



**Manning Road Secondary
Plan Area – Stormwater
Management Study
Class EA Environmental
Study Report**

Final Report

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Corporation of the Town of Tecumseh

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Submitted by

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1.0 INTRODUCTION

1.1 Study Purpose

The Town of Tecumseh has initiated a Class Environmental Assessment (Class EA) to evaluate the impact of one or more stormwater management (SWM) facilities to service land owners within the Manning Road Secondary Plan Area. The study area, illustrated in **Figure 1.0 - Study Area**, is bounded by Essex County Road 22 to the north, Manning Road (Essex County Road 19) to the east, the Canadian Pacific Railway to the south, and the westside of St. Anne Street and Lesperance Road to the west. The study area is comprised of nearly 250 hectares, approximately 150 hectares of which are undeveloped lands. Development applications have been submitted for the majority of the undeveloped parcels, which have multiple owners. Ultimately, within approximately ten years, as many as 800 new residential units and approximately 5 hectares of commercial development are anticipated within the study area.

1.2 Problem Statement

To ensure consistency and quality in evaluation and identifying infrastructure improvements to support the proposed development, the Town of Tecumseh is coordinating the study of stormwater needs for the full development of the study area through the Class EA process.

The purpose of this study is to identify the best possible solution for addressing the stormwater drainage needs to accommodate future development in the Manning Road Secondary Plan Area in the Town of Tecumseh.

1.3 Class Environmental Assessment Process

The stated purpose of the Environmental Assessment Act (EAA) is the “betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment” where the broad environment includes the natural, social, cultural, built, and economic environments.

The provisions of the EAA require all municipalities to undertake an environmental assessment for virtually all public works projects. The procedures and requirements under the EAA are described in the document entitled *Municipal Class Environmental Assessment* that was prepared by the Ontario Municipal Engineers Association (June 2000). The Municipal Class EA process is



a five phased decision-making framework for the planning and design of municipal stormwater projects that are undertaken on a frequent basis, are normally limited in scale and have a predictable range of environmental impacts.

The Class EA document also serves as the public statement of the decision-making process followed by the municipalities in the planning and implementation of the needed infrastructure.

Studies conducted using this framework are considered to have satisfied the requirements of the Ontario Environmental Assessment Act by virtue of having followed the key principles of environmental planning outlined below:

- Consultation with affected parties early in and throughout the process, such that the planning process is a cooperative venture.
- Consideration of a reasonable range of alternatives, both the functionally different “alternatives to” and the “alternative methods” of implementing the solution.
- Identification and consideration of the effects of each alternative on all aspects of the environment.
- Systematic evaluation of alternatives in terms of their advantages and disadvantages to determine their net environmental effects.
- Provision of clear and complete documentation of the planning process followed, to ensure “traceability” of decision-making with respect to the project.

The five Phases of the Class EA process, as described in the *Municipal Class Environmental Assessment* (June, 2000) document and considered essential for the fulfillment of the EAA requirements, are described below:

- *Phase 1* – Identification of the problem or opportunity;
- *Phase 2* – Identification of alternative solutions to the problem which take into account the existing environment, and the establishment of the preferred solution with public



and agency consultation; this phase also includes the confirmation of the appropriate project schedule;

- *Phase 3* - Examination of alternative means of implementing the preferred solution based on the existing environment, potential environmental effects, methods for minimizing effects, input from government agencies and the public, and opportunities for maximizing positive effects;
- *Phase 4* – Preparation of an Environmental Study Report that documents the rationale for the undertaking, and the planning, design and consultation process that was followed; and the placement of the document on the public record for review and comment by government agencies and interested parties; and,
- *Phase 5* – Completion of engineering drawings and documents, followed by the construction and operation of the project, with appropriate monitoring to ensure compliance with environmental provisions and commitments.

In a meeting on February 15, 2005 with Dr. Ron Griffiths, Regional Class EA Co-ordinator, Southwestern Region of the Ministry of Environment (MOE), it was confirmed that a Class EA must be initiated for the SWM facilities within the Manning Road Secondary Plan Area if:

- the SWM facility cannot be included within the applicant's lands which are the subject of an application under the Planning Act (e.g., Plan of Subdivision), or
- the SWM facility will service two or more properties with different ownerships.

It was also confirmed during this meeting that SWM facilities may no longer be constructed as "on-line" facilities within municipal drains designated under the Drainage Act.

The Municipal Class EA document classifies projects into three separate categories: "Schedule A, B, or C". The Manning Road Secondary Plan Area Stormwater Management Study was originally conducted as a "Schedule B" Class EA under the definition of MOE. As described further in this report, the Town of Tecumseh made the decision to go forward with a "Schedule C" project after the first Public Information Centre and upon reviewing and confirming the schedule. "Schedule C" projects require the completion of Phases 1 through 5 of the EA process.



Such projects include “the establishment of new stormwater retention / detention ponds and appurtenances or infiltration systems including outfall to receiving water body.”

In brief, the specific objectives of this Class EA study are as follows:

- define the purpose and description of the undertaking;
- identify and evaluate alternative solutions;
- conduct a Public Information Centre;
- identify and evaluate alternative design concepts;
- conduct a second Public Information Centre;
- document study findings in an Environmental Screening Report; and
- respond to a Part II Order, if required.

Refer to **Figure 2.0 Class Environmental Assessment Process** for a visual description and flow chart of the requirements of the “Schedule C” Class EA process.

1.4 Report Organization

The remainder of the report is organized into the following sections:

Section 2 – Existing Conditions – This section presents a summary of existing conditions that constitutes the ‘Problem Statement’ under Phase 1 of the Class Environmental Assessment process, including a description of the Drainage System and existing land use, as well as a summary of previous studies of the study area. Additional existing conditions characteristics including fisheries, natural heritage, and hydrological considerations are also summarized.

Section 3 – Stormwater Management (SWM) – This section describes the potential stormwater management measures and design criteria that are being considered. These measures include lot-level BMPs, conveyance controls, and centralized and local end-of-pipe facilities with various operational requirements and configurations.



Section 4 – Alternative Solutions – Recommendations in this section form the basis of the Class EA. Each alternative solution is considered via a review of existing system characteristics, and an evaluation of feasible alternatives. Alternative solutions are subject to environmental criteria including social, economic, and natural considerations. The identification and evaluation of alternative solutions addresses key requirements of Phase 2 the Class EA process. This section also summarizes the public and agency consultation activities that are required under Phase 2 of the Class EA.

Section 5 – Alternative Design Concepts – A preferred solution was selected, and the alternative design concepts for the preferred solution were formulated. Each alternative design concept was considered via a review of existing system characteristics, and an evaluation of feasible alternatives. Alternative design concepts, like the alternative solutions, are also subject to environmental criteria including social, economic, and natural considerations. The identification and evaluation of alternative design concepts addresses key requirements of Phase 3 of the Class EA process. This section also summarizes the public and agency consultation activities that are required under Phase 3 of the Class EA.

Section 6 – Development of Preferred Design – This section provides details of the preferred design concept with an indication of the recommended elements of improvement to the degree of development that has been completed during this Environmental Assessment Study.

Section 7 – Project Implementation and Mitigation of Environmental Impacts During Construction – This section provides details of the project construction schedule, mitigation of environmental impacts during construction, and the required construction approvals.

Section 8 – Cost Estimates and Cost Sharing Methodologies – This section describes the proposed cost estimates and cost sharing methodologies for implementation and construction of the project.

1.5 Public Consultation Program

Public and agency consultation is a key element of the EA planning process, and accordingly, extensive efforts have been made to provide the public and agencies with information on the study and to solicit input.



A contact list of potential stakeholder groups and agencies was established in consultation with the Town of Tecumseh in order to identify interested parties. The contact list for this project includes Federal agencies, Provincial Ministries, local agencies, and interest groups, as well as over five hundred property owners within the study area (see **Appendix A: Comprehensive Mailing List** for the complete list).

A Notice of Project Initiation, as shown in **Appendix B: Notice of Project Initiation**, was published in the Windsor Star on June 30, 2005 to notify the public of the proposed undertakings. Notices were also mailed to property owners within the study area and agencies with an interest in the project or study area.

Two Public Information Centres (PICs) were held on March 22, 2006 and December 5, 2006 at the Town of Tecumseh Council Chambers. The first PIC consisted of an informal walk-in session with displays summarizing the work completed to date and the recommended solution. The second PIC was held in order to provide property owners in the study area with a recommended design concept based on the preferred alternative solution. The PIC results are further described in Sections 4.3 and 5.3 of this report.

2.0 EXISTING CONDITIONS

2.1 Existing Land Use

The majority of the undeveloped area is agricultural land and vacant lots. Developed land within the study area includes commercial properties along County Road No. 22 and Manning Road. A developed light industrial area also exists along Manning Road. Developed residential properties lie at the western edge of the study area along Lesperance Road. More specifically, land situated within the study area can be described as follows:

- undeveloped and non-subdivided tracts of land between Manning Road and the existing limits of Tecumseh Hamlet primarily consist of relatively large parcels of land that are currently owned by ten individuals and/or corporations and the parcels range in size from 2.5 to 26.2 ha.



- within the Manning Road Business Park, individual lots were created along Sylvestre Drive and Desro Drive, ranging in area size 0.2 to 3.3 ha. Additional lots have already been created and built along Jamsyl Drive; the majority will require severance applications to create additional highway commercial and/or light industrial building lots north of Sylvestre Drive.
- Immediately south of the Manning Road Business Park, two parcels of land had been severed and zoned for institutional purposes (a new church and school). No construction, on either site, has commenced to date.

Refer to **Figure 3.0 Official Plan Designation** for the former Township of Sandwich South land use designations in the study area. Refer to **Figure 4.0 Existing Land Use** for existing land use in the study area. Refer to **Figure 5 Secondary Plan** showing the limits of the Manning Road Secondary Plan Area

2.2 Drainage System

The study area lies within the East Townline Drain subwatershed.

Local drains within the study area and their drainage boundaries, including the East Townline Drain drainage area, are depicted in **Figure 6.0 Drainage Areas**.

2.2.1 East Townline Drain

The East Townline Drain, which is shown on Figures 7 to 12, extends from the former Township of Sandwich South, through the former Town of Tecumseh along the west side of the Manning Road right-of-way from the Canadian Pacific Railway to Lake St. Clair where it is pumped into Lake St. Clair. The pump station contains two axial flow pumps with a total capacity of 1.9 m³/s. Maintaining pump operation at a satisfactory level with the proposed development in place is one of the considerations in evaluating various stormwater management measures.

Following the recommendation of the *Storm Drainage Study for the Township of Sandwich South, Tecumseh Hamlet* (Dillon, June 1979), the drainage area within the former Township of Sandwich South, to the East Townline Drain, was reduced from 285 to 260 ha.



2.3 Previous Studies

The following sections describe previous studies conducted within and around the study area including recommendations for improvements.

2.3.1 Storm Drainage Study for the Township of Sandwich South, Tecumseh Hamlet, June 1979

In recognizing the need for a comprehensive master drainage plan for this area, the *Storm Drainage Study for the Township of Sandwich South, Tecumseh Hamlet* (M.M. Dillon, July 1979) was prepared to assist the Township in setting requirements for storm drainage as new development occurs. The report provides design criteria recommendations including that the storm sewers be designed for the 2-year storm event using runoff coefficients of 0.35 for Residential, 0.65 for Industrial and 0.20 for Park Land uses.

With respect to the Baillargeon Drain drainage area, the report recommends that it would be desirable to extend the drainage area westerly. This would require major improvements to the outlet drain east of Lesperance Rd. A Drainage Report for this outlet drain was prepared by C.G.R. Armstrong (November 5, 1975). The report found that due to development that had taken place in the drainage area draining into the upper portion of the Baillargeon Drain, the drain is neither sufficiently deep nor large enough to afford proper drainage to the lands and roads affected. The report recommends that the open portion of the drain (from the east of Lesperance to its outlet at the East Townline Drain) be deepened and improved. The drainage study (M.M. Dillon, July 1979) notes that these recommendations have been implemented.

2.3.2 Improvements and Reassessment to East Townline Drain and Pumping Station (1982)

An assessment of the East Townline Drain and the pumping station was conducted to determine improvements necessary as a result of changes in land use and drainage characteristics within the watershed (*Drainage Report, Improvements and Reassessment to East Townline Drain and Pumping Station*, M.M. Dillon Limited, January 1982). Minor improvements to the pumping station and culvert crossings, as well as cleaning of the drain to provide greater hydraulic capacity were recommended.



The East Townline Drain is located along the west side of the Manning Road (County Road 19) right-of-way. It extends, primarily as an open drain from County Road 42 to Lake St. Clair, except between County Road 42 and St. Gregory's Road where it has been enclosed with a precast concrete culvert. The drain services a total of 440 hectares of mixed agricultural, residential, commercial and light industrial land uses, which includes lands within the Cyr, Baillargeon Drains and the Manning Road Drain (in Lakeshore).

An internal storm drainage network is currently in place for the Jamsyl Business Park. A 675 mm storm sewer stub with a capacity of 0.3 m³/s extends from Jamsyl Drive to the western edge of the business park to service approximately 12.1 ha of currently vacant agricultural land abutting the Jamsyl Business Park.

2.2.2 Baillargeon Drain

The Baillargeon Drain traverses the study area, south of the developed Jamsyl Business Park and conveys storm drainage from the built-up residential area west of the undeveloped portion of the study area as well as the abutting vacant agricultural lands.

The drain, which services approximately 90 hectares of developed residential lands and vacant agricultural lands, is primarily an open channel except for a small portion of enclosed drain within the residential areas near Lesperance Road. The Baillargeon Drain outlets to the East Townline Drain at Manning Road.

2.2.3 Cyr Drain

The Cyr Drain is located along the western limit of the study area, as shown on Figures 7 to 12.

The drain is located approximately 300 meters east of Lesperance Road along the boundary between residential and vacant farm lands and extends from County Road 22 southerly approximately 800 metres. The drainage area, which includes approximately 65 hectares of residential, commercial and agricultural land uses, outlets northerly as an open drain to the County Road 22 right-of-way and then easterly along the south side of the right-of-way to the East Townline Drain at Manning Road. A short portion of the Cyr Drain immediately south of County Road 22 is enclosed.



2.3.3 Township of Sandwich South Master Drainage Plan, 1987

The Township of Sandwich South lies at the headwaters of various watersheds, one being the East Townline Drain subwatershed. The *Township of Sandwich South Master Drainage Plan* (N.K. Becker and Associates Ltd., 1987) was conducted for ERCA to identify present and future storm drainage problems based on established land use trends and to identify improvements to the drainage system to maintain storm runoff at predevelopment levels.

Key recommendations that emerged from this study with respect to the East Townline Drain drainage area include:

- For residential and industrial infilling and new subdivisions, on-site stormwater management measures should be implemented to reduce post-development 2-year event flow rate to the pre-development 2-year flow rate.
- The Baillargeon Drain lends itself to channelization for the purposes of creating on-line stormwater detention. Off-line storage would also be possible in this area. (Recent Provincial legislation prohibits on line stormwater detention in municipal drains – see page 3).
- An outlet structure for the Baillargeon Drain would be required to limit runoff to pre-development conditions where it drains to the East Townline Drain. The outlet structure would be required once development applications are approved for these lands.

2.3.4 Manning Road Secondary Plan, 1996

The Manning Road Secondary Plan (Prince Silani & Associates Ltd. and MM. Dillon Ltd., 1996) was prepared to provide the necessary background information to be used during the preparation of new land use policies and designations for the lands that lie in the geographic area defined by County Road No. 22 to the north, Manning Road to the east, the east limit of the existing residential lands along the east side of Lesperance Road to the west, and the CP Rail line to the south (see Figure 5.0). The Secondary Plan was used to identify and describe land use, transportation and servicing policies; specifically, it established servicing policies and design standards for all lands to be developed (i.e., storm , sanitary and water supply systems).



With respect to storm drainage, the Secondary Plan requires that stormwater management practices are required to restrict post-development flows to pre-development levels for the 2-year and 100-year storm events. New development must provide individual stormwater facilities to comply with this requirement. Stormwater management studies which address the impact of the new development on stormwater quantity and quality (using the *Stormwater Management Planning and Design Manual* (MOE, March 2003) for direction) must be prepared for all new development to confirm compliance with the Township of Sandwich South Master Drainage Plan and Provincial guidelines.

More detailed requirements of the Secondary Plan are as follows:

- Open municipal drains within the study are to be subject to easements and special building setback requirements for maintenance purposes as set out in the Township's Comprehensive Zoning By-Law.
- Stormwater quality objectives are to be applied to all new developments and can best be satisfied in single, large facilities that become an integral part of the overall passive open space network.
- For the Cyr Drain drainage area, it was recommended that the downstream portion of the drain (which is an open channel) be adapted to satisfy Provincial water quantity and quality requirements. (Not done).
- For the Baillargeon Drain and East Townline Drain drainage areas, a single stormwater facility at the west side of the study area was recommended to address both quality and quantity issues. It was also recommended that the actual size and location of this facility be established through a separate stormwater management study which would consider the built-up portion of the Baillargeon Drain drainage area (approximately 100 ha) (this facility has not been constructed).

2.3.5 Partial Enclosure of the Baillargeon Drain Report (1996)

A report describing the repair and improvement of part of the Baillargeon Drain was prepared by Bruce D. Crozier Engineering Inc. (November, 1996). The report provides details and specifications and costs for the proposed enclosure of approximately 420 m of the drain which was deemed necessary to require proper drainage for the proposed institutional development



on lands owned by James Sylvestre Developments Ltd. The report concludes that it would be possible to provide an enclosed system that would adequately replace the existing open drainage system within the northerly portion of the proposed service road for this development. Further, it was recommended to access the development across the East Townline Drain by installing a 1800 mm corrugated steel access culvert. (Not done).

2.3.6 Partial Enclosure of the East Townline Drain (2004)

In the *Tecumseh Road/Manning Road Environmental Report (May 2004)*, the Town of Tecumseh proposed a partial enclosure of the East Townline Drain north of Tecumseh Road, downstream of the study area. ERCA advised that the enclosure would require authorization from the Department of Fisheries and Oceans (DFO) and that appropriate habitat compensation would also be required. With the approval of DFO and ERCA, the Town provided fish compensation measures in a nearby watershed so that the East Townline Drain enclosure (from Tecumseh Road to north of St. Gregory Road) could be completed. The drain enclosure was subsequently completed.

2.3.7 Partial Enclosure of the East Townline Drain (2005)

In the *County Road 19 Environmental Study Report (Dec. 2005)*, road and drainage improvements were proposed along Manning Road (County Road 19), from County Road 22 north to the Canadian National Railway line. As a result, the East Townline Drain, from County Road 22 to the CNR line was enclosed with a concrete box culvert.

2.4 Soils

The principle surficial soil in the study area is described as Brookston clay or clay loam which belongs to the Hydrologic Soil Group of C. The Soil Conservation Service curve number for crop and other improved land within this soil group is 82 which indicates a low infiltration capacity and high runoff potential.

2.5 Terrestrial Environment

A site visit of the study area was conducted by a Dillon Consulting Biologist on April 6, 2005 to investigate natural vegetation and aquatic potential within the study area. In areas where vegetation is regenerating naturally and of sufficient size, Ecological Land Classification (Lee et



al. 1998) has been used for classification purposes. Due to the small size and semi-natural state of vegetation along hedgerows, vegetation is only described in generic terms. Representative photographs of the study area vegetation were documented during the field visit and depicted in **Appendix C: Study Area Vegetation and Aquatic Constraints**.

2.5.1 Methods

Vegetation was characterized using the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al. 1998) during field investigations. Where present, vegetation community boundaries were determined through the review of aerial photograph, and then ground-truthed and a vegetation or community classification assigned.

The ELC system recommends that a vegetation community be a minimum of 0.5 ha in size before it is defined. As a result, patches of vegetation less than 0.5 ha or vegetation which have been disturbed were described to the community level only. In some instances, where vegetation was less than 0.5 ha but appeared relatively undisturbed and clearly fit within an ELC vegetation type, the more refined classification was used. Remnant semi-natural vegetation along hedgerows and drains were described in generic terms.

The potential for natural areas and rare species to occur in the study area was examined using the Natural Heritage Information Centre database.

2.5.2 Results

The majority of the study area consists of agricultural fields planted with a mixture of corn and soybean. Semi-natural vegetation in the study is limited to the perimeter of agricultural fields, along municipal drains and a small area along the eastern boundary. Vegetation, along agricultural field perimeters and the three existing municipal drains, ranges from isolated trees mixed with herbaceous pioneer species to small mixed deciduous hedgerows. On the western perimeter of the study area a small section of naturally regenerating vegetation exists.

The Baillargeon Drain is located in approximately the middle of the study area and flows from the west side of the study area, east towards the East Town Line Drain. Dominant vegetation along the western portion of this drain consists of American elm, Manitoba maple and balsam poplar species (*Plate 1*). In the eastern portion of the drain, agricultural fields extend to within



half a metre of the top of bank. Drain slopes are vegetated with a Cultural Old Field Meadow (CUM 1-1), which includes grass species, goldenrod and other pioneer species.

The Cyr Drain is located along the west limit of the study area flowing north and adjacent to the southern limits of County Road 22, flowing west to east. Drain slopes are vegetated with a Cultural Old Field Meadow (CUM 1-1) including grass species, goldenrod and red osier dogwood. A new storm outlet has been created to service commercial development to the west (*Plate 2*) and outlets to the main drain which is enclosed for approximately 200 metres south from County Road 22.

The East Town Line Drain is located along the east limit of the study area within the western limit of the Manning Road right-of-way. Similar to vegetation along other drains, vegetation consists of a Cultural Old Field Meadow (CUM 1-1) dominated by grass and invasive species typical of roadside environments.

Hedgerow 1 is situated in a north south orientation, slightly east of the existing residential development. The type and quality of vegetation along in this hedgerow varies, but, dominant species include hawthorn, white oak, bur oak, balsam poplar, Manitoba maple, American elm, gray dogwood and red-osier dogwood (*Plate 3*). Just south of the middle of the hedgerow, two large oak specimen trees exist.

Hedgerow 2, located south of the western extent of the Baillargeon Drain, is dominated by trembling aspen.

The remaining vegetation located between agricultural fields consists of Cultural Old Field Meadow (CUM 1-1) with isolated white ash, balsam poplar, Manitoba maple, buckthorn and hawthorn species, generally in poor condition (*Plate 4*).

Between Hedgerow 1 and the residential development, a few semi-natural vegetation types have begun regenerating. The northern and southern third consist of typical pioneer Cultural Old Field Meadow (CUM 1-1) vegetation (*Plate 5*). Within the southern third, there is a small inclusion of Mineral Shallow Marsh (MAS) dominated by common reed (*Plate 6*). During fieldwork, blue-winged teal, spring peepers and leopard frogs were observed using the meadow marsh. The middle third is comprised of a Gray Dogwood Cultural Thicket (CUT 1-4) dominated by gray dogwood, red-osier dogwood, hawthorn, wild carrot, golden rod, with isolated swamp rose, sugar maple and green ash individuals (*Plate 7*).



According to the Natural Heritage Information Centre, no natural areas occur in the study area. There is a potential for the Elusive clubtail (S2) and Eastern amberwing (S3) to occur in the surrounding area. Although these species were searched for during fieldwork, neither species nor appropriate habitat were observed in the study area.

2.5.3 Conclusions

Agriculture is the dominant land use in the area and remnant vegetation is isolated and heavily impacted as a result of this current and other historical land uses. Vegetation associated with the drains, is limited to Cultural Old Field Meadows (CUM 1-1) with isolated woody vegetation. The two small hedgerows are dominated by relatively young common deciduous species with the exception of two old specimen trees. In the western portion of the site vegetation has begun to regenerate naturally. Vegetation in this area consists of a mix of Cultural Old Field Meadow (CUM 1-1), Gray Dogwood Mineral Cultural Thicket (CUT 1-4) with a small inclusion of Shallow Meadow Marsh (MAS) dominated by common reed.

According to the Natural Heritage Information Centre, no natural areas occur in the study area. No rare species were observed during fieldwork.

2.6 Aquatic Environment

The East Townline Drain is located on the west side of Manning Road, adjacent to the road shoulder. Potential cover for fish within the drain is minimal, as a result of maintenance to keep it free of debris and obstructions. There appears to be no section of the East Townline Drain that possesses aquatic habitat similar to a natural watercourse. The entire length of the drain is highly altered and is essentially a roadside ditch.

Fish access from Lake St. Clair to the East Townline Drain may be possible through the open gate at the pumping station though this drain is considered a “pumped” system with no gravity outlet to the lake. There are no barriers to upstream fish migration, such as perched culverts, within the study area. It is possible that some pools persist within the lower reaches of the drain that are of sufficient size and depth to support a few small fish. However, the extent of potential fish habitat is unknown and is likely quite limited.



Correspondence from Essex Region Conservation Authority, dated January 26, 2006, confirmed that the reaches of the East Townline Drain, south from the Canadian National Railway line, and upstream, are not considered fish habitat. A copy of this letter is also included in Appendix C.

2.7 Social Environment

As described in Section 2.1 of this report, the existing social environment of the study area is agricultural and light industrial/business park in nature, with a presence of low density residential land uses. Linear open space recreation also exists along the Canadian Pacific Railway line west of the study area.

2.8 Economic Environment

Economic activity, within the study area, includes commercial and light industrial business such as Tecumseh Truss, Marquis Tile, Evergreen Landscaping, Rapid Machine & EDM, J&F Industrial Systems, Superior Seal, Case Construction Equipment Rental, Lock-It Public Storage, and Wayne Dalton Garage Doors. Other economic activities within the study area, include agricultural operations, the majority of which is cash crop farming.

2.9 Cultural Resources

In August 2005, March 2006, November 2006, and April 2007, Dillon submitted letters and notices to the Heritage Planner and Regional Archaeologist of the Ministry of Culture indicating the Town's proposed undertaking and the upcoming public consultation dates. The Ministry did not contact Dillon or the Town indicating any potential for the discovery of archaeological or cultural resources.

3.0 STORMWATER MANAGEMENT (SWM)

3.1 Stormwater Management Design Considerations

3.1.1 Design Criteria

Proposed stormwater management measures for the new development will adhere to the principles of the MOE as documented in the *Stormwater Management Planning and Design Manual*



(March 2003). Only those types of stormwater management controls that are deemed suitable for mitigating the impacts of urban development are considered. Lot level and conveyance controls that are applied at the individual lot level, controls which serve multiple lots (< 2 ha) and end-of-pipe controls that receive stormwater from a conveyance system and discharge to a receiving water will be incorporated into the proposed development. Lot level and conveyance controls maintain the natural hydrologic cycle to the greatest extent possible, while end-of-pipe facilities are required for flood control and water quality treatment. It should be noted that lot level and conveyance controls are not feasible in the Study Area and were not carried forward for consideration.

3.1.2 End-of-Pipe Controls

Examples of end-of-pipe controls include wet and dry ponds, constructed wetlands, green corridors, and oil/grit separators. With the exception of oil/grit separators which can be applied for drainage areas less than 2 ha, the minimum drainage area for the end-of-pipe facilities is 5 ha. The minimum area requirement is a function of sizing the outlet to ensure that it is large enough to prevent clogging.

Dry ponds can be effective for erosion or flood control, but offer little in the way of water quality control. A longer detention time can result in higher suspended solids removal. However, achieving this for smaller drainage areas may be difficult because of outlet size considerations. Therefore, the use of dry ponds, for water quality purposes, remains largely to retrofits or situations where other controls are not feasible.

Wet facilities are those have a permanent pool with an extended detention component because of their multi-purpose design (i.e. water quality and quantity and erosion control). Resuspension of settled solids, in the pond's effluent, is minimized due to the permanent pool. Extended detention refers to the portion of storage which fills during a rainfall event, then subsequently drains.

The bottom of wet ponds are consistently flat to maximize sedimentation removal of pollutants. Constructed wetlands are contoured to vary in depth between shallow and deep pools to maximize contact time with bacterial colonies clustered on the plants and remove dissolved pollutants. The permanent pool water volume remains the same in both configurations, yet to maximize efficiency, constructed wetlands can be more land intensive than wet ponds.



A green corridor is an open space block that provides linkage between terrestrial or aquatic habitats so that plants and animals may migrate between habitats to carry out their reproductive cycle or to expand their territory. In the urban environment, this can mean a park or other open space (SWM pond, trail) system that links two or more woodlots, a river system, wetland or ravine. Green corridors should have a high density of tree cover, broad diversity of habitats and receive a minimum amount of maintenance, yet should be protected within the policy of framework of a Secondary Plan, and as part of an Official Plan. Though green corridors should be considered for their stormwater management and recreational/natural environment benefits, they are not applicable within the Study Area lands.

To maximize the area available for development, stormwater facilities may be allowed to be designated parkland, offering recreational opportunities such as trails and playing fields.

Post-development flow rates will be reduced to pre-development levels for storms with return periods ranging from 2 to 100 years.

3.1.3 Treatment Options

Three levels of water quality treatment are prescribed by the MOE with the goal to maintain or enhance existing aquatic habitat based on the removal of suspended solids. The level of protection is based on a relationship between the long-term average suspended solid removal and the lethal and chronic effects of suspended solids on aquatic life. The habitat characteristics corresponding to three levels are as follows:

- Enhanced Protection - required when sensitive aquatic habitat will be impacted by end-of-pipe discharge. Conditions which will require this level of treatment include areas with high permeability soils (SCS Groups A and B) which are not conducive to infiltration which reduces suspended solids loading from the post-development site; downstream habitats sensitive to sediment and siltation; high base flow discharge areas; high upstream sediment loads. Enhanced protection corresponds to an average removal of 80% of suspended solids.
- Normal Protection - required when conditions for enhanced treatment do not exist. Conditions may include areas with moderate, natural upstream sediment loads and spawning habitat less sensitive to suspended solids loadings. Normal protection corresponds to an average removal of 70% of suspended solids.



- Basic Protection - acceptable only where the receiving aquatic habitat is demonstrated to be insensitive to stormwater impacts and has little potential for immediate or long-term rehabilitation. Conditions where basic protection may be applied include areas where downstream aquatic habitat has adapted to high suspended solid loading and areas where downstream watercourses have been significantly altered (due to urbanization or agriculture), are hardened, polluted and with little short or long-term potential for rehabilitation. Basic protection corresponds to an average removal of 60% of suspended solids.

In the case of the Manning Road stormwater facility, a Normal Level of protection will be provided based on the discharge criteria established above. This level of treatment will be enhanced however, by the sculpting of shallow and deep zones, intended to force water through the aquatic vegetation providing a greater time of interface between the water-borne pollutants and the micro-organisms which colonize the surface of aquatic plants. It is the microbes, which transform the hydrocarbons into harmless bi-products, uptake heavy metals and then expose harmful pathogenic bacteria to the UV spectrum in sunlight, sterilizing the bacteria to halt their reproduction.

The Manning Road facility will be designed, therefore, to go beyond the minimum requirements mandated in the MOE SWMP Manual, treating the water to a higher level through multiple ecological processes capable of converting pollutants into less harmful by-products – all within a facility that is aesthetically attractive with a recreational trail built around the perimeter to put the public in close contact with the flora and fauna, and therefore the ecosystem processes that drive the system.

3.1.4 Overland Flow Routing

Overland flow routing for larger event storms (> 1:100 year) to the stormwater management facility is the preferred scenario. However, the study area is relatively flat; lands slope gently from south to north (average fall = 0.83m) and west to east (average fall = 0.57m). Considering existing site constraints (i.e. land use, infrastructure, etc.), this objective may be difficult to satisfy.



3.2 SWM Facility Design Considerations

The design of the stormwater management facility is based on the Ministry of the Environment's "Stormwater Management Planning and Design Manual, March 2003" as well as criteria established by the Town. Generally, the highest level of performance criteria was selected where possible.

The following facility design considerations were taken into account:

- Detention time (2 days) (Town standard).
- Permanent pool side slopes (5:1) (Town and MOE standard).
- Capacity of the East Townline Drain as an outlet.
- Typical soil particle in runoff is a fine clay, slow to settle from solution
- Provide storage capacity in the facilities to enhance stormwater quality for existing built up areas.
- Minimize the number of stormwater facilities (and pump stations).
- Range of storm events to receive quantity or quality treatment.
- Level of treatment.
- Land requirements.

3.3 Community-Based Design Considerations

The SWM facilities are also required to address social and land use issues consistent with the Town's planning and development practices.

The following issues were also considered.

- SW facilities must provide community value as an amenity.
- SW facilities must mitigate the attraction of waterfowl which may result in hazards to aircraft due to proximity to the Windsor Airport, approximately 5 km away.
- SW facilities design should include mosquito control measures to minimize the potential for the spread of West Nile virus.



3.4 SWM Facilities – Advantages and Disadvantages

The advantages and disadvantages of various types of end-of-pipe treatment facilities were assessed with respect to various considerations, presented earlier in this section, and are pertinent to the study area. The results of this assessment were summarized in **Table 3.1 – Stormwater Management Facilities, Evaluation Matrix**.

It was concluded that wet pond and wetland end-of-pipe treatment options could best address the criteria established by the MOE and the Town.

Table 3.1

Stormwater Management Facilities				
Evaluation Matrix				
Design Requirements / Issues	Dry Pond	Wet Pond	Wetland	Green Corridors
Treatment Level	can achieve Basic* Protection Level only (may not be suitable for warmwater receiving watercourses)	can achieve up to Enhanced Protection Level	can achieve up to Enhanced Protection Level	may achieve Basic Protection Level only (not a standard measure)
Volume Requirement (for impervious level of approximately 45%)	120 m ³ /ha (for Basic Protection Level)	100 m ³ /ha (for Normal Protection Level)	65 m ³ /ha for Normal Protection Level	120 m ³ /ha (for Basic Protection Level, as per Dry Ponds)
Surface Area of Feature	results in a large footprint due to volume requirement and maximum storage depth	similar surface area as required for wetland (tradeoff between larger volume requirement and deeper permanent pool)	similar surface area as required for wet pond (tradeoff between smaller volume requirement and shallower permanent pool)	results in the largest footprint - due to land required for side slopes
Attraction to Birds	limited potential to attract birds due to elimination of permanent pool	higher potential to attract birds due to largest open water space; shallow, gently sloped edges attract Canadian Geese	shallow, gently sloped edges attract Canadian Geese; taller vegetation results in deterrent to birds landing	limited potential to attract birds due to elimination of permanent pool



Stormwater Management Facilities				
Evaluation Matrix				
Design Requirements / Issues	Dry Pond	Wet Pond	Wetland	Green Corridors
Potential for West Nile Virus	limited potential for standing water reduces potential for breeding mosquitoes	deeper standing water somewhat reduces conditions suitable for breeding mosquitoes	fringe areas with emergent vegetation with shallow water suitable for fish that will eat mosquito larvae	limited potential for standing water reduces potential for breeding mosquitoes
Integration with Development Plan (Amenity Value)	limited potential to naturalize feature and integrate into park space/ trail network	opportunity to naturalize feature and integrate into park space network	greatest opportunity to naturalize feature and integrate into park space network	greatest opportunity to naturalize feature and integrate into trail network

Note:

* Basic, normal and enhanced treatment achieves 60%, 70% and 80% long term suspended solids removal, respectively.

 Facilities which best meet the intent of the design requirement/issue.

4.0 ALTERNATIVE SOLUTIONS

A series of alternative solutions were considered to address the Problem Statement. The following sections include a description of the alternative solutions, the assessment and evaluation criteria that were used, and the results of the comparative evaluation of alternatives.

4.1 Identification and Description of Alternative Solutions

Prior to development of the alternative solutions, a number of informal meetings were held with local Developers, local homeowners and the Essex Region Conservation Authority. As a result, the following facility design and community-based criteria were selected.

4.1.1 SWM Facility Design Criteria

The following criteria were selected:

- A 2 day detention time was selected to minimize the pump station size and impact on the East Townline Drain (ETLD).



- 5:1 permanent pool side slopes were selected to provide a satisfactory level of public safety but also to minimize the land requirements for the facility (Town approved 5:1 side slopes which still meets MOE guidelines).
- The existing capacity of the ETLD (1.9m³/sec) was maintained.
- The pond would not have storage capacity to service existing built up lands.
- One regional SWM facility is considered as the optimum condition; however, no more than two separate SWM facilities will be evaluated. Land requirements, per unit of storage required, are optimized with a single regional pond.
- All facilities will be designed to store the entire 1:100 year event (without pumping).
- “Normal” level of quantity treatment will be provided for all storms up to and including the 1:100 year event.

4.1.2 Community-Based Design Criteria

The following criteria were adopted:

- The SWM facility location and configuration would be developed to ensure that the facility could be integrated into a future trail/walkway system and that the public would have safe access to and around the SWM facility.
- The SWM facility design would incorporate waterfowl control features such as grassed shorelines to prevent nesting, tree planting and shallow grassed water areas to discourage landing as well as raptor perches to encourage nesting by predators such as hawks and ospreys.
- The SWM facility design would include mosquito control features such as reducing stagnant pool areas, maximizing large open area surfaces which can react with prevailing winds and introducing small predator fish, dragonfly larvae, frogs and other invertebrates which prey on mosquito larvae.

4.1.3 Other Development Controls

The following additional controls were also adopted:

- Overland flow routes for all development plans will provide temporary storage for storm runoff within the road allowances up to the 1:100 year storm.
- Eaves trough downspouts and lot drainage will be connected to future storm sewers.



- Storm sewer collection systems will be designed based on the Environment Canada AES 5 year storm curve.

As a result of these conclusions, the following alternative solutions to address the problem were identified:

Alternative Solution #1 – Do Nothing

Stormwater management in the study area would remain at the present conditions, with no work done to improve or maintain the current situation. Refer to **Figure 7.0**.

Alternative Solution #2 – Regional Central Wet Pond

A single regional pond, centrally located, would service the drainage area, where the East Town Line drain would serve as the main outlet for the pond. Refer to **Figure 8.0**.

Alternative Solution #3 – Regional Wet Pond at CPR Railway

A single regional pond located at the southern end of the study area at the CPR Railway would service the drainage area. The area of this pond would need to be greater since the pond would be at the highest point of the drainage area. Refer to **Figure 9.0**.

Alternative Solution #4 – Dual Wet Ponds (Centrally Located)

Two wet ponds, centrally located, would service the drainage area, while also providing flexibility with phasing of future development. Two pumping stations and greater land areas would be required to construct two ponds. Refer to **Figure 10.0**.

Alternative Solution # 5 – Dual Wet Ponds

Two wet ponds, one centrally located and one at the CPR Railway, would service the drainage area, while also providing flexibility with phasing of future development. Two pumping stations and greater land areas would be required to construct two ponds. Refer to **Figure 11.0**.

Alternative Solution #6 – Developers' Alternative

Two wet ponds, one located in the eastern portion of the drainage area and one located at the CPR Railway, would service a portion of the drainage area. Drainage for the remainder of the study area (Cyr Drain Lands) is excluded. Refer to **Figure 12.0**.



4.1.4 Modelling Results

Using the criteria developed earlier in this section, six alternatives were evaluated using Visual OTTHYMO, Version 2.0 hydrologic modelling software. This software enables both quantity and quality requirements for a SWM facility to be determined.

Each alternative also included several variations requested by the Developers. These variations provided for the potential development of small parcels within the study area using their own SWM measures to meet Provincial and local requirements (i.e., alternatives a) to d) of Table 4.1 in Appendix D).

The results of the modelling are presented in **Table 4.1 – Examination of Various Alternatives – Quantity Requirements** and included in **Appendix D – Modelling Results for Various Alternatives**.

As expected, the land area (footprint) of a single regional pond was the lowest of all the alternatives considered.

It should also be noted, that the modelling results for only the primary alternatives (no variations) were carried forward as part of the assessment process at the request of the Town.

4.2 Assessment of Alternative Solutions

Evaluation Criteria:

Alternative solutions were evaluated and compared based on their impacts on various aspects of the environment including technical, economic, natural, cultural, and social environment and capital and maintenance costs.

Each alternative solution was evaluated against the following criteria:

- **Technical Impacts**
 - Area of Facility/Facilities
 - Level of Water Treatment
 - Stormwater Detention Time
 - Integration with Overland Flow Routes
 - Capacity of the East Town Line Drain



- Treatment for Existing Developed Areas
- Economic Impacts
 - Disruption to Existing & Proposed Businesses
 - Loss of Developable Land
- Environmental Impacts
 - Impact on Terrestrial Environment
 - Impact on Aquatic Environment
 - Control of Waterfowl Communities
 - Control of Mosquito Larvae
- Cultural Impacts
 - Effect on Cultural Resources
- Social Impacts
 - Disruption of Existing Land Use
 - Integration of Ponds as a Community Amenity
 - Public Safety of the Ponds
- Cost
 - Capital Cost of Treatment Facility/Facilities
 - Capital Cost of Trunk Sewers
 - Capital Cost of Pump Station(s)
 - Operational and Maintenance Cost of Pump Station(s)
 - Operational and Maintenance Cost of Treatment Facility/Facilities

Evaluation of Alternative Solutions:

The evaluation of the alternative solutions is summarized in **Table 4.2 – Alternative Solution Evaluation Matrix**.

The results of the evaluation indicate that **Alternative Solution #2 – Regional Central Wet Pond** or **Alternative Solution #3 – Regional Wet Pond at CPR Railway** are equally preferred solutions and short-listed for further evaluation.

4.3 Public and Agency Input (PIC No. 1)

A contact list of potential stakeholder groups and agencies was established in consultation with the Town of Tecumseh in order to identify interested parties (refer to **Appendix A: Comprehensive Mailing List** for the complete list). The list has been updated to include

TABLE 4.2 – ALTERNATIVE SOLUTION EVALUATION MATRIX

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Description	Do Nothing	Regional Wet Pond	Regional Wet Pond at CPR Railway	Dual Wet Ponds	Dual Wet Ponds	Developers' Proposal
Evaluation Criteria						
Technical Impacts						
Area of Facility (or Facilities)	Low • No stormwater facility	Low • Efficiency of single pond reduces total lands required	Medium • Efficiency of single pond reduces total lands required • Total area increases over Alternative 2 since pond is at the highest point of drainage area	High • Dual ponds require more land area than a single pond	High • Dual ponds require more land area than a single pond	High • Dual ponds require more land area than a single pond
Level of Water Treatment	Low • No stormwater facility	High • Wet pond meets Provincial treatment level requirements for stormwater quality	High • Wet pond meets Provincial treatment level requirements for stormwater quality	High • Wet ponds meets Provincial treatment level requirements for stormwater quality	High • Wet ponds meets Provincial treatment level requirements for stormwater quality	High • Wet ponds meets Provincial treatment level requirements for stormwater quality
Stormwater Detention Time	Low • No stormwater facility	High • Wet pond meets Provincial requirements for stormwater detention time	High • Wet pond meets Provincial requirements for stormwater detention time	High • Wet ponds meets Provincial requirements for stormwater detention time	High • Wet ponds meets Provincial requirements for stormwater detention time	High • Wet ponds meets Provincial requirements for stormwater detention time
Integration with Overland Flow Routes	Low • No stormwater facility	High • Wet pond can be integrated with overland stormwater flow routes	High • Wet pond can be integrated with overland stormwater flow routes	High • Wet ponds can be integrated with overland stormwater flow routes	High • Wet ponds can be integrated with overland stormwater flow routes	High • Wet ponds can be integrated with overland stormwater flow routes
Capacity of the East Town Line Drain	Low • No stormwater facility	High • East Townline Drain can serve as an adequate outlet for the pond	High • East Townline Drain can serve as an adequate outlet for the pond	High • East Townline Drain can serve as an adequate outlet for the ponds	High • East Townline Drain can serve as an adequate outlet for the ponds	High • East Townline Drain can serve as an adequate outlet for the ponds
Treatment for Existing Developed Areas	Low • No stormwater facility	High • Some treatment of existing stormwater flows can be provided in the Baillargeon Drain	Low • No treatment of existing stormwater flows can be provided in the Baillargeon Drain	High • Some treatment of existing stormwater flows can be provided in the Baillargeon Drain	Medium • Less treatment of existing stormwater flows can be provided in the Baillargeon Drain	Medium • Less treatment of existing stormwater flows can be provided in the Baillargeon Drain
Economic Impacts						
Disruption to Existing & Proposed Businesses	Low • No disruption	Low • Little or no disruption	Low • Little or no disruption	Low • Little or no disruption	Low • Little or no disruption	Low • Little or no disruption
Loss of Developable Land	Low • No loss of land	High • Prime residential property in the central area would be required for this alternative	Low • Land at the CPR Railway may be difficult to market as residential, therefore the impact of losing this land for a pond is low	High • Prime residential property in the central area would be required for this alternative	Medium • Some prime residential property in the central area would be required, and some less marketable land along the CPR railway would also be required	Medium • Some prime commercial property along the County Rd 19 and some unmarketable land along the CPR railway would be required
Environmental Impacts						
Impact on Terrestrial Environment	Low • No impact on existing vegetation	Low • Loss of common meadow-type vegetation and wildlife • No significant natural areas occur within the study area	Low • Loss of common meadow-type vegetation and wildlife • No significant natural areas occur within the study area	Low • Loss of common meadow-type vegetation and wildlife • No significant natural areas occur within the study area	Low • Loss of common meadow-type vegetation and wildlife • No significant natural areas occur within the study area	Low • Loss of common meadow-type vegetation and wildlife • No significant natural areas occur within the study area
Impact on Aquatic Environment	Low • No loss of fish habitat	Low • No loss of fish habitat or fish refuge in the existing drainage systems	Low • No loss of fish habitat or fish refuge in the existing drainage systems	Low • No loss of fish habitat or fish refuge in the existing drainage systems	Low • No loss of fish habitat or fish refuge in the existing drainage systems	Low • No loss of fish habitat or fish refuge in the existing drainage systems
Control of Waterfowl Communities	Low • Existing waterfowl conditions to remain unchanged	Low • Central location of pond adjacent to proposed parkland may encourage the development of waterfowl communities	Medium • Location of pond away from proposed parkland may discourage the development waterfowl communities	Low • Central locations of ponds near proposed parkland may encourage the development of waterfowl communities	Medium • Location of ponds away from and adjacent to proposed parkland may discourage the development of waterfowl communities	Medium • Scattered location of ponds away from and adjacent to proposed parkland may be a deterrent for waterfowl communities
Control of Mosquito Larvae	Low • Existing mosquito conditions to remain unchanged	High • A fountain can be installed to promote surface water action, which discourages growth of mosquito larvae • Use of natural wind patterns promotes surface water action, which discourages growth of larvae	High • A fountain can be installed to promote surface water action, which discourages growth of mosquito larvae • Use of natural wind patterns promotes surface water action, which discourages growth of larvae	High • Fountains can be installed to promote surface water action, which discourages growth of mosquito larvae • Use of natural wind patterns promotes surface water action, which discourages growth of larvae	High • Fountains can be installed to promote surface water action, which discourages growth of mosquito larvae • Use of natural wind patterns promotes surface water action, which discourages growth of larvae	High • Fountains can be installed to promote surface water action, which discourages growth of mosquito larvae • Use of natural wind patterns promotes surface water action, which discourages growth of larvae

Evaluation Criteria:

- Low = Low Impact
- Medium = Medium Impact
- High = High Impact

TABLE 4.2 – ALTERNATIVE SOLUTION EVALUATION MATRIX

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Description	Do Nothing	Regional Wet Pond	Regional Wet Pond at CPR Railway	Dual Wet Ponds	Dual Wet Ponds	Developers' Proposal
Evaluation Criteria				larvae		
Cultural Impacts						
Effect on Cultural Resources	Low • No cultural resources will be affected	Low • No cultural resources will be affected	Low • No cultural resources will be affected	Low • No cultural resources will be affected	Low • No cultural resources will be affected	Low • No cultural resources will be affected
Social Impacts						
Disruption of Existing Land Use	Low • No disruption	Medium • Loss of existing agricultural land	Medium • Loss of existing agricultural land	Medium • Loss of existing agricultural land	Medium • Loss of existing agricultural land	Medium • Loss of existing agricultural land
Integration of Wet Ponds as a Community Amenity	Low • No benefit to community value	High • Integration of pond with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity	High • Integration of pond with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity	High • Integration of ponds with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity	High • Integration of ponds with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity	High • Integration of ponds with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity
Public Safety of the Ponds	Low • Existing conditions to remain unchanged	High • Gradual side slope of pond promotes public safety • Shoreline vegetation discourages public trespassing • Signage and public education	High • Gradual side slope of pond promotes public safety • Shoreline vegetation discourages public trespassing • Signage and public education	High • Gradual side slope of ponds promotes public safety • Shoreline vegetation discourages public trespassing • Signage and public education	High • Gradual side slope of ponds promotes public safety • Shoreline vegetation discourages public trespassing • Signage and public education	High • Gradual side slope of ponds promotes public safety • Shoreline vegetation discourages public trespassing • Signage and public education
Cost						
Capital Cost of Treatment Facilities	Low • No stormwater facility	Low • A single pond reduces the cost of construction	Medium • A larger single pond at the highest point of the drainage area increases the cost of construction	High • Dual ponds will increase the cost of construction	Higher • Dual ponds, one being at the highest point of the drainage area, will increase the cost of construction	Highest • Dual ponds, one being at the highest point of the drainage area, will increase the cost of construction
Capital Cost of Trunk Sewers	Low • No stormwater facility	Low • Size and length of trunk sewers will be minimized for centrally located pond	High • Size and length of trunk sewers will be increased for pond located at the highest point of the drainage area	Low • Size and length of trunk sewers will be minimized for centrally located dual ponds	Medium • Size and length of trunk sewers will be increased for centrally located pond and at the highest point of the drainage area	Medium • Size and length of trunk sewers will be increased for centrally located pond and at the highest point of the drainage area
Capital Cost of Pump Station(s)	Low • No stormwater facility	Low • Construction of one stormwater pumping station is required	Low • Construction of one stormwater pumping station is required	Low • Construction of one stormwater pumping station is required	High • Construction of two stormwater pumping stations is required	High • Construction of two stormwater pumping stations is required
Operational & Maintenance Cost of Pump Station(s)	Low • No stormwater facility	Low • One stormwater pumping station needs to be operated and maintained	Low • One stormwater pumping station needs to be operated and maintained	Low • One stormwater pumping station needs to be operated and maintained	Low • Two stormwater pumping stations need to be operated and maintained	Low • Two stormwater pumping stations need to be operated and maintained
Operational & Maintenance Cost of Treatment Facilities	Low • No stormwater facility	Low • One stormwater facility needs to be operated and maintained	Low • One stormwater facility needs to be operated and maintained	High • Two stormwater facilities need to be operated and maintained	High • Two stormwater facilities need to be operated and maintained	High • Two stormwater facilities need to be operated and maintained
Concluding Comments		RECOMMENDED SOLUTION	RECOMMENDED SOLUTION			

Evaluation Criteria:

Low = Low Impact

Medium = Medium Impact

High = High Impact



interested parties who responded to the Project Initiation Notice or who attended either of the Public Information Centres and requested to be informed of project activities.

In preparation for the first Public Information Centre, several notices were placed on the public record. The newspaper and publication dates are identified below (also refer to **Appendix E: Notice of Public Information Centre #1**):

- The Windsor Star: Wednesday, March 8, 2006
- The Tecumseh Tribune: Thursday, March 9, 2006
- The Tecumseh Shoreline: Wednesday, March 8, 2006

The first PIC notice was also mailed to those on the Mailing List, including property owners and affected agencies (refer to **Appendix E** for further details on the Notice and mailing).

The first Public Information Centre was held on Wednesday, March 22, 2006 at the Town of Tecumseh Council Chambers and consisted of an informal walk-in session with displays summarizing the work completed to date. Staff from the Town of Tecumseh and Dillon Consulting were available to explain the displays, answer questions and record comments.

The first PIC was held in order to provide necessary background information and study context as well as the evaluation of alternatives and preliminary recommendations. The displays related to the Class EA included text, graphics and maps showing:

- Class EA Study Process;
- Location and existing land use;
- Description of alternatives; and
- Evaluation of alternatives.

This presentation material is included in **Appendix F: PIC #1 Presentation Material**.

As shown in **Appendix G: Public Input at PIC #1**, approximately twenty-five (25) individuals attended the PIC. The following is a break-down of this total:



- Thirteen (13) residential property owners residing and/or owning property in the study area.
- Four (4) representatives of local agencies.
- Eight (8) local developers and/or representatives of local developers.

Comment sheets were received from fourteen (14) individuals at PIC #1. **Table 4.3 - Summary of Public Information Centre #1 Comments** is a general summary of the comments received at the PIC or shortly thereafter either via email or facsimile.

**Table 4.3 – Summary of Public Information Centre #1 Comments
March 22, 2006**

Address	Name	General Comments
1614 Lesperance	Richard & Deborah St. Louis - Fairlane Developments	<ul style="list-style-type: none"> • Stated that the lands owned by this developer should be able to drain into the Cyr Drain, and that the small development of 40 homes would not greatly affect the Cyr Drain. • Also stated that they would like to rezone a portion of their land for commercial and would like to do so immediately in order to start development.
1815 Deslippe Dr	Dawn Stallard	<ul style="list-style-type: none"> • In support of Alternative #2 Regional Wet Pond. • Recommends the Town purchase the corner lot on Candlewood & construct an alternate route to Lesperance to help with traffic congestion on Gouin.
1754 Lesperance	Rick DeMarse	<ul style="list-style-type: none"> • Opposes Alternative #6 Developers' Proposal because it excludes their property and may create future problems. • Stated that the Cyr Drain has serviced rear lots east of Lesperance for years as it is a natural flow north and east to the East Townline Drain. • Also stated the amount of land affected is a minimal burden to the Cyr Drain. • Alternative #2 Regional Wet Pond would be their second choice to serve their land.
12401 Renaud St	Lena DeMarse	<ul style="list-style-type: none"> • Assumed the Cyr Drain was capable of handling their future land development needs. • In support of Alternative #2 Regional Wet Pond to service the entire area.



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Address	Name	General Comments
		<ul style="list-style-type: none"> • Opposes Alternative #6 Developers' Proposal because it excludes their property.
12364 DeMarse Ct	Gale DeMarse	<ul style="list-style-type: none"> • Opposes Alternative #6 Developers' Proposal since it excludes their property. • Stated that if the Cyr Drain could accommodate their needs, then that would be their choice. • However, in support of Alternative #2 Regional Wet Pond to minimize capital and maintenance costs.
25 Amy Croft Dr	Valente Group	<ul style="list-style-type: none"> • Stated that the Cyr Drain Developers (St. Louis & DeMarse) should be accommodated by that drain. • Alternative #3 Regional Wet Pond at CPR Railway is beneficial since it allows for immediate opportunities for development. • Stated the Town should share in the cost of constructing Alternative #2 Regional Wet Pond since it serves a large existing area of the Town. • In support of Alternative #6 Developers' Proposal – the installation and infrastructure costs are the developers' responsibility; it will allow the freedom to develop at their own schedules; new municipal taxes created by the developments will offset the increased maintenance costs; the increased costs for pumping are insignificant; the SWM facilities will be integrated into the proposed park system. • Stated that capital costs in the matrix should be excluded since this is the responsibility of the developers, not the Town's.
1865 Manning Rd	James Sylvestre Developments Ltd	<ul style="list-style-type: none"> • Operational & maintenance costs are not the responsibility of the Town. • Strongly oppose Alternative #2 Regional Wet Pond
3100 Temple Dr	Richard Spencer	<ul style="list-style-type: none"> • The differences in environmental impacts between Alternatives #2, #3, & #6 are not significant. • In support of Alternative #6 Developers' Proposal (less geese, more developer flexibility)
1957 St. Anne's St	Ms. Pelankas	<ul style="list-style-type: none"> • As a taxpayer, does not want to pay for this through increased property taxes. • Is hoping that her drainage issues in her rear yard will be addressed.
1921 Lesperance	Paul Morand	<ul style="list-style-type: none"> • In support of Alternative #3 Regional Wet Pond at



Address	Name	General Comments
		CP Railway. <ul style="list-style-type: none"> • Opposes a wet pond near residential the neighbourhoods for safety reasons.
Essex OPP	Constable Steve Johnson	<ul style="list-style-type: none"> • Concerned with street closures during construction (for emergency access purposes)
2084 St. Anne's St 2089 St. Anne's St	Ron Hartigan & Linda Proctor	<ul style="list-style-type: none"> • Recommends drainage improvements for residential property on St. Anne's Street. • In support of Alternative #2 Regional Wet Pond and Alternative #4 Dual Wet Ponds. • Recommends integration of the pond(s) within a parks and recreation system. • Does not want to pay for this through increased property taxes.
12378 Funaro St.	Janet Frankowski	<ul style="list-style-type: none"> • Recommends drainage improvements for residential property on Funaro St, especially hers. • In support of Alternatives #2 & #3 - any single pond option that includes her neighbourhood into the drainage system.
1855 Deslippe & 1885 Deslippe	Joe Sperduti & Jim Brown	<ul style="list-style-type: none"> • In support of Alternative #3 Regional Wet Pond at the CP Railway. • Prefers more technical improvements, rather than a community amenity. • Concerned with location of Alt #2 in the flight path. • Concerned with mosquito larvae and recommends installation of a water fountain. • Recommends the Town purchase the corner lot on Candlewood and construct an alternate route to Lesperance to help alleviate traffic congestion on Gouin.

4.4 Rationale for Selection of Preferred Solution(s)

After reviewing input from public agencies and the public at large, **Alternative Solution #2 – Regional Central Wet Pond** and **Alternative Solution #3 – Regional Wet Pond at CPR Railway** were chosen as the preferred solutions to be carried forward in the evaluation process considering design concepts.

In summary, the preferred solutions consist of:

**Table 5.1
Alternative Design Concept Evaluation Matrix**

Alternative Design Concept Evaluation Matrix		Alternative Design Concept #1	Alternative Design Concept #2
Evaluation Criteria	Description	Regional Central Pond	Regional CPR Pond
Technical Impacts	Area of Facility (or Facilities)	<ul style="list-style-type: none"> Low Efficiency of single pond reduces total lands required 	<ul style="list-style-type: none"> Medium Efficiency of single pond reduces total lands required Total area increases over recommended design 1 since pond is at the highest point of drainage area
	Level of Water Treatment	<ul style="list-style-type: none"> High Wet pond meets Provincial treatment level requirements for stormwater quality 	<ul style="list-style-type: none"> High Wet pond meets Provincial treatment level requirements for stormwater quality
	Stormwater Detention Time	<ul style="list-style-type: none"> High Wet pond meets Provincial requirements for stormwater detention time 	<ul style="list-style-type: none"> High Wet pond meets Provincial requirements for stormwater detention time
	Integration with Overland Flow Routes	<ul style="list-style-type: none"> High Wet pond can be integrated with overland stormwater flow routes 	<ul style="list-style-type: none"> High Wet pond can be integrated with overland stormwater flow routes
	Capacity of the East Town Line Drain	<ul style="list-style-type: none"> High East Townline Drain can serve as an adequate outlet for the pond 	<ul style="list-style-type: none"> High East Townline Drain can serve as an adequate outlet for the pond
	Treatment for Existing Developed Areas	<ul style="list-style-type: none"> Low Some treatment of existing stormwater flows can be provided in the Baillargeon Drain 	<ul style="list-style-type: none"> Low No treatment of existing Baillargeon Drain stormwater flows can be provided
Economic Impacts			
	Disruption to Existing & Proposed Businesses	<ul style="list-style-type: none"> Low Little or no disruption 	<ul style="list-style-type: none"> Low Little or no disruption
	Loss of Developable Land	<ul style="list-style-type: none"> High Prime residential property in the central area would be required for this alternative 	<ul style="list-style-type: none"> Low Land at the CPR Railway may be difficult to market as residential, therefore the impact of losing this land for a pond is low
Environmental Impacts			
	Impact on Terrestrial Environment	<ul style="list-style-type: none"> Low Loss of common meadow-type vegetation and wildlife No significant natural areas occur within the study area 	<ul style="list-style-type: none"> Low Loss of common meadow-type vegetation and wildlife No significant natural areas occur within the study area
	Impact on Aquatic Environment	<ul style="list-style-type: none"> Low No loss of fish habitat or fish refuge in the existing drainage systems 	<ul style="list-style-type: none"> Low No loss of fish habitat or fish refuge in the existing drainage systems
	Control of Waterfowl Communities	<ul style="list-style-type: none"> Low Central location of pond adjacent to proposed parkland may encourage the development of waterfowl communities 	<ul style="list-style-type: none"> Medium Location of pond away from proposed parkland may discourage the development of waterfowl communities
	Control of Mosquito Larvae	<ul style="list-style-type: none"> High A fountain can be installed to promote surface water action, which discourages growth of mosquito larvae Use of natural wind patterns promotes surface water action, which discourages growth of larvae 	<ul style="list-style-type: none"> High A fountain can be installed to promote surface water action, which discourages growth of mosquito larvae Use of natural wind patterns promotes surface water action, which discourages growth of larvae
Cultural Impacts			
	Effect on Cultural Resources	<ul style="list-style-type: none"> Low No cultural resources will be affected 	<ul style="list-style-type: none"> Low No cultural resources will be affected
Social Impacts			
	Disruption of Existing Land Use	<ul style="list-style-type: none"> Medium Loss of existing agricultural land 	<ul style="list-style-type: none"> Medium Loss of existing agricultural land
	Integration of Wet Ponds as a Community Amenity	<ul style="list-style-type: none"> High Integration of pond with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity 	<ul style="list-style-type: none"> High Integration of pond with proposed parkland and recreational open spaces, including bicycle and pedestrian connectivity
	Public Safety of the Ponds	<ul style="list-style-type: none"> High Gradual side slope of pond promotes public safety Shoreline vegetation discourages public trespassing Signage and public education 	<ul style="list-style-type: none"> High Gradual side slope of pond promotes public safety Shoreline vegetation discourages public trespassing Signage and public education
Cost			
	Capital Cost of Treatment Facilities	<ul style="list-style-type: none"> Low A single pond reduces the cost of construction 	<ul style="list-style-type: none"> Medium A larger single pond at the highest point of the drainage area increases the cost of construction
	Capital Cost of Trunk Sewers	<ul style="list-style-type: none"> Low Size and length of trunk sewers will be minimized for centrally located pond 	<ul style="list-style-type: none"> Medium Size and length of trunk sewers will be increased for pond located at the highest point of the drainage area
	Capital Cost of Pump Station(s)	<ul style="list-style-type: none"> Low Construction of one stormwater pumping station is required 	<ul style="list-style-type: none"> Low Construction of one stormwater pumping station is required
	Operational & Maintenance Cost of Pump Station(s)	<ul style="list-style-type: none"> Low One stormwater pumping station needs to be operated and maintained 	<ul style="list-style-type: none"> Low One stormwater pumping station needs to be operated and maintained
	Operational & Maintenance Cost of Treatment Facilities	<ul style="list-style-type: none"> Low One stormwater facility needs to be operated and maintained 	<ul style="list-style-type: none"> Low One stormwater facility needs to be operated and maintained
Concluding Comments			Recommended Design Concept

Evaluation Criteria:

Low = Low Impact
 Medium = Medium Impact
 High = High Impact



- One regional stormwater management pond at two possible locations;
- A vast improvement to the existing local drainage system;
- Integration of the pond within a community parks and trail system;
- Control over mosquito and waterfowl habitat; and
- Integration of pond features to promote community safety.

4.5 Confirmation of Class EA Project Schedule

Although the preferred solution did not produce a single outcome, it essentially consists of a single regional stormwater management pond. Regardless of location, certain elements are essential to the final design, and therefore the Town decided that further study was required prior to implementing the preferred solution. Taking into account input from Town administration, the public, land developers with an interest in the area, and agencies, the project schedule was, therefore, confirmed as a “Schedule C” in order to move forward with design concepts for the preferred solution.

5.0 ALTERNATIVE DESIGN CONCEPTS

Once the preferred solution was chosen: one regional wet pond, a series of alternative design concepts for the preferred solution were considered. The following sections include a description of the alternative design concepts, the evaluation criteria that were used in their assessment, and the results of the comparative evaluation of design concepts.

5.1 Identification and Description of Alternative Design Concepts

The following alternative design concepts for the preferred alternative solution were identified:

Alternative Design #1 – Regional Central Pond

Further design and details for the centrally located pond are included, such as landscaping, open water forebays and basins, shallow areas with wetland plants, a cattail split, and an integrated path network. Details regarding depth and inflow are also included. Refer to **Figures 13.1 – 13.3**

Alternative Design #2 – Regional CPR Pond



Further design and details for the pond located at the CPR Railway are included, such as landscaping, open water forebays and basins, shallow areas with wetland plants, and an integrated path network. Details regarding depth and inflow are also included. Refer to **Figures 14.1 – 14.3**

5.2 Assessment of Alternative Design Concepts

As with the alternative solutions, the alternative design concepts were evaluated and compared based on their impacts on various aspects of the environment including technical, economic, natural, cultural, and social environment, and capital and maintenance costs.

To confirm the storage requirements for Alternative Designs 1 and 2, further stormwater analysis was carried out examining existing drainage areas west of Lesperance Road, the conveyance capacity of the East Townline Drain, and a final analysis of the expected development and related runoff. This work was summarized in memos dated November 24, 2006 and February 6, 2007 which can be found in **Appendix D**.

The evaluation of the alternative design concepts is summarized in **Table 5.1 – Alternative Design Concept Evaluation Matrix**.

The results of the evaluation indicate that **Alternative Design #2 – Regional CPR Pond** is the recommended design which best addresses existing deficiencies.

5.3 Public and Agency Input (PIC No. 2)

In preparation for the second Public Information Centre, several notices were placed on the public record. The newspaper and publication dates are identified below (also refer to **Appendix H: Notice of Public Information Centre #2**):

- The Windsor Star: Wednesday, November 22, 2006
- The Tecumseh Shoreline: Wednesday, November 29, 2006
- The Tecumseh Tribune: Thursday, November 30, 2006



The second PIC notice was also mailed to those on the Mailing List, including property owners and affected agencies (refer to **Appendix H**).

The second Public Information Centre was held on Tuesday, December 5, 2006 at the Town of Tecumseh Council Chambers and consisted of an informal walk-in session with displays summarizing the work completed to date. Staff from the Town of Tecumseh and Dillon Consulting were available to explain the displays, answer questions and record comments.

The second PIC was held in order to provide an evaluation of design concepts and preliminary recommendations. The displays related to the Class EA included text, graphics and maps showing:

- Background information to date, including the recommended Pond Solution
- Description of Design Concepts; and
- Evaluation of Design Concepts.

This presentation material is included in **Appendix I: PIC #2 Presentation Material**.

As shown in **Appendix J: Public Input at PIC #2**, approximately ten (10) individuals attended the PIC. The following is a break-down of this total:

- Five (5) residential property owners residing and/or owning property in the study area;
- Two (2) representatives of local agencies; and
- Three (3) local developers and/or representatives of local developers.

Comment sheets were received from four (4) individuals at the PIC #2. **Table 5.2 - Summary of Public Information Centre #2 Comments** is a general summary of the comments received at the second PIC or shortly thereafter either via email or facsimile.



**Table 5.2 – Summary of Public Information Centre #2 Comments
December 5, 2006**

Address	Name	General Comments
1921 Lesperance	Paul Morand	<ul style="list-style-type: none"> • In support of Design Concept #2 Regional CPR Pond.
12378 Funaro	Janet Frankowski	<ul style="list-style-type: none"> • Stated that she is experiencing flooding in her basement, her sump pump is overworking because her property is lowest than neighbouring properties. • Expresses concern over which drain will accommodate the water flow and where overland water will be flowing.
2045 Lesperance	Demitri Latridis	<ul style="list-style-type: none"> • Preference for Design Concept #2 Regional CPR Pond. • Expressed support over park amenity. • Also stated that he is experiencing flooding issues in his backyard and that hopefully these proposals will help with flooding.
1863 St. Anne's St	Fran Ferguson	<ul style="list-style-type: none"> • Stated that a well organised PIC and side by side comparison helped her decide that Design Concept #2 Regional CPR Pond is the better choice. • Also stated that although not immediately affected by the proposed development, she is grateful to be able to voice her opinion.

5.4 Rationale for Selection of the Preferred Design Concept

After reviewing the input from public agencies and the public at large, **Alternative Design #2 – Regional CPR Pond** was chosen as the preferred design concept.

The preferred design concept addresses the comments and concerns of the Town and many of the residents and developers. In summary, the preferred design concept consists of:

- A single, efficient regional stormwater management pond;
- A vast improvement to the existing local drainage system;



- Highest levels of water treatment, stormwater detention time, and integration with overland flow routes;
- Minimal impact to loss of developable land;
- Integration of the pond within a community parks and trail system;
- Control over mosquito and waterfowl habitat; and
- Integration of pond features to promote community safety.

6.0 DEVELOPMENT OF PREFERRED DESIGN

6.1 Introduction

This section of the report provides details of the preferred design concept with the incorporation of the preferred elements of design, which have been recommended in this Class Environmental Assessment Study. **Figure 15.0 - Final Design – Plan & Profile** depicts the preferred final design concept in further detail.

6.2 Selected Storage Design Parameters

To confirm the storage requirements for the Preferred Design, the stormwater analysis carried out previously and reported in the November 24, 2006 memo was updated. This revised data was then summarized in a further memo dated February 6, 2007 which can also be found in **Appendix D**.

6.2.1 Hydraulic Components

- Proposed development : 107 ha; Rainfall 108.9 mm, Runoff 74.7 mm, Volumetric runoff fraction 69%.
- Inlet Structures pipe set at 0.1 % slope with minimum 1.0 m cover over 2,300 m starting at the upstream ground elevation of 180.6, entering the facility at the northwest end
- Pipe sized to convey the 5 year event: 1650 mm dia conc. 2,300 m long at 0.1% slope meeting the pond at an outlet elevation of 175.00 m. Obvert of pipe 176.65 m. Single inlet location at west end of the pond.
- Pipe Outlet Invert / Normal Water Level (NWL): Elev 175.0 no surcharging of pipe at NWL.



- Extended Detention water volume: 4,200 m³ pumped out at a rate of 45 L/sec. based on 25 mm runoff from the 103 ha area / pump down period 26 hours. ED Water level: 175.08.
- 2 Year event water volume: 15,000 m³ at elevation 175.60. Pumped down at a rate of 500L/sec will take an additional 6 hours over that of the ED portion.
- Minimum permanent pool water volume of wet pond below NWL: 5,900 m³ to meet MOE SWMP criteria. The Preliminary design provided has a volume of 5900m³ used to maximize sedimentation and enhance pollutant removal through biological processes.
- Maximum (peak) storage volume at 100 year storm: 59,900 m³. 100 yr water level: 177.09 m.
- Peak storage to be pumped out at a rate of 500 L/sec for a drawdown period of approximately 41 hours.

6.2.2 Structural Components for Outlet Structure

- Intake should be an inverse sloped pipe to avoid siltation and take water from below the surface.
- Two stage electric pump sized for 0.045 m³/sec below an elevation of 175.08 m then, 0.50 m³/sec above that – outlets north to East Townline Drain. Suggested location of pump house is shown on Figure 15.0. Pump to shut off when it draws the water down to 175.00 m.
- Allow for an adjustable water level in concrete outlet weir to meet desired elevations or make corrections – either mechanically or electronically.
- Allow for a gate at the bottom so the entire pond can be pumped down for maintenance
- Allow for pipes to connect each basin to allow pump down. These pipes should have valves to give flexibility over isolating the separate areas to avoid a full pump-down.
- Coir cloth over marsh meadow mix in 4 m band around the perimeter of the pond covering the normal water level and above the Extended Detention level – stops wind setup waves from eroding soils around the perimeter at the normal water level.
- Pump down rate for the extended detention volume of 4,200 m³, 26 hours is 0.045 m³/sec.
- Pump down rate for the 100 year storm volume of 59,900 m³, 41 hours is 0.50 m³/sec.



6.3 Biological Components

- Incorporate shallows and wetland plants into the flow patterns to increase the retention time and contact time – three shallow areas proposed, one very large to give the impression of a large marsh – this minimizes the utilization by geese.
- Tall, dense plants, some woody, surrounding the waters edge to minimize the intrusion of geese.
- Add in bird and bat boxes to help consume mosquitoes.
- Add in habitat pockets for fox to help keep away geese and raccoons.
- Stock fish: Largemouth Bass (50 pair) and fathead minnow (250 pair) at a minimum – to control nuisance species – mosquitoes, biting midges, coarse fish, goldfish and carp.
- Bottoms should be quite deep – upwards of 4 m deep to ensure high oxygen levels during winter.

6.4 Recreational / Residential Components

- Incorporate a trail around the periphery and a bench 2/3 of the way up the slopes – above the 100 yr water level of 177.10 m – 2.5 m wide, asphalt surface – three connections to the area currently proposed at: south east, south west and north ends of the facility.
- No boardwalk / crossing through the facility.
- Ensure public safety by maintaining slopes at 5:1 or shallower wherever practical – note that design is currently calculated at 5:1 slopes.
- Landscaping trees, shrub beds spot the landscape, making interesting viewpoints, planting beds and sitting areas.
- Western side slopes can be reduced in height by up to 4.0 m making walkouts for properties that back onto the pond leaving 1.0 m for freeboard.
- Width of top buffer: 3 m.

6.5 Maintenance Components

- Include a clean out ramp and roadway to the nearest road.
- Allow for trash racks on the inlet of the outlet structure to avoid aquatic weed problems
- Sediment forebag may be left unhardened given the low cleanout frequency.



- High Density PolyEthylene (HDPE) piping (300 mm dia) to be installed between each basin – 2 required. Pipes to be valved to provide flexibility for maintenance draw-down.
- Screen Common Reed Grass from topsoil and minimize spread through ongoing maintenance.
- Low maintenance, low grow, drought and flood tolerant grasses on the side slopes.

6.6 Preferred Facility Design

6.6.1 Pond Details

The preferred facility design is presented on **Figures 15.0 and 16.0 – Manning Road CPR Stormwater Pond, Plan and Profiles** and represents a modified wet pond / wetland design to optimize the treatment and environmental / aesthetic objectives of this study. The final design and construction of this facility will follow the conceptual design presented in Figures 15.0 and 16.0.

Approximately 300,000 m³ of excavated material will result from the construction of this facility. There may be construction uses for this excavated material within the greater Windsor area (i.e. Highway 401 improvements, Detroit River Third Crossing improvements, etc.) which may help to defray the cost of constructing the pond.

6.6.2 Pumping Facilities

As noted earlier, a pump station and sewer outlet to the ETLD will be required. The sewer diameter will be established at the time of pump design and selection.

The pumps will be housed within a building structure with sloped or peaked roof, and exterior finishes including brick or architectural masonry block, stucco or natural wood finishes.

No emergency generator will be required for this pump station.

6.6.3 Site Setbacks

The facility should provide for a minimum 20m setback from existing and future residential lot lines.



The setback along the CPR property will be 5 m.

The setback from the Manning Road (County Road 19) right-of-way will be 45 m.

6.6.4 Overland Flood Routing

It is not possible to route overland flows from the entire Study Area to the stormwater facility owing to the natural gradients of the Study Area. This will only be possible for lands immediately surrounding the facility. Overland flow routing will be addressed as outlined in the following sections.

The road network will be designed to encourage storage of flows on roadway pavements for storm frequencies up to and including the 1:100 year storm. Storage depths will be restricted to no more than 250 mm. All stored flows will be conveyed by the storm sewer system to the stormwater facility which has been designed to receive these flows.

For the overland flows resulting from storms greater than the 1:100 year and unable to be stored on the roadways, these flows will be directed by the major collector roads northerly to the Cyr Drain which is located along the south side of the County Road 22 road allowance. The overland flows reaching County Road 22 would then be conveyed easterly to the East Townline Drain or the proposed stormwater management facility planned for the improvements to Manning Road and County Road 22.

6.7 Trails

The preferred design concept includes an integrated community parks and trail system. As described in Section 6.3.5, the final design of the stormwater management pond is meant to function both technically and as a community amenity park. The 2.5 m wide trail system within the boundaries of the stormwater management pond links to the existing trail system located to the west of the site as well as to the proposed trail system as depicted in the Manning Road Secondary Plan. The trail system surrounding the stormwater management pond will, therefore, provide a valuable community amenity to residents of the existing neighbourhoods to the west and future residents of the proposed Manning Road Secondary Plan area.



6.8 Planting & Habitat Design Brief

The planting design is an integral component of stormwater management ponds. When effectively implemented, vegetation in and around stormwater facilities are able to improve their overall performance while enhancing the ecological and structural stability of the entire area. By selecting native species based upon habitat requirements such as soil type, chemistry and moisture, it not only greatly increases their chances of survival, but also enhances slope stability.

6.8.1 Construction Phasing

The tall surrounding slopes of this facility and the imperfectly drained soil conditions of the area present a challenge to successfully stabilize the surficial soils of the facility following construction. Experience on ponds of a similar nature in the Essex Region, has demonstrated the need for a two or three stage approach to seeding and planting. The most important strategy for keeping the soils on the slopes and out of the pond is to seed the area immediately after topsoil is applied, cover it with a suitable erosion control blanket, such as Curlex 'Quickgrass' by American Excelsior, and let it grow in for at least a full year, preferably two, before the shrubs and trees are planted. The normal contracting sequence of the general contractor 'sub-contracting' the work to a landscape contractor at the end of the project has proven to be problematic for similar projects and is not recommended. A separate tender and contract should be set up for planting the slopes and surrounding lands with trees and shrubs well after the grass is established. The more structural components such as the trail system, the perimeter bioengineering, the seeding and the in-water plants should be completed as part of the primary earthworks contract.

6.8.2 Waterfowl and Mosquito Control

Wildlife habitat requirements also need to be considered. Canada Geese are a significant nuisance in Essex Region, both following construction (eating the plants) and as an ongoing problem fouling the grass and pathways. Stormwater ponds make natural habitats for geese, particularly those where the grass is kept short for recreational purposes – this provides a good food source for the birds and they can take refuge on the water when threatened. A community of tall, dense plants, either herbaceous or woody shrubs around the perimeter reduces the desirability of the pond habitat for geese to lay eggs and raise their young. Additionally, building den habitat structures to attract small mammal predators like fox makes



an effective deterrent for Canada geese, yet these species need to be isolated from the human population by keeping them, on the slopes adjacent to the CP railway.

Underwater habitat structures are also recommended to support a mixed population of fish and aquatic organisms. Mosquitoes and common carp can be a nuisance when SWM pond development has not included habitat and ecosystem processes. Recently, mosquitoes have presented a more significant threat to the human population due to the spread of the West Nile viral disease. The species of mosquitoes that are the disease vectors, are usually found in very shallow, stagnant water, which is seldom found in SWM ponds, yet the public perception is that all mosquitoes carry the disease and need to be controlled. Stocking the facility with Fathead Minnow and placing bat and bluebird /swallow bird boxes around the perimeter have been found to provide around-the-clock predation of all mosquito species and can significantly alleviate potential problems due to the West Nile virus.

Breeding pairs of Large Mouth Bass are to be stocked after the second season of growth to control nuisance fish species. Residents often will dispose of unwanted tropical fish in the stormwater ponds, in particular goldfish. The goldfish will over winter well and as they grow and reproduce, reverting to their carp genetic heritage. Several species of carp are also available live in food stores and are used by some ethnic groups for religious ceremonies where they release the fish into the SWM pond waters. Carp and other non-desirable fish species can also enter the system as sticky eggs, attached to waterfowl. With the proximity to Lake St Clair, this is very possible in this location. Carp are a significant problem in a SWM system as they constantly mix the bottom searching for food organisms, re-suspending the sediments that are intended to accumulate in the facility forebay. Large Mouth Bass are territorial and predatory and when in a large enough population, will consume the goldfish and young carp to keep the population in check. Unfortunately, they will also eat the beneficial fat head minnow so they are stocked well after the fat head have had a chance to breed several times and multiply.

The objective is to make for an increasingly dynamic ecosystem that would achieve long-term functionality and improve the aesthetic objectives. The species present however, must be considered as contaminated and not for human consumption. During the periodic cleanouts, these species should be land-filled along with the collected sediments and wetland plant biomass.



6.8.3 Soil Preparation

The following Planting Design outlines the species, density requirements, actual community plantings and rationale of each to ensure the form and function of the stormwater pond located within the Manning Road planning area.

To ensure seeding and planting success, proper soil preparation is an essential step in the rehabilitation process. All areas of the stormwater management pond that are proposed to be seeded or planted will have to be dressed with varying depths of topsoil to be conducive of plant growth. Recommended minimum topsoil depths for a particular vegetation community are as follows:

- Tree pits: 60cm (minimum amount of topsoil may be put into an oversized tree planting pit and not spread over the entire tree planting area)
- Shrub beds: 40cm (minimum amount of topsoil may be put into oversized shrub beds and not spread over the entire shrub planting area)
- Seeded areas: 30cm
- Aquatic planting areas: 30cm of high organic (black) topsoil; preferably retained from another wetland

The topsoil may require scarification or tilling to ensure the proper loose and friable density that is ideal for supporting plant growth. Depending on the weed species present at the source, a pre-treatment of an approved weed inhibitor is recommended to avoid weed problems. Areas that contain Common Reed Grass (*Phragmites australis*) should be avoided at all cost. If used, however, the topsoil shall be screened to a 20 mm maximum size and sterilized before application.

6.8.4 Seeding

Seeding will also be completed in these upland areas. Topsoil areas that will be seeded must be scarified prior to seeding. After application of seed, wood fibre Curlex II Quickgrass should be placed over the seeded areas to decrease wind blown removal of seeds, animals feeding on seeds. The Quickgrass also traps moisture in the topsoil to aid germination and then degenerates over a two year period. Seed mixtures are selected according to soil conditions and intended biological function. Seed mixtures are described in the following table. As described