

Big Creek Watershed Plan – Terms of Reference Discussion Paper
February 21, 2008

1.0 Introduction and Rationale

The Big Creek watershed drains over 7,000 hectares (17,000 acres) including parts of the urban core of Amherstburg as well as rural and agricultural lands to the south. In ERCA's 2006 *Watershed Report Card* the Big Creek watershed scored higher than any other in the region. Total natural areas coverage is approximately 19%, including approximately 11% wetland and 8% tree cover. This is well above the regional average of 2.5% wetland and 5% tree cover. In addition, surface water quality fared better at the two permanent monitoring stations on Big Creek than elsewhere in the region.

Big Creek Marsh is the watershed's largest natural heritage feature, and consists of approximately 900 hectares (2,500 acres) of Provincially Significant Wetland that has a controlled outlet to Lake Erie. The marsh is also a provincially-identified significant life science Area of Natural and Scientific Interest (ANSI), Environmentally Significant Area (ESA), and globally Important Bird Area (IBA).

Notwithstanding this, the Big Creek watershed has been substantially altered since European settlement. Alterations to drainage through flow control structures and the construction of drains and re-routing of watercourses, as well as clearing of natural features for various land uses have resulted in many impacts. These include changes in watershed hydrology, reductions in water quality, and diminished ecological function.

A number of recent land and resource use activities and applications in the Big Creek watershed have highlighted the difficulty in assessing these applications in the context of the varied natural resource values and community priorities that exist in the area. In particular, they have revealed a need for a watershed plan that can be used to inform decision-making related to a variety of local activities and uses. The development of a watershed plan is consistent with a proactive approach to planning, and reduces reliance on site specific sources of information (e.g., environmental impact assessments) that are developed as part of reactive planning processes.

The purpose of a watershed plan is to affirm and/or identify and assess natural resources in the watershed, and to establish appropriate strategies for the protection or management of these features and processes under present conditions, and as land use and other changes occur over time. The plan must recognize the importance of creating an inclusive vision for the watershed which supports a diverse agricultural industry, a wide variety of recreational opportunities including hunting, bird watching and other passive uses, with plentiful opportunities for residential growth and other development.

A watershed plan will need to address two priorities – the collection, analysis and synthesis of technical information, within a process that allows for an expression of the community's vision for the watershed. These priorities, which can occur concurrently

over the planning period, will be integrated later in the process to develop the watershed plan itself.

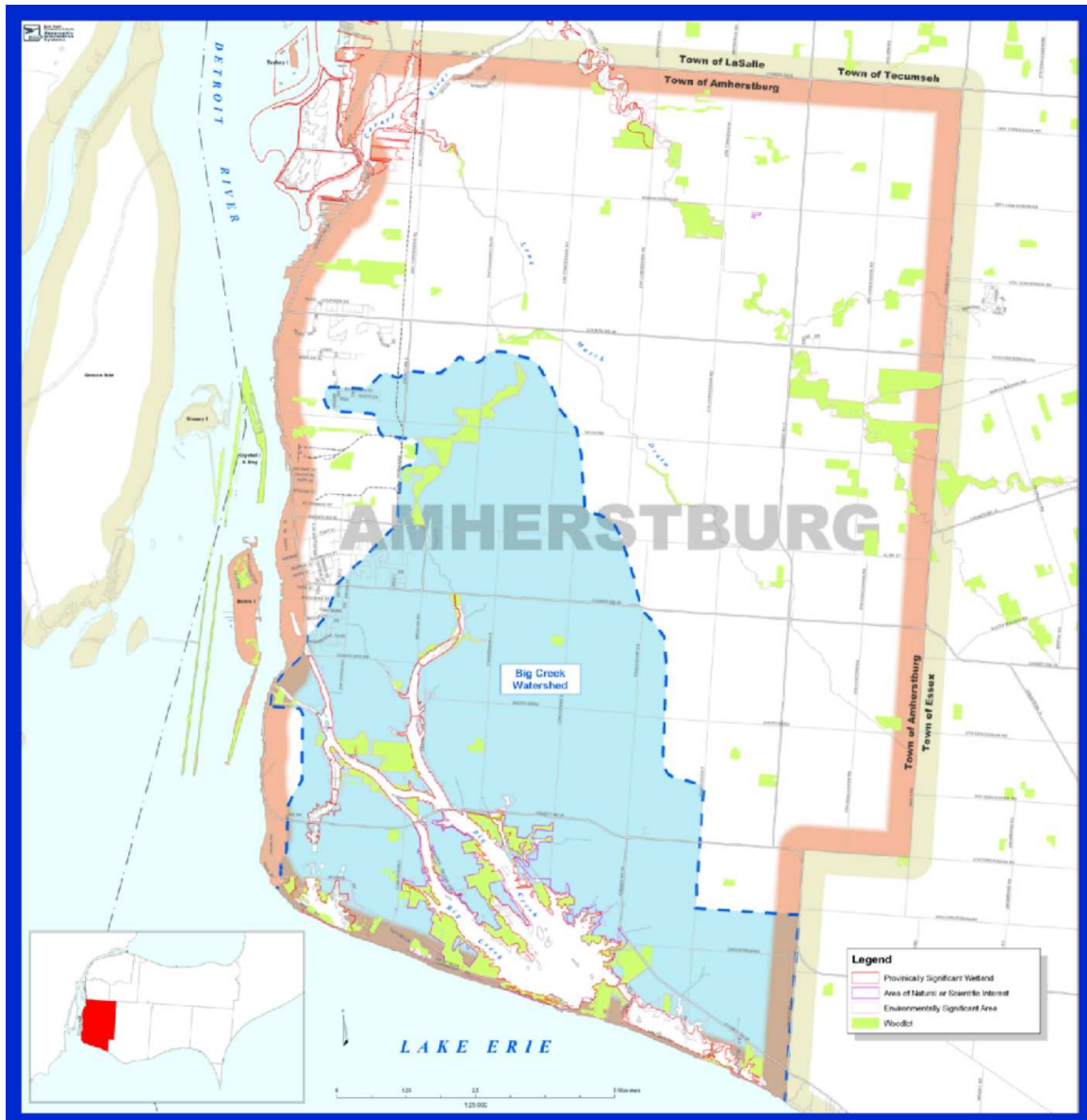


Figure 1: The Big Creek Watershed, Town of Amherstburg

The information generated by this study will be used to support planning, regulatory, and implementation responsibilities of the study partners, and also guide voluntary stewardship actions. It is expected that the Watershed Plan will inform and influence decisions and policies of the Town, the Conservation Authority, and other organizations.

2.0 Linkage to Provincial and Municipal Priorities

The Province's natural heritage resources, water, agricultural lands, mineral resources and cultural heritage and archaeological resources provide important environmental, economic and social benefits. The wise use and management of these resources over the long term is a key Provincial interest as expressed in the *Planning Act* and the 2005 Provincial Policy Statement (PPS). To implement Provincial Policy the Municipality, ERCA and other local agencies must ensure that the resources in the watershed are managed in a sustainable way to protect essential ecological processes and public health and safety, and to avoid or minimize environmental impacts.

The PPS requires the maintenance of biodiversity, and that protection of natural features and the long term ecological function of natural heritage systems must be maintained, restored or, where possible improved recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

Furthermore, the *Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem* recognizes the clear linkage between tributary and nearshore lake water quality. Specifically, Annex 3 Lake and Basin Sustainability of COA envisions strengthened local science and information that can be used to enhance Great Lakes sustainability to achieve social, economic and aquatic ecosystem well-being.

The Town of Amherstburg Official Plan (as adopted by Council on September 11, 2006) provides some goal and policy guidance regarding natural environment areas, woodlots, and wetlands (sections 3.4, 3.5 and 3.6). These goals and policies generally emphasize improving and enhancing the management of the Town's natural resource features and functions through collaborative partnerships with public and private landowners and organizations.

3.0 Watershed Plan Elements

The watershed plan will address several elements, some of which will require supporting technical investigations, as outlined below. Technical studies will be prepared as stand alone 'issue papers'. Approximate costs for the supporting technical studies are included in the budget section of this Terms of Reference. Each technical study will include an evaluation of issues and opportunities, as well as recommendations, for the technical issue being addressed.

3.1 Human Settlement

Basic background information on human settlement of the Big Creek watershed will be collected and summarized. This section of the report will include a brief historical context of the watershed from pre-European settlement times to present, with an emphasis on human settlement patterns and landscape alterations. In addition, a description of current conditions in the watershed will be summarized using recent census

data and planning documents including information on land uses, community demographics, and employment characteristics.

3.2 Geology, Soils & Channel Morphology

Geology and soils fundamentally influence watershed characteristics including channel form and background water chemistry. Existing geological and soils information will be summarized and their implications for landscape form and features will be described.

The watercourses that drain the Big Creek watershed include private drains, municipal drains, and reaches of natural channel with their associated hydrologic features e.g. wetlands. A detailed watercourse morphology and erosion study will be undertaken to determine existing conditions of watercourses in the watershed (are they stable, unstable or eroding?), the sensitivity of major watercourses to increased rates of erosion due to urbanization and other hydrologic modifications in portions of the watershed, appropriate stormwater management procedures to minimize any potential increases in erosion associated with urbanization and other hydrologic modifications, and appropriate drain maintenance procedures to enhance the stability and habitat values of drains while allowing for a continuation of their drainage function. Mapped information will also be developed.

3.3 Natural Heritage and Fauna

Natural heritage features provide habitat for a diversity of species, reduce soil erosion, purify air and water, and provide many other functions. A detailed study of natural heritage characteristics utilizing current, accepted protocols will be completed as a central part of the watershed planning process.

Initially, available documents on the watershed's natural heritage features and functions will be reviewed. Considering the results of the background review, and using current air photography, all the natural heritage elements in the watershed with their associated flora and fauna will be examined and evaluated using a consistent criteria based approach. These elements comprise wetlands, woodlands, meadows and successional areas including abandoned pits and quarries, and corridors including drains and fencerows. Existing documentation of the watershed's natural heritage will be reviewed. Evaluation criteria will need to be confirmed and may include considerations of provincial significance (significant wetland, habitat endangered and threatened species, significant woodlands, significant wildlife habitat, and significant valleylands) and regional significance (ecological function, diversity, significant species, significant communities, and condition).

The original 1984 wetland evaluation defining the Big Creek Marsh Provincially Significant Wetland will be revisited and the wetland boundary redefined. It may be expedient to divide the watershed into subunits with separate evaluations. Examples of subunits are Back Creek-Mans' Marsh, Upper Reach Wetlands, Middle Reach Wetlands and Big Creek Shoreline Wetlands.

The faunal studies will rely on existing documentation available from the Holiday Beach Migration Observatory, Holiday Beach Banding Station, Ontario Ministry of Natural Resources, ERCA reports, private sector reports, Natural Heritage Information Centre database, Ontario Breeding Bird Atlas, and Christmas Bird Counts. Fish presence and distribution information will be summarized from available reports and studies. Particular emphasis will be placed on documenting faunal species at risk and their significant habitat. Fieldwork will be required to validate and update existing data. Faunal inventories should be conducted during appropriate seasons based on advice from the Ontario Ministry of Natural Resources and other experts, as appropriate.

Besides surveying for known species of interest (species at risk S1 to S3, rare in Essex) of faunal groups such as birds, reptiles and amphibians, the surveys will target butterflies and odonata (dragonflies and damselflies) given that these two faunal groups likely have as many or more rare species than the traditional targets. Although species of interest will be targeted when survey dates are chosen, it is expected that the full suite of common and expected species will be recorded through field work or through data from existing databases.

The floral studies will require a three season inventory (spring, summer and fall) for natural areas larger than two hectares in size, for a total of 53 patches. The resulting species list should be specific to location within the broad ecosystem components outlined for the wetland evaluation. Species at Risk will be located using global positioning system (GPS) and population estimates will be provided. Natural communities will be classified and evaluated using the Ontario Ecological Land Classification protocol and geographically defined on aerial photos. Old woodland (and conceivably old growth) will be located through an inventory of large trees (diameter at breast height ≥ 80 cm) with GPS locations.

Stresses and negative impacts on the watershed's natural heritage will be noted. Restoration and linkage opportunities will be identified for consideration in the development of the implementation recommendations of the watershed plan.

3.4 Surface Water Quality

Surface water quality fundamentally influences the composition of aquatic communities, the predators they attract, and the susceptibility of fish and other aquatic life to disease and other stressors. Tributary water quality also directly influences Lake Erie nearshore and offshore water quality.

A detailed surface water quality study will be undertaken in order to characterize ambient and long term water quality trends in the watershed as well as the sources of various pollutants in that watershed. From 1964 to 1996 surface water quality in Big Creek was monitored at two stations through the Provincial Water Quality Monitoring Network (PWQMN) program. This program was discontinued for a number of years due to PWQMN cutbacks. At present, there are two water quality monitoring stations, which

are monitored through ERCA's region wide surface water quality monitoring program. This monitoring has been conducted since 2000 for a limited number of water quality parameters.

Existing water quality data will be collected and analyzed by adding additional fixed water quality monitoring stations, and by completing regular as well as precipitation event based sampling. Through this expanded program a clear understanding of ambient water quality and the event based pollutant loadings from various sources to the watershed will be achieved. This information can then be used to establish water quality targets for watershed sub-basins, with associated measurable actions to achieve those targets, through the watershed plan itself.

Water quality parameters to be measured during regular and event based sampling will focus on conventional pollutants including *E.coli*, total suspended solids, turbidity and nutrients. Water chemistry will be augmented by benthic invertebrate monitoring at the proposed water quality stations on the watershed. These water quality parameters are the best indicators of land use patterns and impacts associated with rural and urban land uses in the watershed. Water quality monitoring will be completed concurrent with water quantity (i.e., flow) monitoring through the water budget study, which will enable calculations of contaminant loadings to the receiving water bodies. The water sampling and flow measurements will be conducted during normal conditions and also during significant precipitation events.

An improved understanding of the contributions of various non-point sources of contaminants will help in controlling and managing inputs. The emerging field of microbial source tracking (MST) will be utilized to assist in identifying non-point sources of fecal contamination. Many MST protocols are available for research or practical applications, and based on the initial water quality monitoring results, an appropriate MST protocol will be used for further investigations.

Current land uses in the watershed include urban, rural, and commercial/industrial, each of which may influence Big Creek water quality conditions. Concentrations of non-conventional pollutants such as organics (e.g., pesticides) and heavy metals (e.g., chromium, lead, arsenic) will be assessed. Since lab costs for these parameters are very expensive, samples will be collected twice, during normal and extreme weather conditions. Based on the results of this exercise further source track down activities may be necessary.

3.5 Surface Water Quantity

Information on water quantity matters related to Big Creek, specifically how and where water flows, and how human activities affect ground and surface water, is poorly developed.

A detailed water budget analysis/assessment of hydrological processes will be completed to better understand the movement of water in its various forms and pathways, and the

uses of water over time, on, through and below the surface of the earth. The water budget will determine the volume of surface and groundwater available for the benefit of both humans and natural systems. Through the analysis, the amount of precipitation, runoff, recharge, evaporation, transpiration, and natural and anthropogenic uses of water within the watershed will be quantified. This will help determine the impact of land use changes on natural features such as wetlands, headwater areas and aquifer recharge areas. It will also inform water quality management actions.

The water budget will address the following questions:

- Where is the water? (i.e., where are the various watershed hydrologic elements located e.g., watercourses, aquifers?)
- How does the water move between these elements? i.e., what are the pathways through which the water travels?
- What and where are the stresses on the water? Where are the takings?
- What are the trends? Are levels declining, increasing or remaining constant over time?

Watershed modeling tools will be employed in this study to answer the above questions in terms of water resources assessment, development, and management. They will be used to quantify the impact of watershed management strategies, linking human activities within the watershed to water quantity and quality in Big Creek and its receiving body i.e., Lake Erie.

Computer modeling (Soil and Water Assessment Tool (SWAT)) will be utilized to complete the water budget analysis. Modeling tasks include:

- Development of data bases using geographic information system (GIS) layers on spatial data (drainage, soil, land use, hydrogeology) and temporal data (climate, precipitation, temperature, wind, radiation).
- Field investigations including infiltration tests, baseflow monitoring, streamflow monitoring, tile drainage monitoring, groundwater level monitoring.
- Assessments including development of a continuous watershed (SWAT) model with model calibration (based on streamflow data).
- Development of water budget estimates including surface water potential, groundwater potential, recharge estimation, dependable baseflows, and evapotranspiration.

In addition to the above, urban stormwater will be assessed collaboratively with Town of Amherstburg Engineering staff using information provided by the Town.

Recommendations will include a consideration of stormwater management alternatives. Further, the potential for water losses through the marsh beach during periods of higher water levels in the marsh will be assessed. This assessment may include the excavation of small test pits.

The water budget analysis will consider the implications of changes in land use and specific climate scenarios on the hydrological regime.

Anecdotal evidence indicates that parts of the Big Creek is dry during summer months. The study will explore ways to augment baseflows in Big Creek.

3.6 Plan Implementation & Monitoring

Watershed planning processes ordinarily involve the preparation of the plan, followed by implementation, and an adaptive management process of monitoring progress and success and making mid-course adjustments as necessary.

The communities' diverse priorities for the watershed and available technical information will be used to develop the plan's recommendations. Recommendations will consider a number of criteria, including but not limited to:

- impact on the hydrological regime
- impact on surface water quality
- impact on natural heritage features
- impact on fish and wildlife populations
- technical feasibility
- impacts on private lands
- relative cost
- agency and public acceptance

The watershed plan will include a section addressing matters relating to plan implementation and monitoring. Implementation options for the various recommendations will developed featuring a 'toolkit' approach. Recommendations will also including necessary follow up monitoring that is required to measure progress, including but not limited to natural features cover, and surface and ground water quality.

4.0 Plan Development Process

Preparation of the plan will be a collaborative process guided by a Steering Committee consisting of the Town of Amherstburg (one position), ERCA (one position), Ontario Ministry of Natural Resources (one position), Ontario Ministry of Environment (one position), Environment Canada (one position), Amherstburg Committee on the Environment (ACE) (one position), and watershed residents (four positions). The Steering Committee will be co-chaired by the Town and ERCA, and major project milestones will be reviewed and endorsed by Town Council and the ERCA Board. A Steering Committee Code of Conduct is included as Appendix A.

Landowner representatives on the Steering Committee will be selected through a public nominations process. Committee positions will be advertised throughout the community, and a short list of candidates will be interviewed. A selection committee consisting of the

Town, ERCA and ACE will select four candidates that are reflective of the diversity of interests in the watershed.

It is expected that the Steering Committee will liaise with Town of Amherstburg Council on an as needed basis through ACE.

Community engagement will be a major focus of the planning process. In addition to community representation on the Steering Committee, broader public consultation through Open Houses and/or focus group session(s) will be undertaken during each phase of the planning process.

The process is expected to take approximately two and half years. Project phases are shown on Figure 2 and include:

Phase 1 – Project Initiation and Background Study
(October, 2007 – July, 2008)

- Confirm terms of reference
- Establish Steering Committee and confirm public consultation process
- Confirm funding and select consulting Project Manager
- Collect, analyze and synthesize background information
- Public Meeting #1 – develop environmental goals and objectives

Phase 2 – Detailed Studies
(May, 2008 – September, 2009)

- Conduct natural heritage inventory
- Complete water quality study
- Complete hydrological assessment of watershed, including the Marsh
- Complete geomorphological assessment
- Steering Committee meetings / Council Liaison as necessary
- Public Meeting #2 - update on technical studies
- Public Open Houses as appropriate

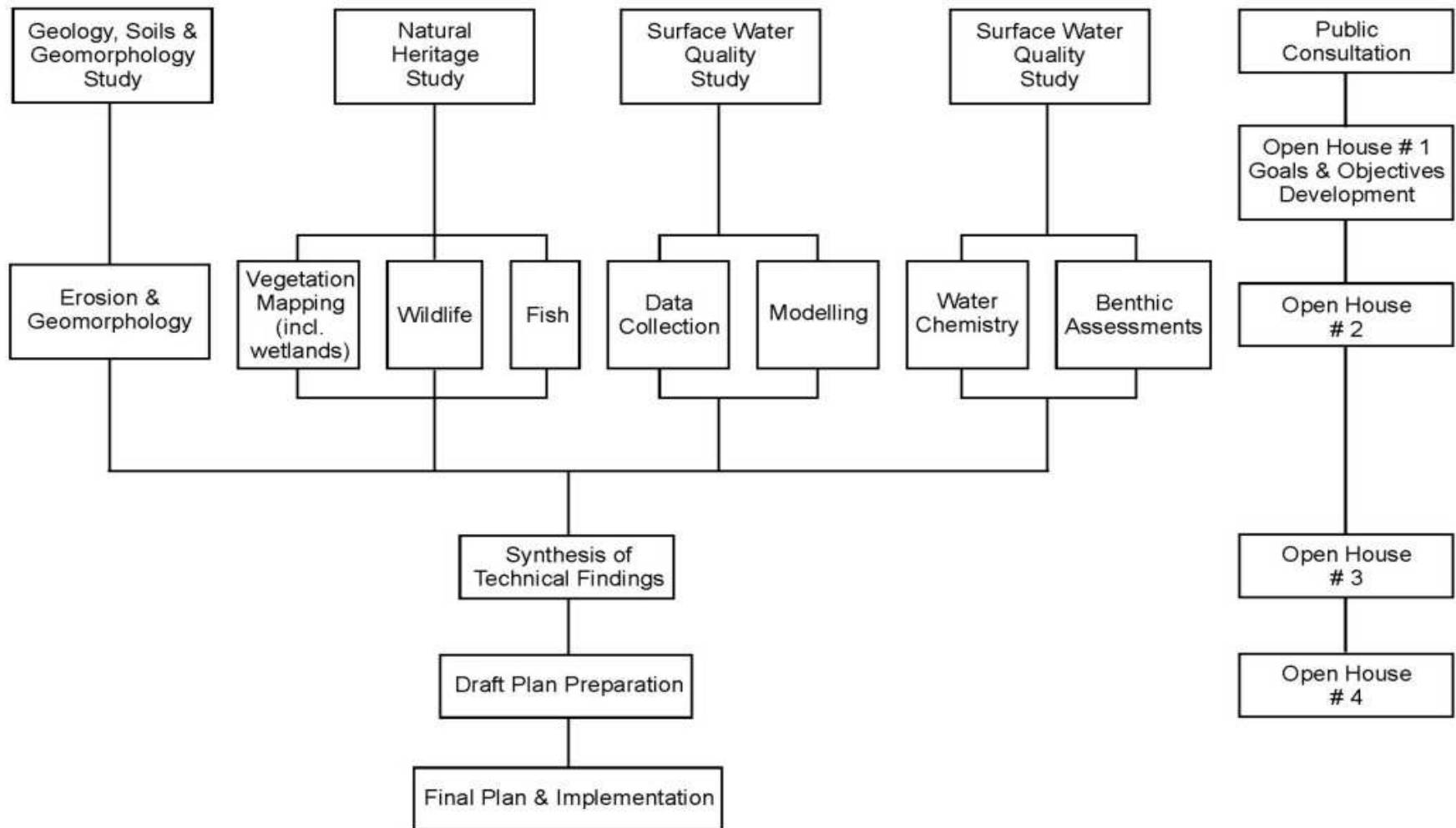
Phase 3 – The Plan
(September, 2009 – March, 2010)

- Integrate detailed study findings with the results of public consultations to develop prescriptive elements of the draft plan
- Steering Committee meetings / Council Liaison as necessary
- Public Meeting #3 to provide input prior to development of draft plan
- Public Meeting #4 to review draft plan

Phase 4 – Plan Implementation & Monitoring
(>April, 2010)

- Implement plan through mechanisms described in the plan on an ongoing basis
- Monitor progress and achievements and adapt plan as necessary

Figure 2: Big Creek Watershed Plan Process



5.0 Cost Estimate

The watershed plan will be coordinated by a consulting Project Manager. Supporting technical studies will be completed primarily by appropriately qualified agency and private sector contractors.

Total costs of the three year study are estimated to be \$333,900 (see below). A cost estimate for preparing the Watershed Plan is included overleaf. Funding contributions are expected from the federal and/or provincial levels, as well as local sources.

Task	Human Resources	Equipment/Lab	Other	Total
Project Management	\$125,000			\$125,000
Geomorphology Study	\$18,000	\$2,000		\$20,000
Natural Heritage Study	\$74,000		\$4,400	\$78,400
Water Quality Study	\$15,000	\$7,500		\$22,500
Water Quantity Study	\$60,000	\$20,000	\$3,000	\$83,000
Public Consultation			\$5,000	\$5,000
TOTAL				\$333,900

Appendix A – Steering Committee Code of Conduct

Purpose

The Steering Committee is responsible for providing comprehensive coordination and direction to the preparation of the Big Creek Watershed Plan, as outlined in the Terms of Reference Discussion Document.

Values

The Big Creek Watershed Plan Steering Committee believes that a framework of common values is an essential foundation for the development and maintenance of a strong working environment and effective teamwork. The members of the Steering Committee will apply the following values in all aspects of doing business:

- Openness - Communicating and sharing information and ideas
- Clarity - Using appropriate language and communication techniques to bring about clear understanding
- Understanding - Analysing, listening, and communicating all aspects of what has to be discussed
- Sensitivity - Caring for and being responsive to the needs of others in a respectful manner
- Action - Establishing priorities and undertaking initiatives based on desired results
- Integrity - Ensuring that actions and decisions do not compromise fundamental values or principles
- Trust - Believing and having confidence in each other to achieve goals
- Flexibility - Being adaptable and willing to change
- Fairness - Being objective and equitable in all aspects of doing business
- Preparedness - Being ready with prudence, foresight, and forethought for the actions taken
- Innovation - Being receptive to and taking fresh, new approaches
- Honesty - Telling the truth
- Decisiveness - Making decisions in a timely manner
- Commitment - Being prepared to help each other to make things happen.

Membership

The membership of the Steering Committee is limited in number to improve decision-making. Committee members include representatives from:

- Town of Amherstburg (one position) (Co-Chair)
- Essex Region Conservation Authority (one position) (Co-Chair)
- Ontario Ministry of Natural Resources (one position)
- Ontario Ministry of Environment (one position)

- Environment Canada (one position)
- Amherstburg Committee on the Environment (one position)
- Watershed Residents (four positions)

The watershed resident positions will be selected through a full public process. All other positions will be appointed by the member organization.

Co-Chairs

The Town of Amherstburg and the Essex Region Conservation Authority will sit as permanent Co-Chairs of the Steering Committee in order to ensure local accountability and maintain links with local decision-making. The role of the Steering Committee Co-Chairs are:

- to provide overall leadership to the Committee
- to call, set the agenda for, and oversee the conduct of meetings
- to work collaboratively with all Steering Committee members, technical specialists conducting the studies, and the broader community to ensure the project is progressing positively and towards its intended outcome.

Meetings

Meetings of this Committee will be held at the call of the Chair, and will primarily be conducted outside of normal business hours. It is anticipated that decisions will be made by the Steering Committee on a consensus basis, however a simple majority vote may be held if consensus cannot be reached. If a vote is held, any one member of the minority shall be entitled to set out the minority position in writing to form part of the Meeting Record. All approved Steering Committee Meeting Records will be a matter of public record, and available for public review.