Executive Summary

Introduction

The existing storm drainage infrastructure in the Municipality of Middlesex Centre (Municipality) Settlement Areas was designed and constructed on a site-by-site basis as development occurred, without the benefit of an overall stormwater management strategy. This has resulted in a fragmented drainage system that does not efficiently service the existing communities, and which has limited capacity to service future growth.

The Municipality has completed a Municipal Class Environmental Assessment (EA) following the Master Plan approach to identify necessary storm drainage system improvements to better service the existing communities and to provide a drainage servicing strategy to accommodate future growth and development within the Settlement Areas. The study area for the Master Plan includes the Settlement Areas of Arva, Birr, Ballymote, Coldstream, Denfield, Ilderton, Kilworth, Komoka, Melrose, Poplar Hill, Bryanston, and Lobo.

This study excludes the Delaware Settlement Area, which was assessed through a previous Master Planning process.

Master Plan and Public Consultation

The intent of the Stormwater Master Plan is to address public, review agency, and First Nation community's requirements and concerns and to ensure a reasonable range of alternatives and opportunities are fairly assessed and reviewed in a public forum before being finalized and carried forward for implementation.

The Stormwater Master Plan is being undertaken in accordance with the Master Planning requirements of the MEA Municipal Class Environmental Assessment (October 2000 as amended in 2007, 2011, and 2015). Master Plans are not subject to requests from the public, agencies or First Nations communities for a Minster's Order (Part II Order). However, individual projects identified within a Class EA process can be subject to a Part II Order. As such, the Master Plan can be implemented following Council approval.

Consultation with members of the community involved the publication of the Notice of Commencement, an interactive online map which was also hosted on the Municipality's website, and two series' of Public Information Centre (PICs) hosted throughout the Municipality. The Notices of PIC were published in two consecutive editions of the Londoner and Middlesex Banner newspapers; additionally, and notices were also provided to all residents within the Settlement Areas via their water/stormwater bills. All information presented at the PICs was made available on the Municipality of Middlesex Centre website, and residents were encouraged to submit comments using the comment sheets provided. Consultation with local landowners/developers was also undertaken to address concerns over preferred alternatives presented at the PICs, and modifications were made to allow flexibility in the location of SWM facilities servicing

future developments, and to ensure that proper coordination of servicing is made during the development application process.

All project notices were mailed directly to potentially interested First Nation Communities, and follow-up communication was made to ensure that they had appropriate opportunities to review project information and provide comment. A First Nations Communications Log was completed for this project to document the communication process.

Several government agencies identified as potentially having interest in the project were added to the contact list and sent all project documentation. An Agency Communications Log was completed for this project to document the communication process. The study area is regulated by the Upper Thames River Conservation Authority (UTRCA), as well as small portions regulated by the St. Clair Region Conservation Authority, Ausable Bayfield Conservation Authority, and the Lower Thames Valley Conservation Authority, and as such they were identified as important stakeholders throughout the project. Following PIC 2, comments were received from the UTRCA that were addressed throughout the Master Plan document and documented in the Agency Communications Log.

Phase 1 Problems and Opportunities

Phase 1 of the Municipal Class Environmental Assessment process is to identify the problem or opportunity that has led to the undertaking of the Stormwater Master Plan. The Problem and Opportunity Statement for the Middlesex Centre Settlement Area Stormwater Master Plan is as follows:

The Master Plan shall assess the existing drainage conditions throughout the Settlement Areas and develop an environmentally sound and sustainable strategy for addressing existing issues and accommodating future growth. The objective is to develop a Master Plan for the identified Settlement Areas that balances the following responsibilities:

- *Reduce negative impacts of flooding on properties, where feasible;*
- *Provide adequate stormwater treatment;*
- *Minimize stormwater servicing costs; and*
- *Protect the natural environment.*

It is noted that while properly functioning storm drainage infrastructure is crucial in protecting property from flood damage and may help mitigate lot-level drainage issues, this Master Plan does not specifically address certain lot-level concerns such as high groundwater (i.e. sump pumps running continually).

Phase 2 Existing Conditions - General Setting

The study area includes the Settlement Areas within the Municipality of Middlesex Centre, excluding the Community Settlement of Delaware. The study area was broken down into catchment areas based on the existing storm drainage infrastructure, which consists of municipal drains and municipal storm sewers**.**

The subject Settlement Areas are comprised of mainly residential land use, with some areas of Commercial and Employment lands. Although the majority of the study area is comprised of built-out residential development, several areas of potential future development were identified based on the Municipality of Middlesex Centre Official Plan Land Use Schedules in order to address and incorporate the need for future stormwater servicing into the stormwater servicing strategy.

Phase 2 Existing Conditions – Review of Existing Infrastructure

A review of the existing drainage conditions was completed, and the study area was broken down into catchment areas based on the available drawings provided by the Municipality of Middlesex Centre, municipal drainage reports, topographic mapping and site visit observations. Locations of existing or potential surface ponding were identified using sewer design sheets, information provided by the Municipality, as well as collected by public response to the online survey.

Phase 2 Existing Conditions – Socio-Economic, Cultural, and Environmental Environments

As part of the Master Plan Class EA planning process, a general inventory of the socio-economic, cultural, and environmental conditions throughout the study area was completed. This included a desktop review of existing municipal policy documents, information on active developments, available mapping, and other published sources and information provided by the Municipality. Based on this review, recommendations for further assessment and potential permit requirements prior to implementation have been identified.

Phase 2 Alternative Solutions

As part of the Class EA planning process, reasonable and feasible alternative solutions to the Phase 1 Problem and Opportunity Statement are identified and described in Phase 2. The net positive and negative effects of each alternative solution are identified and evaluated. Study objectives were also developed to incorporate applicable design criteria in order to identify the preferred alternative to address the key issues identified for each of the existing drainage systems. The following provides a summary of the alternative solutions and preferred solution for each drainage area.

Arva Development Area

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Arva Development Area:

Alternative 1: Do Nothing

Alternative 2: Regional SWM Facility

Alternative 3: Local SWM Controls

Alternative 3 “Local SWM Controls” was selected as the **preferred alternative**.

All stormwater treatment is provided to the runoff from future development in the Arva Development Area by local SWM controls. The proposed local SWM controls provide provide at-source water quality, water quantity, and erosion control treatment to the runoff from all future development and may include:

- Soakaway pits and/or bioswales to capture and infiltrate rooftop runoff;
- Underground storage to provide peak flow attenuation;
- Permeable pavement on private roadways; and
- Dry SWM ponds to provide peak flow attenuation during severe design events.

The developer's engineer will be responsible for selecting the at-source SWM control measures to treat the runoff from the future development concept. The measures must be designed to meet the post-development SWM control requirements and must be accepted by MOMC. Construction of the proposed local SWM controls will be the responsibility of the developer.

Ballymote

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Ballymote Settlement Area:

Alternative 1: Do Nothing

Alternative 2: On-Site SWM Controls

Alternative 3: Replace Drain with Storm Sewer Located in Easement

Alternative 4: Replace Drain with Storm Sewer Located in Medway Road

Alternative 2 "On-Site SWM Controls" was selected as the **preferred alternative**.

Stormwater treatment is provided to the runoff from all proposed development in the Ballymote Settlement Area by proposed on-site SWM controls that limit the post-development peak discharges to pre-development magnitudes. On single family residential properties, the proposed lot level controls should be located in the front yards to reduce the risk of future home improvements such as patios, decks, and pools interfering with their operation. Construction of the proposed on-site SWM controls will be the responsibility of the development proponents.

To ensure that the proposed on-site SWM controls installed, operated and maintained, Stantec recommends the following:

- The Municipality should enact a bylaw to ensure that on-site SWM controls must be operated and maintained by the property owner. The bylaw should state that the property owner is responsible for any maintenance.
- The proposed on-site SWM controls should be registered on title to prohibit their removal or alteration.
- An development agreement should include a clause stating: "The Owner shall include in all Purchase and Sale Agreements the requirement that the buildings to be designed and constructed on all Lots in this Plan are to have on-site SWM controls installed and included in the building permit application for the Lot."

- The installation of every on-site SWM control measure will need to be inspected to ensure that they are constructed in accordance with the accepted design.

It is anticipated that MECP ECAs will not be required for the proposed on-side SWM controls since the proposed development will likely consist of single family residential lots and each proposed on-site SWM measure will only control the runoff from a single lot. However, this will need to be confirmed with the MECP by the proponent prior to development.

Both the Highbury Armitage Municipal Drain and the Ballymote East Municipal Drain will be realigned around the perimeter of the Ballymote Settlement Area. The realignment will be completed in accordance with the provisions of the *Drainage Act*. The proposed drain realignments will be the responsibility of the development proponents.

Ilderton Drain No. 2

The following stormwater alternatives were developed to address the problem opportunity statement relating to the Ilderton Drain No. 2 catchment:

Alternative 1: Do Nothing

Alternative 2: Drain Improvements

Alternative 3: SWM Pond

Alternative 4: SWM Pond and Downstream Storm Sewer Improvements

Alternative 2 "Drain Improvements" was selected as the **preferred alternative**.

In accordance with the design drawings prepared by IBI, the existing 400 mm diameter concrete pipe that conveys runoff from Hyde Park Road and the upstream drainage area is replaced with a 600 mm diameter PVC pipe to provide additional conveyance from the Hyde Park Road low point and to mitigate local flooding. While this solution does not provide drainage servicing that meets Municipal standards, it can be completed within the Municipal Drain working limits and does not require land expropriation. The proposed drain improvements should be completed in accordance with the provisions of the *Drainage Act*.

The Municipality should monitor the performance of the proposed drain improvements and over the long-term, should develop a plan to acquire the lands necessary to implement Alternative 4.

During PIC #2, Stantec was notified of several drainage problems in the Meadowcreek Subdivision. Stantec subsequently met with residents on site to discuss the following concerns:

- Some homes in the subdivision have recently experienced multiple basement floods caused by sanitary backups;
- Sump pump discharges to surface result in icy conditions on roads during the winter and persistently wet lawns that are too soft to mow in the summer;
- Sump pumps run frequently;
- Persistently wet soil conditions causing premature decay of wooden fence posts;

- The west pathway from Willowridge Road to Meadowcreek Park has been previously repaired and is currently heaving; and
- Residents were concerned that development of the Clear Skies Subdivision will exacerbate their drainage issues.

Some residents have mitigated problems caused by the sump pump surface discharges by conveying them to the curb with plastic drainage tiles or discharging directly to catchbasins. Furthermore, residents have installed backflow preventers to mitigate the risk of sanitary backups.

Based on the information provided by residents and site observations, the existing drainage concerns in the Meadowcreek Subdivision are likely caused by two factors:

1. Inadequate wet weather sanitary sewer capacity; and
2. High local groundwater conditions.

Stantec recommends completion of a wet weather sanitary sewer capacity analysis to identify potential inflow/infiltration problems in the Willowcreek Subdivision and provide mitigation recommendations. The study should include analysis of the Willow Ridge Road sanitary sewer and other locations where the Municipality has received basement flooding complaints.

Homes where sump pumps run frequently were likely designed without adequate consideration for the local groundwater elevations. Urban stormwater systems are typically designed to collect and convey surface runoff from rainfall events to mitigate the possibility of surface flooding. Collecting subsurface water to lower local groundwater elevations and reduce the use of residential sump pumps is not usually considered a responsibility of the Municipality. However, given the widespread groundwater concerns in the Meadowcreek Subdivision, the Municipality should consider completing a hydrogeological investigation to document local groundwater elevations and provide mitigation recommendations.

Development of the Clear Skies Subdivision is unlikely to exacerbate the existing Meadowcreek Subdivision drainage problems. The Clear Skies Subdivision SWM Report shows that the surface runoff from the proposed development does not travel southward across Ilderton Road but is instead conveyed westward to Oxbow Creek.

South Ilderton Development Area

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the South Ilderton Development Area:

Alternative 1: Do Nothing

Alternative 2: Single SWM Facility

Alternative 3: Two SWM Facilities

Alternative 4: On-Site SWM Controls

Alternative 3 “Two SWM Facilities” was selected as the **preferred alternative**.

Two proposed regional SWM facilities provide all necessary stormwater treatment to the runoff from the South Ilderton Development Area. Both facilities are anticipated to be designed as wet ponds. This servicing option provides flexibility for development phasing, reduces the size of conveyance infrastructure required to carry stormwater from the west side of Hyde Park Road to the proposed outlet, and manages major flows crossing Hyde Park Road.

SWM 1 is located west of Hyde Park Road and provides all necessary treatment to the runoff from proposed development. The proposed pond will also be designed to accommodate the runoff from the external undeveloped drainage area located beyond the settlement boundary. The proposed SWM pond discharges to a proposed trunk storm sewer that conveys the treated stormwater across Hyde Park Road to the Oxbow Creek Drain.

Similarly, SWM 2 provides all necessary treatment to the runoff from the east side of Hyde Park Road and discharges to the Oxbow Creek Drain. The portion of the Hughes Charlton Drain located within the Settlement Area is abandoned and replaced with proposed storm sewers.

Based on information provided by municipal staff, water levels in the Oxbow Creek Drain tend to remain high for prolonged periods following severe storm events, resulting in high tailwater conditions at the proposed pond outlets. Consequently, the proposed ponds will need to be designed to account for the effects of high tailwater elevations, which may include:

- Providing backflow prevention at the pond outlets;
- Sizing the pond outlet control structure to account for the reduced head caused by downstream tailwater conditions; and
- Providing additional quantity control storage volume in the proposed ponds to accommodate unanticipated longer detention times.

During detailed design, consideration should be given to constructing a single outlet to the Oxbow Creek Drain to service both proposed SWM facilities. This will reduce the risk of potential impacts on the drain and corresponding permitting requirements.

Komoka Drain No. 1

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Komoka Drain No. 1 catchment:

Alternative 1: Do Nothing

Alternative 2: Pond Location 4 with Thames River Outlet

Alternative 3: Pond Location 1 with Komoka Road Outlet

Alternative 4: Pond Location 1 with Municipal Drain Outlet

Alternative 5: Pond Location 5 with Thames River Outlet

Alternative 6: Combine Alternatives 3 and 5

Alternative 6 "Combine Alternatives 3 and 5" was selected as the **preferred alternative**.

Stormwater treatment for the Komoka Drain No. 1 catchment area is provided by a proposed stormwater management pond located on the west side of Komoka Road. The proposed SWM pond is a former gravel pit that will be repurposed as a wet pond designed in accordance with MECP design criteria to provide both water quality and peak flow control to the runoff from the upstream service area including:

- The Komoka Drain No. 1 drainage area,
- The proposed Glendon Drive streetscape improvements, and
- The existing commercial and residential development located southwest of the Komoka Road/Glendon Drive intersection.

Runoff from the Tunks Lane future development is treated by on-site SWM controls that discharge to the proposed Glendon Drive storm sewer.

The proposed pond discharges to an approximately 700 m long proposed outlet storm sewer on Glendon Drive that conveys the treated flows southward to the Komoka Provincial Park pond. Recently completed outlet improvements at the park pond have reduced the Provincial Park pond normal water elevation. With the structure was designed to reduce the normal water level to 228.0 m, Ontario Parks is in the process of reevaluating this target. An existing neighboring privately owned pond discharges directly to the park pond through a 400 mm diameter CSP culvert with and invert elevation of approximately 229.31 m.

Both Ontario Parks staff and the neighboring pond owner were consulted to identify concerns associated with utilizing the existing park pond outlet to convey the treated stormwater to the Thames River. Initial concerns identified by Park staff included effects on pond levels, water quality concerns, and resulting impacts on flora and fauna. Similarly, the neighboring pond owner expressed concerns regarding potential impacts on their pond water levels and the resulting effects on future development opportunities on their lands. Stantec completed a preliminary hydrologic/hydraulic assessment to evaluate the anticipated impacts. The assessment was completed based on the original Park design normal water level of 228.0 m, and the results suggest:

- No significant water quality impacts are anticipated, as the stormwater is treated in accordance with MECP standards to levels that can be discharged to the natural environment, in accordance with the Ontario *Water Resources Act*;
- No significant impact on pond water levels or drawdown times, since during the 250-year storm event, the additional flows to the existing outlet only increase the maximum calculated water surface elevations in the park pond by approximately 0.12 m; and
- No significant impact on the neighboring privately owned pond since the maximum 250-year calculated water surface elevation is 228.82 m, which is lower than the invert of the existing connecting culvert.

Ontario Parks staff noted that additional approvals will be required to utilize the existing park pond outlet, including completion of a Class EA for Provincial Parks and Conservation Reserves, that an easement would need to be acquired by the municipality from Infrastructure Ontario for both the proposed inlet and the existing outlet, and that the Municipality should work with Ontario Parks to develop an outflow agreement to formalize roles and responsibilities associated with the existing outlet.

Should the required permits and approvals, including the PPCR Class EA, not be secured for the proposed Park pond outlet, an alternate outlet may be constructed along Komoka Road as shown in Alternative 3. While this alternative is less-preferred due to the costs associated with constructing the sewer along Komoka Road, as well as the added environmental impacts associated with the new outlet to the Thames River, it should be considered as a contingency in the event the appropriate approvals cannot be secured. It is noted that a scoped Environmental Impact Study should be undertaken to assess impacts to sensitive habitats along the Thames River associated with the new outlet, along with required permits through the UTRCA.

Komoka Drain No. 3

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Komoka Drain No. 3 catchment:

Alternative 1: Do Nothing

Alternative 2: Service Only Proposed Development

Alternative 3: Service Both Existing and Proposed Development

Alternative 2 "Service Only Proposed Development" was selected as the **preferred alternative**.

A proposed stormwater management facility located on the north side of Oxbow Drive and east of the CN railway line will provide all necessary stormwater treatment to the runoff from the proposed development located west of Komoka Road. Runoff from more frequent storm events will be attenuated in the facility and discharged to Komoka Drain No. 3, based on the available municipal drain capacity. Runoff from severe storm events may be discharged to the existing overland flow route that conveys surface flows to the downstream CP Rail culvert.

Since Komoka Creek supports a coldwater fishery, the proposed facility will mitigate potential temperature impacts. This may be achieved by discharging the water quality control volume via infiltration. If the proposed SWM facility includes an infiltration component, pretreatment will be required to remove suspended sediment from the incoming stormwater. A hydrogeological assessment will be required prior to detailed to identify the maximum local groundwater elevations. If stormwater infiltration is proposed, the hydrogeological assessment will measure existing infiltration rates and establish the pond design infiltration volume.

Overflows from the upstream external drainage areas are conveyed around the perimeter of the proposed development by a proposed bypass swale. While the bypassed flows may be discharged to the existing overland flow route that conveys surface flows to the downstream CP Rail culvert. However, the proposed SWM design will need to provide sufficient documentation to demonstrate that the post-development discharges to not raise the risk of downstream flooding and/or erosion.

West Komoka Development Area

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the West Komoka Development Area:

Alternative 1: Do Nothing

Alternative 2: Service Only Proposed Development

Alternative 3: Service Both Existing and Proposed Development

Alternative 2 "Service Only Proposed Development" was selected as the **preferred alternative**.

The future land use identified in the Official Plan in this catchment area is Settlement Employment. Runoff from this future development is treated by two proposed SWM facilities.

SWM 1, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff. The only available surface water outlet from this catchment is the existing small diameter CSP Glendon Drive culvert. The available soils information and the lack of a defined channel downstream of the culvert suggest that the site soils are extremely permeable. Consequently, SWM 1 will be designed primarily as an infiltration facility, with overflows directed to the existing Glendon Drive culvert. Additionally, future developments within the proposed SWM 1 service area should be designed with on-site infiltration measures to retain the runoff from small frequent storm events and infiltrate the captured runoff over a larger area.

SWM 2, located west of Komoka Creek, provides both water quality treatment and peak flow control to the proposed development runoff. The proposed pond will be designed as a dry facility. Since Komoka Creek supports a coldwater fishery, the proposed facility will mitigate potential temperature impacts by discharging the water quality control volume via infiltration. Runoff from more significant storm events will be attenuated in the facility and discharged to Komoka Creek via a proposed pipe outlet

Since the proposed SWM facilities include infiltration component, pretreatment will be required to remove suspended sediment from the incoming stormwater. A hydrogeological assessment will be completed prior to detailed design to measure soil permeability, identify the maximum local groundwater elevations, and establish the pond design infiltration volume. Industrial land uses should be avoided in this area, as current MECP guidance states that runoff from industrial sites should not be treated using infiltration measures due to the associated risk of groundwater contamination.

Northeast Komoka Development Area

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Northeast Komoka Development Area:

Alternative 1: Do Nothing

Alternative 2: SWM Facility with Surface Water Outlet to Oxbow Creek

Alternative 3: Two SWM Facilities

Alternative 3 "Two SWM Facilities" was selected as the **preferred alternative**.

Runoff from future development in the Northeast Komoka Development Area will be treated by two proposed SWM facilities. Stormwater from the eastern portion of the catchment is treated by SWM 1, which provides water quality treatment and peak flow control prior to discharging to Oxbow Creek. The proposed pond will be designed as a dry facility to mitigate potential temperature impacts on Oxbow Creek. Pretreatment will be provided upstream of the facility to verify that the proposed SWM measures provide Enhanced Protection Level water quality treatment.

The western portion of this catchment is a former gravel pit that currently drains exclusively via infiltration and evaporation. Runoff from future development in this area will be treated by SWM 2, which will detail all runoff from the future residential development and release it via infiltration, similar to existing conditions. Pretreatment will be required to remove suspended sediment from the post-development runoff prior to discharging to SWM 2.

Kilworth Glendon Drive Area

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Kilworth Glendon Drive Area:

Alternative 1: Do Nothing

Alternative 2: Discharge to Oxbow Creek

Alternative 3: Discharge to Glendon Drive Storm Sewer

Alternative 3 "Discharge to Glendon Drive Storm Sewer" was selected as the **preferred alternative**.

The proposed Glendon Drive streetscape improvements include a proposed trunk storm sewer to collect and convey minor flows from the proposed right-of-way westward to a future outlet. This proposed trunk storm sewer will provide the outlet from future development located north of Glendon Drive. Major flows the portion of the proposed Glendon Drive streetscape improvements located in this catchment are conveyed to Oxbow Creek by the existing overland drainage route.

A proposed regional SWM pond provides all necessary stormwater treatment to the runoff from future development located north of Glendon Drive. Minor flows are conveyed to SWM 1 by proposed local storm sewers and major flows are conveyed by the future right-of-ways. Given the local sandy soils, LID measures to capture and retain runoff near its source are likely a feasible strategy for reducing the peak minor system flows and the SWM1 design storage volumes.

The treated flows from SWM1 are discharged to a proposed storm sewer on Tunks Lane, that discharges to the future Glendon Drive trunk storm sewer. Given the recent development activity in the Tunks Lane Area, the Municipality should develop a plan to secure a drainage corridor from this catchment area to Tunks Lane to prevent obstruction of this drainage route by future development.

Kilworth East

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Kilworth East catchment:

Alternative 1: Do Nothing

Alternative 2: SWM Strategy per Glendon Drive EA

Alternative 3: Grassed Ditches to Provide Treatment

Alternative 2 "SWM Strategy per Glendon Drive EA" was selected as the **preferred alternative**.

In accordance with the recommendations of the Glendon Drive Streetscape EA, all runoff from this portion of the Glendon Drive improvements is collected and treated by a proposed enhanced grass swale located on the north side of the Glendon Drive right-of-way. The proposed enhanced grassed swale will be designed in accordance with MECP guidelines to provide water quality treatment and will incorporate check dams to provide peak flow control. The proposed enhanced grassed swale will discharge to the Thames River.

Given the significant anticipated street and property impacts, replacement of the existing concrete lined ditches in the Kilworth Subdivision is not recommended at this time, though they should be maintained and repaired as needed. The Municipality could consider replacing driveway culverts that are prone to debris accumulation with improved inlets to reduce maintenance requirements.

Melrose

The following stormwater alternatives were developed to address the problem and opportunity statement relating to the Melrose Settlement Area:

Alternative 1: Do Nothing

Alternative 2: Relocate Drainage System

Alternative 2 "Relocate Drainage System" was selected as the **preferred alternative**.

The existing municipal drains located in the residential rear yards are abandoned and replaced with rear yard catchbasins with leads that connect to the local storm sewers located in the municipal right-of-ways. The proposed leads will be located in proposed drainage easements offset from existing property lines to mitigate the risk of damage caused by future home improvements. Where feasible, trenchless installation should be considered to reduce construction disruption on affected homeowners.

The **preferred alternatives** are illustrated on Figures ES-1 through ES-11 appended to the Executive Summary.

Capital Program Tables and Class EA Schedule Summary

This Master Plan has been completed in accordance with Approach 2 under the MEA Class EA approach for Master Plans which satisfies Phase 1 and 2 of the planning process. Accordingly, this document provides information to support any future studies or investigations in relation to each of the preferred solutions identified within the Master Plan.

Projects identified as part of the Master Plan are outlined in Table E.1, along with their respective Class EA Schedule. In determining the proposed Class EA schedule for each project, recommendations are provided based on the anticipated magnitude of the preferred alternatives' environmental impact, input received by stakeholders as part of the consultation process, and guidance provided in Appendix 1 of the MEA Class EA document. For drainage areas where development may occur and stormwater works are required (i.e., SWM pond, OGS) on development lands subject to a *Planning Act* application such as a Draft Plan of Subdivision, works are noted as Schedule A activities as the SWM facilities and related appurtenances will be addressed as part of the *Planning Act*.

Upon completion of the Master Plan and subject to the 30-day review period (assuming no Part II Order requests are made for individual projects identified), Schedule A, A+, and B projects are pre-approved and may proceed to design and construction subject to approval by Council. During subsequent design and construction, proposed alignments and locations of infrastructure may be refined as necessary, but within the general context of the project as defined in this Master Plan. Site specific environmental investigations or mitigation measures identified within this Master Plan document shall also be incorporated into the detailed design and construction processes.

The Notice of Completion of this Master Plan is issued on the basis of the identification of the following projects and Class EA schedules.

Table E.1-1 Projects, Class EA Schedule, and Estimated Costs

Project/Drainage Area	Preferred Alternative	Municipal Class EA Schedule	Estimated Cost
Arva Development Area	Alternative 2	Schedule A	$300,000
Ballymote	Alternative 2	Not applicable	$100,000
Ilderton Drain No. 2	Alternative 2	Not applicable	$150,000
South Ilderton Development Area	Alternative 3	Schedule A	$5,350,000
Komoka Drain No. 1	Alternative 6	Schedule B and Provincial Parks and Conservation Reserve EA and Infrastructure Ontario approval	$4,300,000
Komoka Drain No. 3	Alternative 2	Schedule A	$1,300,000
West Komoka Development Area	Alternative 2	Schedule A	$4,800,000

Project/Drainage Area	Preferred Alternative	Municipal Class EA Schedule	Estimated Cost
Northeast Komoka Development Area	Alternative 3	Schedule A	$2,250,000
Kilworth Glendon Drive Area	Alternative 3	Schedule B	$2,500,000
Kilworth East	Alternative 2	Schedule A	$410,000
Melrose	Alternative 2	Schedule B	$350,000

Cost estimates are considered Class 4, and consistent with ASTME 2516-06 accuracy ranges are subject to +20% to +30%, and -10% to -20%. Cost estimates below include anticipated construction costs, contingency, and engineering costs at a percentage of construction, which provides an allowance for typical permits and site investigations (geotechnical and hydrogeological).

Figures ES-1 through ES-11 Preferred Alternatives