vegetation communities, wildlife corridors, wildlife habitat areas, significant wildlife habitat, significant woodlands, significant valleylands, provincially and regionally/locally significant wetlands and Areas of Natural and Scientific Interest (ANSI's) and Environmentally Sensitive Areas (ESA's) that may be located within, or adjacent to in order to provide landscape context, the Primary Study Area.
- c) Define functional relationships between wildlife and natural areas, with particular attention to movement and seasonal habitat requirements. Identify Critical Function Zones around wetlands, from which appropriate setback distances/ buffer treatments would be established.
- d) Where necessary to ensure appropriate level of knowledge/documentation complete inventory of the vegetative and wildlife resources of each area, confirm previous findings;

- e) In conjunction with the Hydrology and Hydrogeology section, determine the water needs of these natural systems and appropriate buffers.
- f) Identify the circumstances, which promote the observed resources and their associated functions. Set targets and recommend practices to ensure their maintenance or enhancement, where possible.
- g) Investigate the impact of the existing and proposed land use changes, municipal wells, and servicing are having and will have on these natural areas and functions. Suggest practices and techniques to maintain the natural resources.
- h) Develop a natural heritage system that incorporates the natural heritage features and areas identified through the subwatershed study process, including restoration and enhancement areas, required to protect or improve the ecological and hydrologic functions of the system for the long term.
- i) Identify opportunities to link isolated natural areas to the Regional Natural Heritage System, where appropriate.

Impact Assessment

An assessment of the impacts of urban development on the size, diversity, health, connectivity, functionality and resilience of natural areas will be completed. The assessment should include potential effects before, during and after development, including but not limited to:

- Direct on-site effects (e.g. encroachment, fragmentation or elimination of habitat, tree removal, enhancement and/or restoration of existing features).
- Indirect effects (e.g. sediment transport downstream, diversion of water flows, ponding, changes in volume of surface runoff)
- Effects on the ecological characteristics of the entire natural area (e.g. loss of habitat, edge effect, change in habitat)
- Short-term and long-term effects
- Secondary effects (e.g. changes to the aesthetic qualities or educational value of the area, obstruction of greenway connections, effects on adjacent natural areas)
- Cumulative impacts

The following issues should be explored in relation to the proposed development:

- The significance of features and functions of the natural area and how the development will affect them
- The sensitivity of the features and functions of the natural area and how the development will affect them
- The potential impacts to the area and the likely duration of the impacts
- The apparent impacts of previous developments or land use activities on the natural area/feature and/or function (e.g. trails, dumping, excavation and fill, exotic and/or invasive species)

- The methods used to determine the effects of the development
- Ecological studies should incorporate relevant information from geotechnical and stormwater studies (and visa versa) for a comprehensive understanding of the potential impacts to the site features

Secondary sources must be consulted and referenced and/or methodologies used to determine impacts must be explained to support the assessment of impacts on natural areas. Statements such as "no impact" or "low impacts" need to be qualified with references or empirical data.

Implementation and Monitoring

Recommend practices and techniques to mitigate development impacts and restore the natural ecosystem to the extent possible. The preferred hierarchy applied to the consideration of development impacts on natural features/functions is avoidance, mitigation, compensation/ restoration. Recommendations on appropriate setbacks and buffer treatments will be a key component of this section. Other potential mitigation techniques include, but are not limited to, fencing and complementary adjacent land uses.

The Project Consultant will recommend a monitoring program (pre, during and post construction) to evaluate the effectiveness of the plan recommendations and allow for adaptive management response. The monitoring will include, but not be limited to, the following:

- Wetland hydrology
- Forest health
- Wildlife response
- Vegetation community changes (e.g. succession, invasive species)
- Encroachment

The first round of monitoring should be conducted as a component of the Subwatershed Study to establish baseline conditions at permanent/long-term monitoring stations. Post-construction monitoring should continue for a minimum of 5 years after 100% build out, on a schedule to be established in consultation with the SWSC. All natural/semi-natural features identified in the characterization stage of the Subwatershed Study must remain on the landscape until such time as their future status has received final approval from all agencies.

10.0 Additional Background Review

Municipal and Land Use Planning

- existing and future land use
- Official Plans and Zoning By-laws
- Population projections, population densities
- Planning and development studies

- Existing and future transportation corridors
- Provincial Policy Statement

The background review will include all relative reports and information sources.

- a) The Project Consultant will lay out a frame work for the organization, management and presentation of resource data.
- b) The Project Consultant will identify all wetlands, ponds, drainage paths, and defined watercourses using aerial photos and field inspections. During the field inspections, the Project Consultant will also observe and comment on existing land uses, vegetative cover, quantity of flow, wildlife and fish habitat and pollution sources.
- c) Data deficiencies should be identified and requirements for field monitoring of specific parameters or characteristics to augment the data base should be made. Standards will have to be specified for collection of additional data. Additional field data shall be collected where necessary and added to the existing databases such that the level of detail will support the decision making process of the subwatershed study.
- d) Consideration should be given to post development monitoring requirements when sighting locations of additional stations. Additional data requirements identified by field survey.
- e) The Project Consultant will prepare a base map of the Primary Study Area which can be used throughout the study to overlay subwatershed attributes and plan components.
- f) After carrying out the review, the Project Consultant will prepare a background report which will:
 - summarize the findings of the review;
 - formulate an issue and problem statement;
 - prepare a detailed work plan for the study.

The background report should be prepared in such a way that it can be used as introductory chapters in the final study report (see Schedule A).

- g) The Project Consultant will work closely with the SWTAC chairman and members of other on-going studies.

11.0 Relationships Between Study Components

The Subwatershed Study will define relationships between Primary Study Area components/parameters required for the description and assessment of the overall

natural heritage system. The study will also assess the impacts of different plans on these relationships based on an integrated approach.

12.0 Overall Land-Water Management

The Subwatershed Study will receive and utilize information on existing and future land use, as per Regional Official Plan Amendment No. 38, and complementary Southwest Georgetown Integrated Planning Project studies. The Study will relate proposed land use to subwatershed resources, and identify isolated resource areas and opportunities to link isolated areas to main corridors as part of the refinement of the Regional Natural Heritage System. The study will also comment on land use scenarios that will meet future land use needs while minimizing impacts on the natural heritage system.

13.0 Overall Implementation and Monitoring Plan

The monitoring plan needs to refer to all appropriate targets for study parameters assessed. The parameters all need to be assessed quantitatively and they must be assessed using accepted protocols that are demonstrated to be repeatable. During and post construction monitoring reports need to communicate whether the development designs and associated mitigation measures are having an effect on the environmental parameters being assessed. Monitoring must also communicate whether environmental targets for all parameters assessed are being met or whether these targets (thresholds) are being exceeded. Recommend an implementation strategy, including phasing, cost sharing, public awareness program development, public land acquisition, enforcement and updating. Recommend an adaptive environmental management plan and monitoring program (pre, during and post construction) to measure the plan's success and to provide recommendations for potential future mitigation of residual or unanticipated negative impacts. Also determine appropriate duration of construction after that the post construction monitoring should be initiated. Set up monitoring stations and implement first round of surveys to establish baseline conditions.

14.0 Formation and Evaluation of Subwatershed Management Plans

Subwatershed Synopsis

- a) The Project Consultant will summarize the targets, constraints and opportunities identified in the subwatershed Synopsis:
- land use targets and constraints
 - natural/semi-natural cover targets and constraints
 - recreation targets and constraints
 - flood flow and volume constraints for flood and erosion control
 - constraints on urban development to meet flows and volume targets
 - susceptibility of groundwater to contamination from urban stormwater infiltration

- potential recharge and discharge zones to maintain/enhance baseflow and water temperature in the stream
- existing sources of pollution and corresponding remedial action
- water quality targets based on stream use
- constraints on urban development to maintain/enhance water quality
- circumstances which promote the target fish species
- constraints on urban development to enhance fish habitat
- natural heritage system and associated restoration opportunities (including, but not limited to, wetlands, environmentally sensitive areas, stream corridors, Conservation Authority regulated areas, ANSIs, ESA's)

Watershed Targets and Opportunities

- b) The Project Consultant will consolidate the list of targets and constraints to fulfill the subwatershed Goals and Objectives.

Plan Development

- c) Using constraint analysis, develop a natural heritage system and stream corridor management boundary for the streams and other natural heritage features within the subwatersheds, with consideration for adjacent features. The stream corridor should be determined so as to include natural, cultural and historic features where protection and preservation is important to meet the goals and objectives of the study. Features to be included are floodplains, wetlands, woodlands, erosion prone areas, significant wildlife areas, ecologically important areas and all related buffers.
- d) The Project Consultant will prepare a list of Conservation Practices, based on applicable Federal, Provincial, Watershed/Conservation Authority and Municipal policies, guidelines, and objectives, which address stream flow, water quality, wetlands, fisheries, soil erosion and other general natural resource conservation requirements. (This list is intended to be used as a guide and starting point in formulating alternative plan components).
- e) The Project Consultant will investigate alternative measures and techniques to address targets and constraints for flooding, erosion, water quality, natural resources and terrestrial and fish habitat under present and future conditions. These measures may include:
- the identified conservation practices and variations on them
 - programs and works to address existing problems
 - considerations for type, density, and location of development
 - works to be incorporated during individual site development
 - centralized works to be implemented prior to development

- f) The Project Consultant will combine various measures and techniques to formulate alternative plans which will meet the Subwatershed Plan Goals and Objectives.

Final Subwatershed Plan

- g) the Project Consultant will evaluate and compare each of the plans. The evaluation will be based upon:
- a) how well the Study's goals and objectives are met;
 - b) environmental impacts of each plan (physical, natural and social).
- h) Review and analyze applicable Provincial, Regional, Municipal and Conservation Authority plans and policies to ensure that any recommended subwatershed management plans are consistent with the existing plans and policies.
- i) Recommend a preferred plan.

15.0 Implementation Plan

A detailed subwatershed management implementation strategy will be developed for the preferred development scenario based on the Phase 2 evaluation of a range of subwatershed management options, using the subwatershed goals, objectives, targets. The Project Consultant will identify additional studies to be completed in support of future planning phases, as required to meet the objectives and targets of the Subwatershed Study.

The implementation strategy will include but not be limited to:

- phasing of required works;
- public awareness program;
- reflecting the appropriate implementations and directions in the Secondary Plan, Block Plan, Zoning By-law and Draft Plans of Subdivision;
- directions to development proponents on site-specific studies and assessments;
- available plan review mechanisms such as conditions of subdivision draft plan approval, site plan control;
- enforcement measures such as Zoning, Conservation Authority Regulations, Site Plan Agreements and corresponding responsibilities for inspection;
- enhancement programs;
- timing and responsibilities for further study;
- recommend additional plans and studies (e.g. Secondary Plan Level Studies) and Terms of Reference thereof;
- A detailed stormwater management strategy will be determined for future development lands. BMPs will be recommended for site controls and conveyance controls. Conceptual design will be completed for end-of-pipe treatments including required storage volumes, flow targets, generalized land area requirements and locations.

The Phase 3 Interim Report will be provided to the Technical Committee for review including the final draft Implementation and Monitoring Plan identifying actions for each management / monitoring item as well as the anticipated/estimated timeline, responsible party(ies) and financial requirements associated with each item.

16.0 Monitoring

- a) The Project Consultant will recommend a monitoring program (pre, during and post construction) to evaluate the effectiveness of the plan recommendation and allow for adaptive management response, The monitoring will include:
- short and long term station network for streamflow, groundwater elevation and quality, surface water quality and temperature, fish and benthic surveys, as well as stream form, and natural heritage features. Outline timing, duration, the location and duration of monitoring stations
 - Identify targets and adaptive management actions to meeting targets for each phase of development
 - Implement a strategy for corrective actions, which may be necessary based on results of the monitoring program
 - Sediment and Erosion control effectiveness monitoring
 - monitoring and reporting responsibilities, short term and long term
 - sources of long term funding
 - follow-up and enforcement responsibilities tied in with implementation strategy
 - monitoring of fish habitat features

The first round of monitoring should be conducted as a component of the Subwatershed Study to establish baseline conditions. All natural/semi-natural features identified in the characterization stage of the Subwatershed Study must remain on the landscape until such time as their future status has received final approval from all agencies.

Appendix A – Studies and References

A Guide to Road Ecology in Ontario. 2010. Prepared by the Ontario Road Ecology Group, Toronto Zoo.

Assessing the Degradation Effects of Local Residents on Urban Forests in Ontario, Canada. 2010. McWilliam, W., P. Eagles, M. Seasons and R. Brown. *Arboriculture & Urban Forestry* 2010. 36(6): 253-260.

Birds of Hamilton and surrounding areas: including all or parts of Brant, Halton, Haldimand, Niagara, Norfolk, Peel, Waterloo and Wellington. 2006. Prepared by Robert Curry and the Hamilton Naturalists' Club.

Effectiveness of Boundary Structures in Limiting Residential Encroachment into Urban Forests, McWilliam et al., 2011.

Halton Natural Areas Inventory. 2006. Prepared by Halton/North Peel Naturalists' Club, Conservation Halton, South Peel Naturalists' Club, Halton Region and Hamilton Naturalists' Club.

Study Report: thermal impacts of urbanization including preventative and mitigation techniques, CVC, 2011.

The Herpetofaunal Atlas for the Halton Region. 1999. Prepared by Lori Macadam and published by The Halton/North Peel Naturalist Club.

The Impacts of Urbanization on the Hydrology of Wetlands: a literature review, TRCA, 2011

The Reptiles and Amphibians of the Hamilton Area: An Historical Summary and the Results of The Hamilton Herpetofaunal Atlas. 1994. Prepared by William G. Lamond and published by the Hamilton Naturalists' Club.

Towards a Natural Heritage System for the Credit River Watershed: phases 1 and 2 watershed characterization and landscape scale analysis final technical report, CVC, 2011.

Assessment Report for the Halton Region Source Protection Area, Version 2.1, dated January 26, 2012. Prepared by Halton-Hamilton Source Protection staff.

Assessment Report for the Credit Valley Source Protection Area

Sixteen Mile Creek Watershed Plan, prepared in support of the Halton Urban Structure Plan, February 1996

Sixteen Mile Creek Watershed Plan, Technical Report # 2, Evaluation of Potential Development Impacts, prepared in support of the Sixteen Mile Creek Watershed Plan and the Halton Urban Structure Plan, February 1995

Sixteen Mile Creek Watershed Plan, Technical Report # 3, Regional Hydrogeology, prepared in support of the Sixteen Mile Creek Watershed Plan and the Halton Urban Structure Plan, February 1995

Sixteen Mile Creek Watershed Plan, Technical Report # 4, Natural Environment, prepared in support of the Sixteen Mile Creek Watershed Plan and the Halton Urban Structure Plan, February 1995

Silver Creek Subwatershed Study; Background Report (September 2001), Phase I Characterization Report (August 2002), Phase II Impact Assessment (May 2003), Phase III Implementation Report (July 2003) and Supporting Document: land use scenarios (July 2003). Credit Valley Conservation.

Credit River Water Management Strategy Update Study, 2007, Credit Valley Conservation

Study Report: Thermal Impacts of Urbanization including Preventative and Mitigation Techniques, January 2011, Credit Valley Conservation.

Fluvial Geomorphic Guidelines fact Sheet I to V, Credit Valley Conservation

Stability, Erosion, and Development Setback Components Definition & Determination, July 2011, Credit Valley Conservation

Stormwater Management Criteria-Draft April 2012, Credit Valley Conservation

Appendix B – Terrestrial Field Methodologies

ELC fieldwork will include three season botanical surveys and will result in the identification of significant community types, faunal and floral species, as well as existing levels of disturbance. ELC data cards will be required, which encompass vegetation, wildlife, soils, and human disturbance information. In Summary, the ELC and botanical work will collect/document the following:

- i) Thorough inventory of flora species composition and abundance within vegetation community.
- ii) Vegetation community structure, densities, and age.
- iii) Assessment and evidence of natural and cultural disturbance, and document cultural features (i.e. trails or structures).
- iv) Identification and relative abundance (abundant, occasional, rare – see ELC manual) of disease and invasive species
- v) Note any other natural features. May include but not limited to vegetation community inclusions, old growth, watercourses, swales, seeps, specialized wildlife habitat, and kettle wetlands.
- vi) Identify, map the location, and describe the abundance of locally rare or uncommon species, their location and distribution based upon the *Halton Natural Areas Inventory (2006)*;
- vii) Provide an assessment of the current health of the vegetation considering factors using the Floristic Quality Assessment System (Oldham, Bakowsky and Sutherland, 1995).
- viii) Calculate Floristic Quality Assessment, Coefficient of Conservatism, and Wetness
- ix) Index for vegetation communities
- x) Confirm lands with potential old growth or trees (≈ 100 years or greater).
- xi) Identify the representativeness and rarity of the natural features and functions, by ELC vegetation type, within the context of the Primary Study Area, Municipality, Conservation Halton and Credit River Watersheds, and the Province of Ontario. *Note: Ranking by Rarity in the Province of Ontario as prepared by W. Bakowsky of the Ontario Natural Heritage Information Centre (NHIC)*

Wildlife surveys will utilize the following standard protocols. Where survey methodologies for certain taxa are lacking, consultation and approval by the TAC will be required.

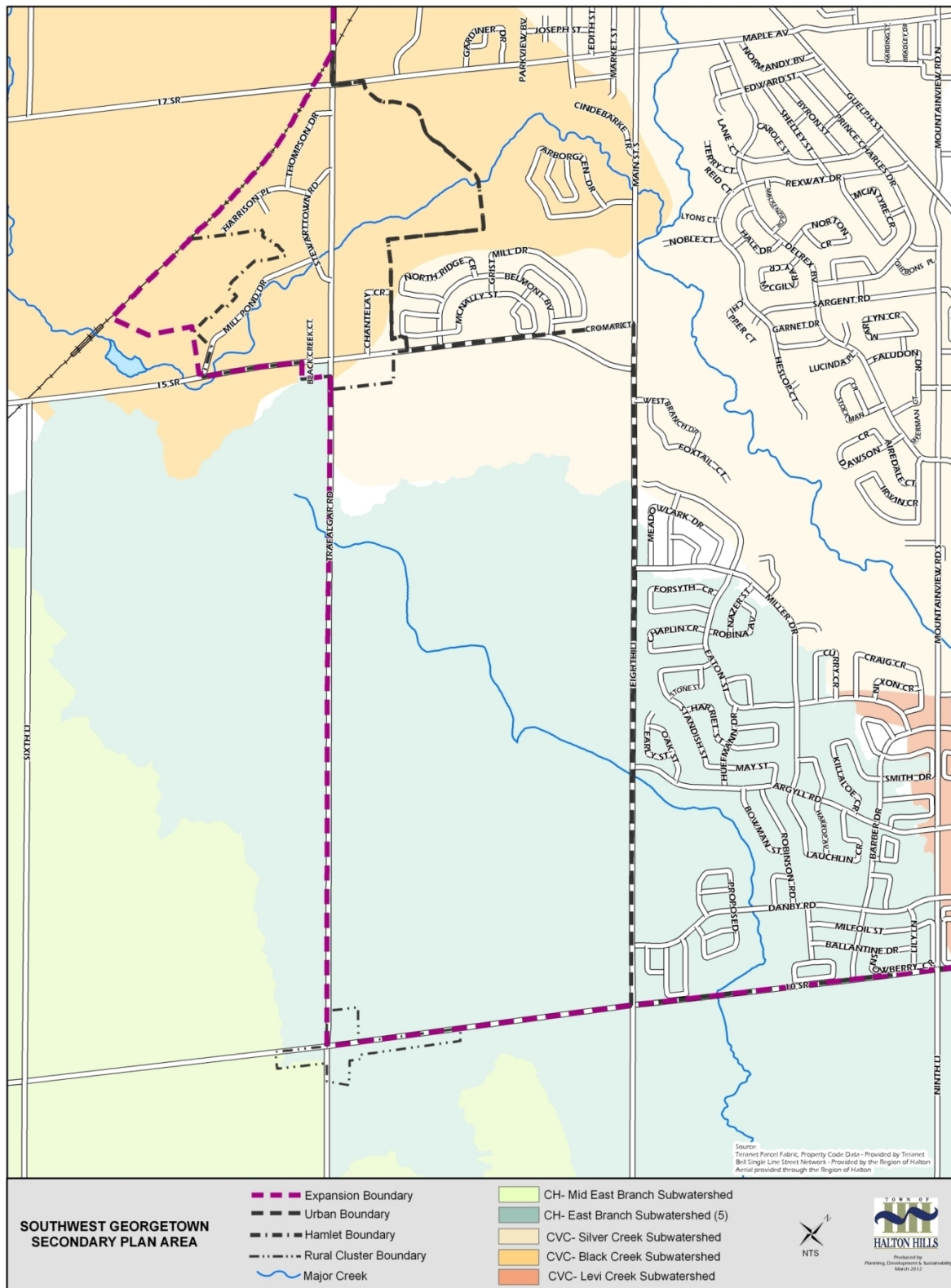
- Winter Wildlife Surveys following the Significant Wildlife Habitat Technical Guide (OMNR 2000) as well as the RISC (Resources Inventory Standards Committee) species inventory methods manual
- Owl and Raptor Surveys during migration and nesting season (Winter 2013);

- Breeding bird surveys in accordance with the Ontario Breeding Bird Atlas protocol (OBBA, 2001), Forest Bird Monitoring Program, (CWS, 2002) or the Marsh Monitoring Program (BSC, 2003);
- Breeding Amphibian Surveys (April, May, June) in accordance with Bird Studies
- Canada Marsh Monitoring Program; and,
- Targeted wildlife surveys for reptiles (snakes and turtles), odonates (damselflies and dragonflies), butterflies, mammals and salamanders; incidental observations of moths and other insects. Survey protocols for these taxa are to be approved by the SWTAC.

Through the wildlife surveys, the following data will be assembled:

- Identification of any rare or uncommon species, their location and distribution based on the *Halton Natural Areas Inventory* as well as Priority Landbird Species as identified by Ontario Landbird Conservation Plan: Lower Great Lakes/St. Lawrence Plain (North American Bird Conservation Region 13), Priorities, Objectives and Recommended Actions (OPIF, 2005);
- Review data against the Significant Wildlife Habitat Technical Guide and associated supporting documents to determine which vegetation communities meet designation criteria for significant wildlife habitat.

Schedule One – Southwest Georgetown Subwatersheds



Schedule Two – Subwatersheds of Halton Hills

