4.0 THE DEVELOPMENT, PLANNING AND APPROVAL PROCESS

The two primary stream of implementation related to land development in the Credit River watershed is the land use planning approval process. In support of this process, a myriad of supporting technical studies, including servicing design, are required to be undertaken. The number and extent of technical studies that are required for a given development proposals depends on the location, size, type and extent of the proposed development. In addition, there are related activities that evolve from both the land use planning and studies. The typical implementation process included in the municipal planning approval process is illustrated in Figure 4.

The planning process for development proposals in the Credit River watershed includes the following steps:

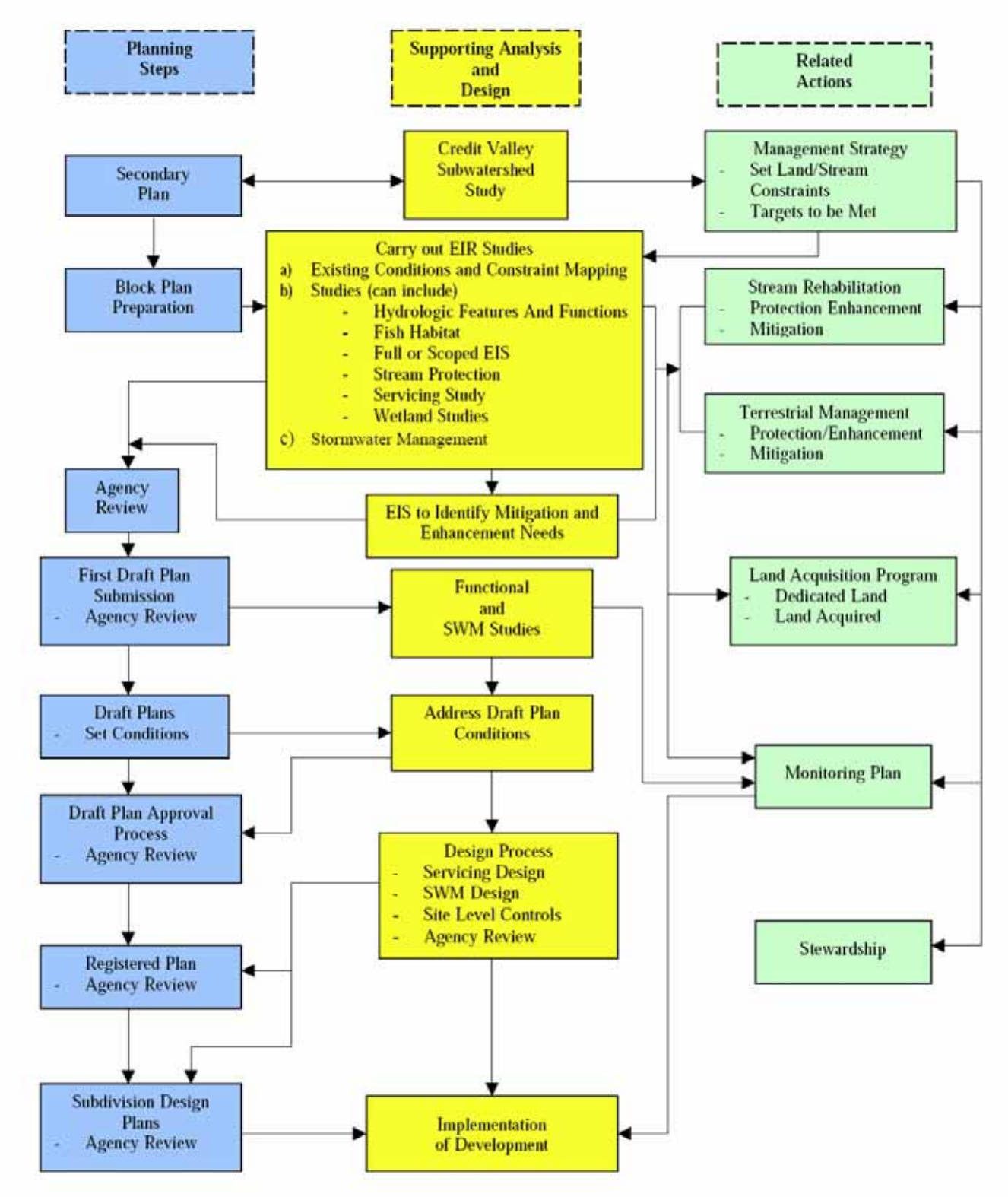
- Secondary Plans;
- Block Plans;
- Draft Plan;
- Plan Registration; and
- Subdivision Design Plans.

Some of the supporting studies related to water management that may be required for various proposals include:

- Subwatershed Studies;
- Servicing and Settlement Master Plan
- Landscape Scale Analyses;
- Environmental Implementation Reports (EIRs);
- Functional Servicing Reports
- SWM Design and Implementation Reports;
- Erosion and Sediment Control Plans; and
- other studies.

This section outlines CVC's requirements from a stormwater management perspective and provides guidance on the studies required and related actions.

Figure 4: Implementation Process



4.1 Planning Process

Land use planning involves the management of land and resources with municipalities setting goals for growth and development and the approaches to achieve these goals. Land use planning is intended to balance the interests of individual property owners with the wider interests and objectives of the whole municipality.

The planning process involves making decisions on planning applications where the municipality or planning board is the approval authority. The *Planning Act* provides municipalities, planning boards and review agencies with a framework to promote the orderly development of land. The *Planning Act* promotes sustainable economic development in a healthy natural environment within a provincial policy framework. It guides land use planning decisions in Ontario as well as the establishment of local policy that is consistent with provincial requirements. In this regard, Section 3 of the *Planning Act* allows the Province to develop and implement detailed policies for those matters considered to be of provincial interest.

The municipal role under the *Planning Act* includes making local planning decisions that will determine the future of communities. In addition, municipalities prepare planning documents, such as Official Plans, which set out the municipality's general planning goals and policies to guide future land use, and zoning by-laws, which set the rules and regulations that control development as it occurs.

Conservation Authorities are commenting agencies under the *Planning Act* relating to their responsibilities under the *Conservation Authorities Act*. CVC provides advice to municipalities on natural heritage and natural hazards to assist in land use decisions. The Memorandum of Understanding (MOU) with the Ministry of Municipal Affairs and Housing (MMAH) and the Ministry of Natural Resources (MNR) clarifies the role of Conservation Authorities under the One Window Planning System with respect to natural hazards.

CVC has natural heritage advisory service agreements with many watershed municipalities. The Authority provides information, advice and expertise in support of provincial and local policies for the review of applications under the *Planning Act*, including Official Plan and zoning by-law amendments, site plans, subdivision and condominium plans, severances and minor variances. CVC also provides comments on *Niagara Escarpment Act* and *Environmental Assessment Act* applications.

The Figure 2.1 illustrates the relationship of environmental planning studies to the municipal planning process. Environmental planning studies such as subwatershed studies, Environmental Implementation Reports, and Stormwater Management Reports are prepared in support of municipal land use studies and plans to help guide land use decisions and streamline the review process.

4.2 Planning Components

4.2.1 Subwatershed Studies

The Subwatershed Planning process can be broken down into four separate but linked phases. Figure 4.1 illustrates and lists the key questions that are addressed in each phase.

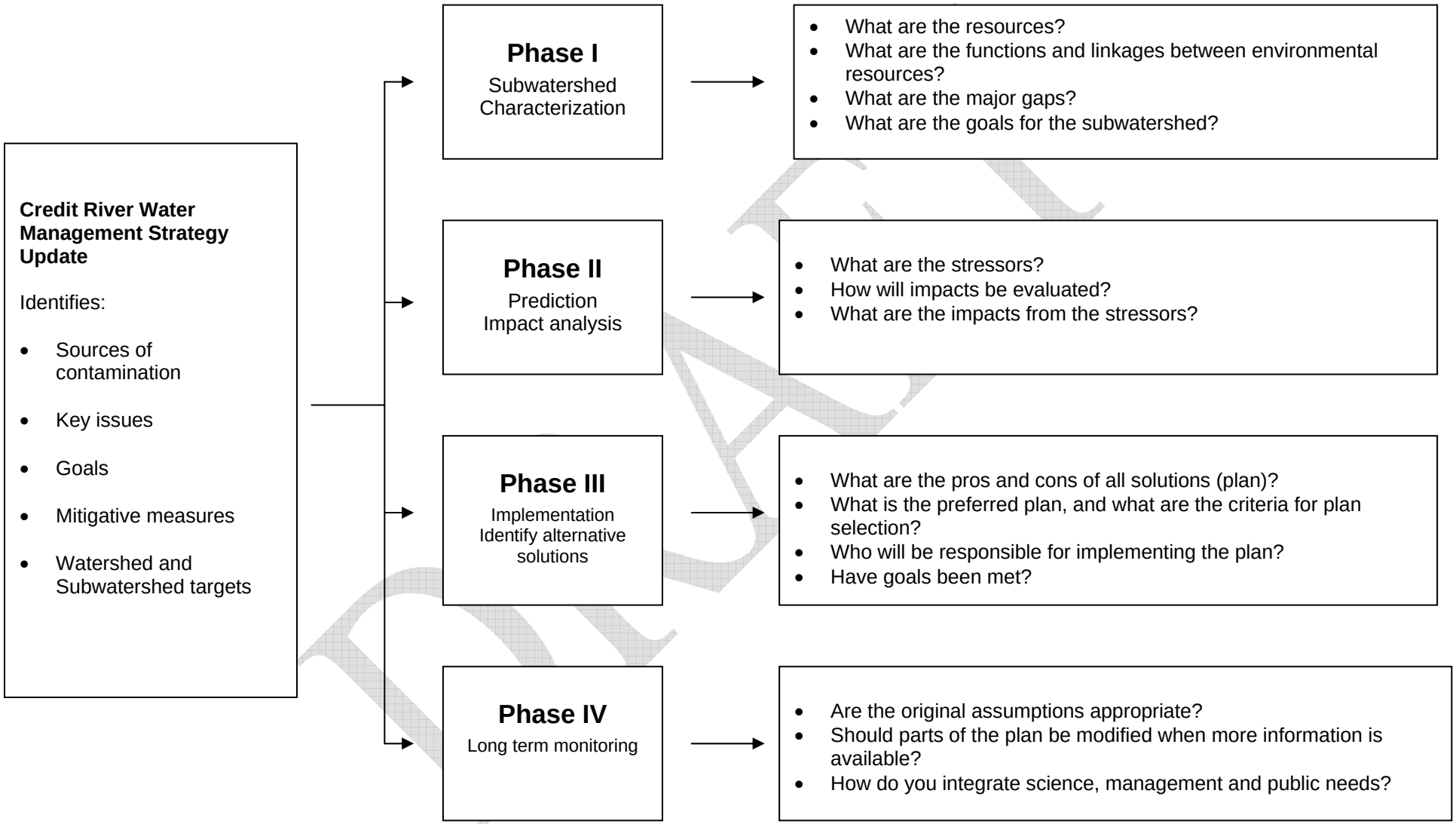
Phase 1 of a subwatershed study is Subwatershed Characterization. In this phase the resources of the subwatershed are described and assessed by various study disciplines (i.e., hydrology and hydraulics, hydrogeology, water quality, stream morphology, aquatic and terrestrial ecology). Background and supplemental field data are assessed within each discipline and then across disciplines to establish an understanding of the form, function and linkages of the environmental resources. During this phase, goals and objectives are developed to guide future management in the subwatershed.

Phase 2 of a subwatershed study focuses on Prediction Impact Analysis. Key stressors affecting the health of the watershed are identified, and the future impacts of these stressors (such as land use changes) are predicted for a variety of possible future land use scenarios. Future impacts are evaluated relative to the goals and objectives identified in Phase 1. In some cases computer models (i.e., hydrogeology, hydrology, hydraulics and water quality) are used to predict the future impacts of stressors on the watershed. Information and analysis from CVC's Effectiveness Monitoring Study and other related studies (i.e., Integrated Watershed Monitoring Program, CRWMSU, Credit River Flow Management Study) are used to help calibrate existing conditions and model future scenarios. For other components of the environment, such as terrestrial and aquatic ecology, future predictions are qualitative or conceptual, based on the landscape scale analysis, other subwatershed disciplines (i.e., hydrogeology, hydrology hydraulics and water quality models), experience elsewhere and knowledge of habitat and biota interactions.

Phase 3 of a subwatershed study focuses on the evaluation of alternative solutions and the selection of a Preferred Management Strategy. This is done by evaluating various land use scenarios and selecting a set of management strategies to achieve the identified goals and objectives. The Implementation Plan for the subwatershed identifies specific actions that need to take place in the following categories: Planning (i.e., land use designations and form) and Policy, Rehabilitation and Retrofit, Stewardship, Monitoring, and Research and Development.

Phase 4 of a subwatershed study is Long-Term Monitoring. This evaluates the success of the Implementation Plan over time by assessing whether the assumptions and predictions made were appropriate and determining if parts of the plan should be modified

Figure 4.1: Subwatershed Study Process



Objectives of the Subwatershed Planning Process

The objectives of the Subwatershed Planning process include:

a) To integrate the information and analysis from CVC and municipal Monitoring Program(s), existing subwatershed studies, Landscape Scale Analysis and any other relevant environmental study within the subwatershed boundary (for example any EIRs)

b) To develop specific subwatershed targets consistent with the CRWMSU to:
- Identify key linkage points for conservation given the connected links identified in the Landscape Scale Analysis;
- Establish the appropriate natural cover targets and distribution for the achievement of sustainable ecosystem maintenance (e.g. biodiversity conservation);
- Develop a management strategy to address surface and groundwater quantity (including volume) and quality; and
- Establish land use designations, form and best management practices;

c) To provide delineation, on a reconnaissance scale, of:
- Recharge areas for regional and local groundwater systems;
- The groundwater resource potential for the area;
- Generalized groundwater flow patterns; and
- Water balance/budgets for each subwatershed and/or subcatchment;

d) To integrate information from Municipal, Regional or County planning studies and provide direction to help inform these planning documents;

e) To establish direction for future studies such as Environmental Implementation Reports (EIRs) and storm water management plans (SWM plans)

f) To develop an implementation plan that includes specific implementation schemes (i.e., define areas for protection, conservation, restoration and remediation) and outlines roles and responsibilities to carry out all recommendations that result from this study.

g) To provide a monitoring plan that includes:
- A long-term plan of action and a description of the information required for assessing results of the ongoing CVC and municipal Monitoring Programs;

h) To establish recommendations for stewardship of sensitive areas;

i) To develop a Recommended Plan that includes recommendations for:
- Planning and Policy;
- Rehabilitation and Retrofit;
- Stewardship;
- Monitoring; and
- Research and Development.

4.2.2 Landscape Scale Analysis

Landscape Scale Analysis (LSA) may be done in conjunction with a subwatershed study. The LSA is intended to provide a watershed, regional and intra-subwatershed context for the natural heritage features and functions of the secondary plan-subwatershed study area. It is also used in the refinement of subwatershed targets, goals and scenarios. The LSA for the Northwest Brampton, for example, includes an area 2.5 kilometres greater than the Mount Pleasant Secondary Plan area, and includes the Credit River and Niagara Escarpment in Halton, and the Etobicoke Creek subwatershed in Caledon/Brampton. LSA boundaries may vary by subwatershed and should be defined in consultation with the CVC.

The landscape scale analysis will:

- identify natural features and habitat blocks that lie within the defined LSA study area;
- identify riparian and terrestrial linkages between natural features and habitat blocks;
- identify existing barriers (bridges, roads, railways) that affect the viability of corridors; and
- incorporate the multi-disciplinary information gathered from the subwatershed studies to refine corridor design attributes and habitat block protection, restoration or improvement requirements.

Note: The Landscape Scale Analysis and Subwatershed Study are intended to be interactive and iterative. The data collected in the Subwatershed Study is fed back into the Landscape Scale Analysis to be refined through various land use scenarios in Phase 2 and 3 of the Subwatershed Study.

The LSA Report should summarise the detailed methodology and protocols used and should include Existing Features Maps (ELC), Policy areas, Analysis Maps, System LSA Maps and Finalized Natural Features and Functions. It should integrate the terrestrial and aquatic ecosystems within the LSA Study Area. More specifically, it should assemble information layers to be incorporated in the analysis. This includes the following features and information:

- All existing natural vegetation features to ELC Community Series (Lee et al., 1998), as appropriate (based on remote sensing and roadside verification):
  - Woodlands;
  - Wetlands and ponds and lakes (including extracted, rehabilitated pits and quarries);
  - Meadows and prairie (natural and cultural);
  - Treed areas, hedgerows, orchards, plantations, parks, cliffs crevices, bluffs or any other relevant features collected through subwatershed studies;
  - Floodplain, riparian and valley floor communities; and
  - Physiography (soils, geology, elevation, wetness index);

- Significant Species:
  - Occurrence records of federal (COSEWIC, 2005) and provincial (OMNR, 2004) “Species At Risk” and provincial, regional or local species of conservation concern (OMNR, 2000 and COSSARO) such as CVC bird species of Conservation Concern, etc.;

- Significant Wildlife Habitat:
  - Potential Significant Wildlife Habitat Units that are ecologically important in terms of features, functions, representation or amount of habitat, and which contribute to the quality and diversity of an identifiable geographic area or ecosystem;

- Policy and zoned areas:
  - Policy areas (including wetlands, ESAs/ANSIs and Greenlands);
  - Public and Private open space (e.g., schools, golf courses, etc.);
  - Cultural or natural features (e.g., roads, dams, bridges, rail lines, hydro and gas corridors, stormwater management ponds and other infrastructure);
  - Agricultural lands (intensive and non-intensive);
  - Urban lands (development barriers for wildlife); and
  - Licensed Aggregate properties;

- Water resources information:
  - Infiltration (recharge and discharge);
  - Floodplain, meander belts, defined crest of slope (valley lands);
  - Stream classification, both watercourses and drainage features;
  - Water quality (including benthics);
  - Geomorphology; and
  - Classified fish habitat contributing areas and erosion sites.

Using the information gathered above, the LSA will also:

- Provide an assessment of the current habitat composition and configuration on the landscape in its entirety (including natural features, agricultural and existing urban/rural development);

- Identify potential future habitat conditions, impacts and mitigative measures to minimize impacts on ecosystem function given potential future development scenarios within the subwatershed area; and

- Conduct a Corridor Analysis at the Landscape Scale study area that assesses barriers and potential corridors for movement of species across the landscape connecting the subwatershed to other natural heritage areas.

4.2.3 Servicing and Settlement Master Plans

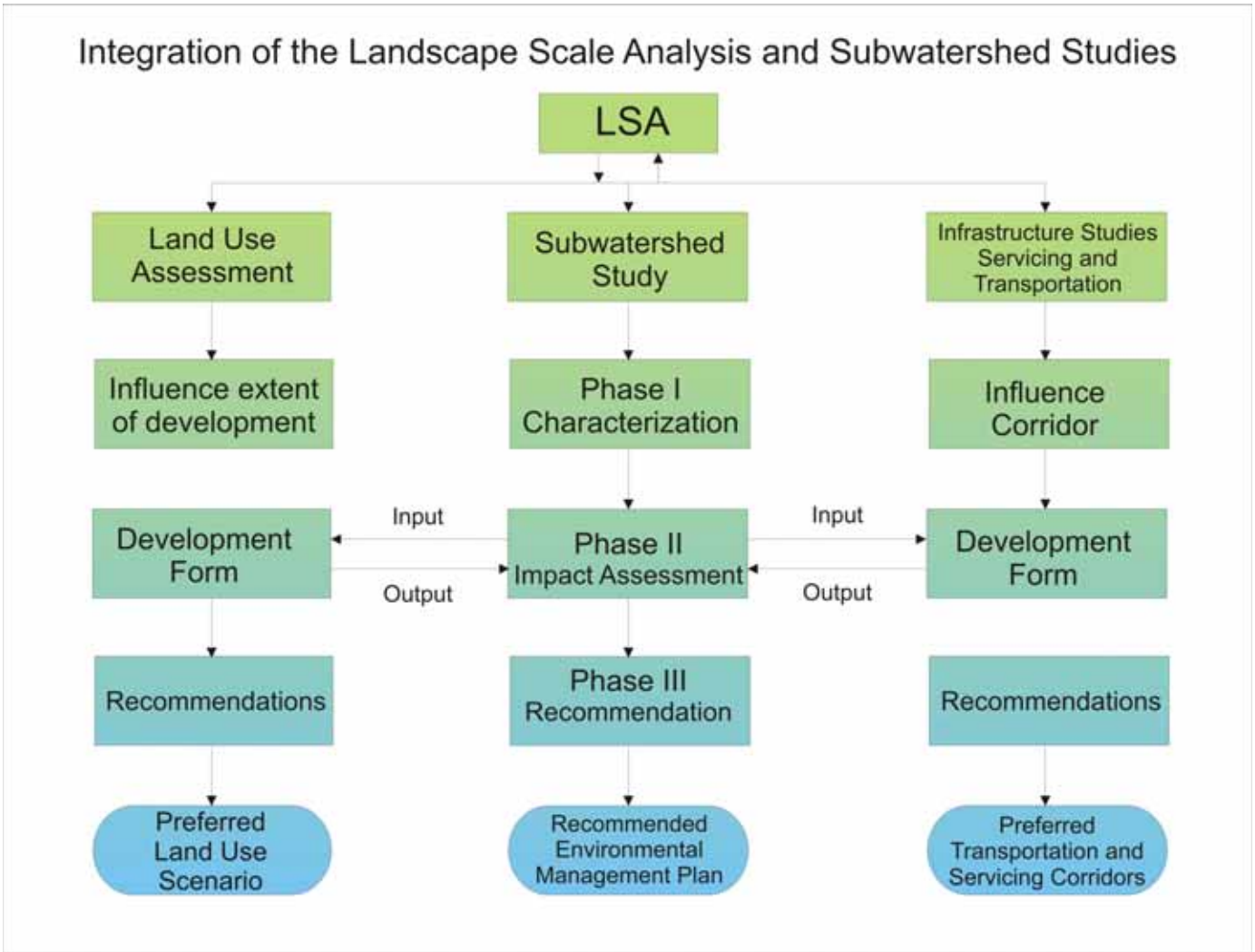
Servicing and Settlement Master Plans (SSMPs) are designed to address the planning, environmental and servicing implications of growth and communal sewage disposal systems (CSDS) in rural communities in a comprehensive and fully integrated manner. The study approach consists of three distinct, but interrelated components: Community Planning, Environmental and Servicing.

The *Planning Component* of an SSMP aims to develop a long-term plan to guide the changes and new development in a village over the next 15 to 20 years and to ensure that the character of the community and the quality of life enjoyed by its residents are maintained and enhanced. Specific planning considerations should include: community function and character, population, aesthetics, heritage, form and compatibility of new development, viability of the commercial core, community facilities and services, and transportation. The study will result in the development of a recommended Community Plan.

Key issues to be addressed in the *Environmental Component* include: ground and surface water resources, fisheries, aquatic and terrestrial habitat, wetlands, woodlands, fluvial geomorphology, and the assimilative capacity of the Credit River. Environmental considerations will be integrated into the servicing and planning components of the study and an Environmental Management Plan will be developed.

The *Servicing Component* will examine water and wastewater issues pertaining to the village. This will include: an examination of existing water and sewage disposal infrastructure, an assessment of infrastructure options in relation to the planning scenarios, environmental management, costs and other operational concerns, the identification of preferred servicing option(s) and the development of a Community Servicing Plan. The servicing work program has been designed to satisfy the requirements of the *Environmental Assessment Act.* This will ensure that if it is determined later in the study that an environmental assessment is required for implementing the identified infrastructure options, the study will have addressed the environmental assessment process requirements.

Figure 4.2: Landscape Scale Analysis



4.2.4 Environmental Implementation Reports

The Environmental Implementation Report (which may also be referred to as an Environmental Management Plan, Environmental Area Plan or Master Environmental Servicing Plan) is generally a requirement of a subwatershed study. As depicted in Figure 2, an EIR is required for the preparation of the Block/Neighbourhood Plan and/or should be completed prior to consideration of Draft Plan Approval (MOE, 2003).

The Environmental Implementation Report should include supporting technical reports such as those dealing with hydrogeology, geotechnical matters, fluvial geomorphology, stormwater management, Environmental Impact Statement (EIS), etc. The intent of the EIR is to provide an integrated analysis of these technical reports, including their data, analysis and recommendations. An executive summary should highlight the key recommendations and requirements to be addressed through the future draft plans of subdivision and/or site plans.

Depending on the scale and extent of work undertaken in the subwatershed study, the EIR should do the following:

- **Review Existing Information:** The proponent should review subwatershed study data, analyses and recommendations in conjunction with other studies completed in the study area (i.e., servicing and transportation, growth management, recreation, etc.) to identify any information gaps relating to the conservation of natural heritage areas, features and functions.

- **Define Existing Environmental Conditions:** Based on the review of existing information, the proponent should carry out additional technical review of specific resource issues, such as hydrogeology. In addition, studies specific to a site within the study area may be required, such as the evaluation of wetlands.

- **Establish Constraint/Opportunity Mapping:** The proponent should conduct a functional analysis of the environmentally hazardous and ecologically sensitive lands of the natural heritage system and should prepare a detailed constraint and opportunity map.

- **Assess Land Use Impact to Establish Preferred Environmental and Stormwater Management Strategy:** The proponent should develop a land use plan that addresses the environmental and stormwater management requirements and practices identified by the subwatershed study, and which reflects the detailed constraint and opportunity map. The proponent develops an impact assessment of the proposed land use to determine if alternative environmental and stormwater management strategies may be necessary (such as measures to address restoration, remediation and or enhancement), and which addresses other economic and social issues such as interim servicing, cost sharing, development timing, etc;

Table 4.1 shows the required components of an EIR. A checklist is also included in Appendix B.

Table 4.1: Submission Requirements Environmental Implementation Report

Number	Required Components
1	**Referenced Drainage Studies:** • Approved watershed, subwatershed and/or master drainage studies
2	**Background Component:** • Define applicable planning policies – provincial, municipal, agency • Define requirements for compliance with subwatershed study • Study area boundaries • Define supporting reports to be integrated through Environmental Implementation Report (EIR)
3	**Environmental Impact Study:** • Vegetation (ELC) and wetland (OWES) evaluations, as appropriate; wildlife and fisheries studies • Evaluation, classification and management of headwater drainage features • Identification of downstream problems
4	**Existing Ecological Functions:** • Linkages • Vegetation Communities • Wetlands • Flora and fauna inventories (including fisheries) • Constraints and opportunities map
5	**Constraints Analysis (Limits of Development):** • Geotechnical • Slope stability analysis • Erosion hazard analysis • Soils analysis • Fluvial Geomorphology • Watercourse characterization • Erosion thresholds • Meander belt/erosion hazards • Drainage density • Post-development floodplain analysis • Ecological • Significant valleylands and woodlands • Fish habitat • Species at Risk/Conservation Concern, Significant Wildlife, interior habitat, etc. • Preliminary grading analysis
6	**Stormwater Management:** • Hydrologic analysis • Hydraulics analysis • Fluvial geomorphology recommendations • Best Management Practices/Stormwater Management recommendations • Outfall Locations • Preliminary grading plans/facility design elements • Pre and Post Drainage boundaries • Low impact development techniques

Number	Required Components
7	**Hydrogeology:** ***Setting*** • Description of the physiographic, geologic, and hydrogeologic conditions • Identification of major groundwater resources and groundwater users in the area ***Site Characterization*** • Description of site topography, geology, and hydrogeology • Description of groundwater levels, groundwater flow direction and gradients • Characterization of groundwater quality where potential exists for development to alter conditions (e.g., individual septic systems) • Characterization of groundwater recharge across the site with consideration of topography, land use, soils, etc. • Characterization of groundwater discharge through collection of field data ***Impact of Ground Water Takings*** • If the site development is likely to include new or increased water takings then the potential impacts of the water takings must be thoroughly analyzed through the characterization of the site and additional field work (e.g., pumping test) as necessary, with particular emphasis on characterizing long term impacts to sensitive features (e.g., aquatic habitat) ***Preliminary Water Balance*** • The preliminary water balance should calculate pre-development recharge at the site (e.g., MOE 1995 method) and also calculate a preliminary post-development water balance, including identification of potential methods for maintaining pre-development recharge rates (e.g. infiltration facilities). • Recommendations regarding Future site development to ensure groundwater functions and linkages will be maintained. Additional monitoring, including monitoring to evaluate the impacts of development (e.g., impacts of water takings or servicing).
8	**Surface Water Quality:** • Background characterization of surface water and sediment chemistry • Detailed monitoring program designed to illustrate storm water management facilities will meet water quality criteria
9	**Impact Analysis of Development Proposal:** • Proposed elimination/impacts to ecological features drainage feature realignments • Natural community vegetation loss/encroachment • Changes to hydrology/hydrogeology affecting fish and wildlife habitat, and vegetation • Loss/impact to corridors/linkages • Loss of cultural features including hedgerows, orchards, etc. • Buffer and/or setback delineation • Mitigation and/or compensation for issues • Restoration, remediation and/or enhancement measures

Number	Required Components
10	**Natural Channel Design:** • Location • Preliminary hydraulics analysis • Design concepts (fish, wetland, corridor, etc.) • Preliminary corridor sizing (bottom width, side slopes, depths) • Fish Habitat Impacts
11	**Water Quality:** • Background Assessment • Groundwater characterization (groundwater flow system; recharge/discharge assessment; identification of groundwater receptors, etc.) • Preliminary Water Balance analysis • Infiltration studies to identify recharge potential for nitrate mass balance calculation • Existing Nutrient Loading • Septic Loading Impact Analysis • Mass Balance of Nitrate Loadings • Monitoring and Mitigation Measures
12	**Impact of Development on Surface Water Quality:** • Background characterization of surface water and sediment chemistry • Detailed monitoring program designed to illustrate storm water management facilities will meet water quality criteria • Impact of Ground Water Takings • Impact on Development on Water Balance • Stormwater infiltration must be accommodated on site to ensure adequate infiltration for septic dilution
13	**Monitoring:** • Terrestrial and aquatic issues • Fish and wildlife habitat • Geotechnical/fluvial geomorphic issues • Hydrogeotechnical issues • Stormwater Management/water quality • Sediment and erosion management
14	**Summary and Conclusions**
15	**Future study requirements**
16	**List As-Built plans to be submitted**

4.2.5 Functional Servicing Reports

Functional Servicing Reports (FSRs) provide a review of functional serviceability for development and verify that the water, sanitary, and storm sewer network is adequate for servicing the development. The FSR describes the location and nature of existing municipal water, sanitary, and storm infrastructure that may be available to provide servicing for the proposed development. It should outline in detail the proposed servicing requirements for the development and indicate, where possible, the capacity of the existing mains to support the development. Table 4.2 shows the required components of an FSR. A checklist is also included in Appendix B.

Table 4.2: Submission Requirements Functional Servicing Report

Number	Required Components
1	**Referenced Drainage Studies:** • Approved watershed, subwatershed, master drainage studies and Environmental Implementation Report as appropriate
2	**Requirements:** • Water Quality Analysis – Background review of existing water quality data to determine background conditions in receiving water courses – if no data this will trigger the need for background monitoring. Outline water quality guidelines and criteria that must be met. • Water Quantity • Downstream Erosion Control/Monitoring • Meander Belt • Slope Stability • Pre and post-development drainage boundaries • Identified limits of development
3	**Site Hydrology and Hydraulics (Pre and Post-Development):** • Assumptions and site parameters • Sub-basins within, or flowing through, the site • Land use, acreage, hydrologic soil group and land use to be modeled for each sub-basin • Output summary (hydrologic/hydraulic Analysis) • Detailed hydraulic analysis and hydrologic calculations (Appendix) • Topographic map showing the following for predevelopment and post development conditions: o Sub-basin boundaries o Off-site contributing areas o Development Area o Preliminary major and minor drainage patterns o Land use o Natural streams and drainage features o Points of discharge from the site o Existing on and off-site drainage facilities, including overland swales o Pre and post-development floodlines o Constraints mapping o Preliminary grading plans

Number	Required Components
4	**Hydrogeology:** • Detailed water balance • Including identification of any infiltration methods and locations • Preliminary stormwater management pond design is appropriate for existing groundwater conditions (e.g., depth to water table; disruption of shallow groundwater flow to areas of groundwater discharge, etc.)
5	**Stormwater Management Design:** • Proposed methods • Alternate methods • Justification for choice of proposed methods • Preliminary calculations • Preliminary design plans
6	**Channel Design or Alteration (if required):** • Location • Justification for crossing • Preliminary Sizing calculations (flow, velocity, etc.) • Preliminary design plans (plan/profile) • Fluvial geomorphology components (corridor width and slope to ensure stability
7	**Erosion and Sediment Control Plans** • Details • Location plan • Calculations • Outfall locations • Monitoring plan • Contingency plans • Construction sequencing
8	**Channel Crossing Plans (if required)** • Requirements • Meander belt analysis/review • Hydrologic and hydraulic calculations • Preliminary drawings (plan, profile, x-sections) • Fish habitat impacts
9	**Summary and Conclusions**
10	**Future Study Requirements**
Note: All reports and engineering plans MUST be signed and stamped by a professional engineer or a qualified professional.	

4.2.6 SWM Design and Implementation Reports

Stormwater Management (SWM) Design and Implementation Reports are prepared in order to meet conditions set at the Draft Plan, Site Plan or EIR stage. The SWM Reports provide detailed information with respect to the proposed environmental and stormwater management measures. Grading, erosion control and site servicing plans are required as part of the SWM Report.

A SWM Report should include detailed design of stormwater controls and environmental restoration works, delineation/confirmation of constraint boundaries (e.g., significant woodlands, top-of-bank, slope hazard areas, meanderbelt widths), sediment/erosion control plans, geotechnical studies, hydraulic and hydrologic analyses; and preservation and restoration/remediation plans.

The SWM Report should be the final step prior to approval of the SWM plans and must provide, in sufficient detail, the required design and supporting calculations for all areas of stormwater management. The specific requirements will vary from municipality to municipality. The components of the study will also vary depending upon whether an EIR and/or subwatershed study has been completed. Table 4.3 shows the required components of an SWM Design/Implementation Report. A checklist is also included in Appendix B.

4.2.7 Site Plan Applications

The municipality may establish areas or forms of development subject to site plan control approval as an effective means to ensure high quality development. Site plan control is often required for commercial and industrial lands, waterfront development, and residential areas with unique characteristics to be maintained, such as lot sizes, heritage and/or architectural interests, landscape or vegetation. Site plan applications cover proposals for a developments ranging from a garden shed to a large industrial building to a high-rise condominium. The requirements for site plans are variable depending on existing site conditions and the proposed use. Typical details shown on the site plan include existing and proposed locations of buildings and structures, and conditions of the lot including, but not limited to: topography, vegetation, drainage, watercourses, floodplains, marshes, and waterways, open spaces, walkways, means of ingress and egress, utility services, landscaping, buildings, structures, signs, lighting and screening devices, center lines of rights-of-way, and dimensions. Table 4.4 shows the required components of a site plan submission to address CVC's requirements.

Table 4.3: Submission Requirements SWM Design and Implementation Report

Number	Required Components
1	**Referenced Drainage Studies:** • Watershed, subwatershed or master drainage studies • Approved Environmental Implementation Report and Functional Servicing Report • Approved Stormwater management reports for same site and near by developments (for peak flow analysis) • Approved detailed stormwater management reports for same site
2	**Site Hydrology and Hydraulics (Pre and Post Development):** • Assumptions and site parameters • Sub-basins within, or flowing through, the site • Land use, acreage, hydrologic soil group and land use to be modeled for each sub-basin • Output summary (hydrologic/hydraulic Analysis) • Detailed hydraulic analysis and hydrologic calculations (Appendix) • Topographic map showing the following for predevelopment and post development conditions: o Sub-basin boundaries o Off-site contributing areas o Development Area o Preliminary major and minor drainage patterns o Land use o Natural streams and drainage features o Points of discharge from the site o Existing on and off-site drainage facilities, including overland swales o Pre and post-development floodlines o Constraints mapping o Preliminary grading plans
3	**Stormwater Management Design:** • Proposed methods • Alternate methods • Justification for choice of proposed methods • Detailed calculations • Calculations/Detailed Description of methods to meet Water Quality Criteria • Topsoil requirements • Detailed design plans • Operations and Maintenance plan/report • Permanent water level • Monitoring Program to assist in future design, maintenance or retrofits
4	**Hydrogeologic:** • Final design of any infiltration facilities required to maintain pre-development water balance • Confirmation that SWM and infiltration facilities are designed appropriately for hydrogeologic conditions (e.g. soil types and depth to water table)

Number	Required Components
5	**Channel Design or Alteration:** • Location • Sizing calculations (flow, velocity, etc.) • Vertical and lateral erosion rates • Detailed design plans (plan/profile) • Fluvial geomorphology components (low flow/bankfull/floodplain width, inverts and slopes, tractive force/erosion analysis, etc.)
6	**Erosion and Sediment Control Plans** • Details • Location plan • Calculations • Outfall locations • Monitoring plan • Contingency plans • Construction sequencing
7	**Revegetation/Landscape Plans** • Requirements – refer to Credit Valley Conservation Stormwater Management Facility Planting Guidelines • Locations • Species list • Quantity calculations
8	**Channel Crossing Plans (if required)** • Requirements • Justification • Geomorphic Analysis of channel setting, meander/amplitudes, alignment, slopes, etc. • Hydrologic and hydraulic calculations • Detail drawings (plan, profile, x-sections) • Fisheries timing window • Sufficient allowance for services and utilities crossing without resulting in negative disturbances or impacts to the watercourse
9	**Monitoring Plan – generally to address municipal issues**
10	**Summary and Conclusions**
Note: All reports and engineering plans MUST be signed and stamped by a professional engineer or a qualified professional	

Table 4.4: Submission Requirements for Site Plan Proposals

Number	Required Components
1	**Referenced Drainage Studies:** • Watershed, subwatershed or master drainage studies • Approved Environmental Implementation Report and Functional Servicing Report • Approved Stormwater management reports for same site and near by developments (for peak flow analysis) • Approved detailed stormwater management reports for same site
2	**Site Hydrology and Hydraulics (Pre and Post-Development) (if required):** • Assumptions and site parameters • Land use, acreage, hydrologic soil group and land use • Output summary (hydrologic/hydraulic Analysis) • Detailed hydraulic analysis and hydrologic calculations (Appendix) • Topographic map showing the following for predevelopment and post development conditions: o Off-site contributing areas o Development Area o Preliminary major and minor drainage patterns o Land use o Natural streams and drainage features o Points of discharge from the site o Existing on and off-site drainage facilities, including overland swales o Pre and post-development floodlines o Constraints mapping o Preliminary grading plans o Storm sewer calculations, including indication of hydraulic grade line
3	**Stormwater Management Design:** • Proposed methods • Justification for choice of proposed methods • Detailed calculations • Calculations/Detailed Description of methods to meet Water Quality Criteria • Topsoil requirements • Detailed design plans • Operations and Maintenance plan/report (if required) • Monitoring Program to assist in future design, maintenance or retrofits
4	**Hydrogeologic:** • Final design of any infiltration facilities required to maintain pre-development water balance • Confirmation that SWM and infiltration facilities are designed appropriately for hydrogeologic conditions (e.g. soil types and depth to water table)

Number	Required Components
5	**Channel Design or Alteration:** • Location • Sizing calculations (flow, velocity, etc.) • Vertical and lateral erosion rates • Detailed design plans (plan/profile) • Fluvial geomorphology components (low flow/bankfull/floodplain width, inverts and slopes, tractive force/erosion analysis, etc.)
6	**Erosion and Sediment Control Plans** • Details • Location plan • Calculations • Outfall locations • Monitoring plan • Contingency plans • Construction sequencing
7	**Revegetation/Landscape Plans** • Requirements – refer to Credit Valley Conservation Stormwater Management Facility Planting Guidelines • Locations • Species list • Quantity calculations
8	**Channel Crossing Plans (if required)** • Requirements • Justification • Geomorphic Analysis of channel setting, meander/amplitudes, alignment, slopes, etc. • Hydrologic and hydraulic calculations • Detail drawings (plan, profile, x-sections) • Fisheries timing window • Sufficient allowance for services and utilities crossing without resulting in negative disturbances or impacts to the watercourse
9	**Monitoring Plan – generally to address municipal issues**
10	**Summary and Conclusions**
Note: All reports and engineering plans MUST be signed and stamped by a professional engineer or a qualified professional	

4.2.8 Erosion and Sediment Control Plans

Erosion and Sediment Control (ESC) is defined as the control of solid soil material (both mineral and organic) during a land disturbing activity to prevent its transport out of the disturbed area by means of air, water, gravity, or ice.

Erosion is the detachment and removal of soil materials from a given area by the processes of wind, water and/or gravity. It entails the wearing away of the land by running water, rainfall or wind including such processes as detachment, entrainment, suspension, transportation and mass movement. Erosion can occur over long geological periods under natural environmental conditions, when undisturbed by humans. However, accelerated erosion, involving the much more rapid loss of soil material from the land, can result from the influence of human activities.

Sedimentation involves the deposition of eroded material in areas on-site, off-site on neighbouring land, within street gutters, drains, bushland and surface waters. Much of this sediment is deposited only temporarily. Subsequent run-off events may wash the sediment further downslope or downstream.

Erosion and sedimentation processes can occur long after specific disturbances such as construction or urban development are completed, and may affect rivers through continued downstream bank and bed erosion and deposition.

The goal of an ESC plan is to minimize the erosion and transport of on-site materials and minimize the sedimentation of this material off-site. Typically, an ESC Plan uses a number of strategies to achieve this goal. An ESC plan can vary from a simple statement for minor proposals to complex engineering plans and associated documentation for major proposals, Whatever the scale, ESC plans must demonstrate that appropriate controls have been planned and that these will minimize erosion and sedimentation when implemented.

4.2.9 Water Takings

Water takings in Ontario are governed by the *Ontario Water Resources Act* and the Water Taking and Transfer Regulation. Section 34 of the *Ontario Water Resources Act* requires most water taking applicants removing more than 50,000 litres/day to obtain a permit to take water (PTTW) from the MOE. While CVC does not have responsibility for issuing PTTWs, the MOE does circulate water taking applications within the Credit River watershed to CVC for review and comment. In addition, the MOE encourages water taking applicants to consult with local municipalities and conservation authorities before applying for a PTTW.

Water taking applicants should consult with CVC staff (e.g., hydrogeologist, aquatic biologist, ecologist, planner) at the beginning of the PTTW application process. CVC staff should be consulted on the background information and studies available for the area of interest, and also to assist with the identification of sensitive receptors that could potentially be affected by the proposed water taking. CVC staff should also be consulted on the selection of monitoring

locations, frequency, and duration for investigations (e.g., site characterization, pumping test) and/or associated monitoring programs.

The specific requirements for a water taking will vary according to the details of the taking and its setting; however, the following are some basic components that should be addressed by all water taking applications:

- site characterization (hydrological, geological, hydrogeological, ecological);
- identification of potential receptors (e.g., aquatic habitat, wetlands);
- test design and monitoring locations to evaluate potential zone of influence from water taking;
- analysis of test results to identify potential impacts from water taking;
- development of trigger levels that will indicate impending impacts and possible mitigation methods; and
- long term monitoring program to assess impacts of water taking.