Sandwich South Master Servicing Plan
Additional Stormwater Management Assessment
Municipal Servicing Alternative and Preferred Options
Public Consultation

June 2022

1.0 Introduction and Purpose

This document supplements the **Additional Stormwater Management (SWM) Assessment, Public Consultation Presentation** provided as part of the Sandwich South Master Servicing Plan (SMP). This document will provide the public and stakeholders with a summary of revisions to the service areas and outline the municipal SWM servicing alternatives. The project team completed a comparative evaluation of developed alternatives and determined a preliminary preferred SWM option to facilitate the construction of the Lauzon Parkway and County Road 42 Intersection, as well as to support local development.

The City of Windsor (The City) has identified the need to complete the first phase of the Lauzon Parkway Improvements identified in the previously completed Lauzon Parkway Environmental Assessment (2014). The first phase will include the realignment of Lauzon Parkway, between Service Road B and County Road 42, including reconstruction of County Road 42, between the City of Windsor municipal boundary to the east and the Little River drain corridor to the west.

Construction of the roadway will require SWM to treat and control the additional runoff resulting from the increased impervious area and to mitigate impacts to downstream areas. This solution is in keeping with the recommendations of the Upper Little River Watershed Master Drainage and Stormwater Management Plan Environmental Assessment (Stantec, Ongoing) (ULRMP). A draft copy of this study can be found on the City of Windsor Upper Little River Master Plan Environmental Assessment webpage.

This study is being completed to meet the requirements of a Master Plan, defined under the Municipal Class Environmental Assessment; as such, the work must include consideration of alternative solutions for servicing infrastructure.

This document shall be reviewed in conjunction with the previously provided Public Information Centre #2 (PIC 2) presentation and other reference materials that are available on the Sandwich South Master Servicing Plan project website.

2.0 Evaluation Criteria

The evaluation criteria for this supplemental assessment has not changed from those used for the previously completed comparative assessments. Refer to the Municipal Servicing Alternative and Preferred Options, Public Information Centre #2 (September 2021), available on the project website Sandwich South Master Servicing Plan project website.

3.0 Stormwater Management – Additional Stormwater Analysis

As described in PIC 2, the preferred strategy to control surface flooding and support development in the Sandwich South area is to implement end of system treatment Stormwater Management - Wet Ponds (Option 1A) which consists of regional SWM facilities that provide both water quantity and quality control of stormwater. The solutions are mandated to meet the Essex Region Conservation Authority (ERCA) Regional SWM Standards Manual (December 2018) and achieve the objectives and recommendations of the ULRMP. This additional SWM assessment will review alternatives to integrate the first phases of Lauzon Parkway construction into the previous developed SWM strategy presented in PIC 2 (PIC 2 - Figure 3) and will build on the findings presented previously.

Problem

- Future development of the Sandwich South study area requires SWM to treat and attenuate the increased runoff from impervious areas. To support the first phase of

the Lauzon Parkway Improvements and to serve proposed development, SWM facilities are required north of County Road 42 (CR42).

Opportunity

- There is opportunity to integrate drainage from future development areas, south of CR42, with the new SWM facility required for the roadway to aid in the staging of works and to mitigate impacts to private property.

The following section outlines the development of alternatives and comparative evaluation completed to determine the preferred solution to service the roadway developable area.

3.1 Alternative Solutions – Drainage Areas Delineation

Two (2) servicing alternative solutions to implement SWM for the service areas were reviewed and compared to a "Do Nothing" alternative. The two servicing solutions represent different storm drainage area configurations and staging scenarios and are described in more detail below. These drainage strategies where developed, in part, based on consultation with property owners undertaken as part of this study. It was requested that the project team review alternatives to use 'open space' designated areas for SWM infrastructure in lieu of private property areas to accommodate more developable area.

The following servicing alternatives have been evaluated:

- **Do Nothing - No Stormwater Management for Lauzon Parkway or Drainage Area North of CR42:** This alternative represents a scenario in which SWM facilities are not implemented to serve the proposed roadway and developable area north of CR42 and instead uncontrolled runoff is conveyed directly to existing drains including the Little River.
- **Option A - Stormwater Management for Lauzon Parkway and the Drainage Area North of CR42:** The drainage area routed to the new regional SWM facilities (P7 and P8) includes the first phase of the Lauzon Parkway/CR42 Intersection as well as the future development areas north of CR42. This would not require modifications to the storm sewer design and functional design for the proposed development areas south

of CR42. A total Drainage Area of approximately 113 Hectares would require approximately 16.1 Hectares of SWM facility area.

- **Option B - Stormwater Management for Lauzon Parkway and the Drainage Areas North and South of CR42:** The drainage area routed to the new regional SWM facilities (P7 and P8) includes the first phase of the Lauzon Parkway/CR42 Intersections as well as the CR42 road right-of-way, future development areas north of CR42 and a portion south of CR42. The proposed trunk storm sewer that is proposed along CR42, between Walker Road and Little River, will be directed north to P8. The development parcels fronting CR42 have been assessed to the proposed storm trunk sewer along CR42. A total Drainage Area of approximately 210 Hectares would require approximately 34 Hectares of SWM facility area.

The portion of Lauzon Parkway, east of Little River to the existing Lauzon Parkway right-of-way is expected to drain to a future SWM facility (P7) east of Little River. A separate facility is required due to constraints related to depth conflicts between the proposed storm sewer and conflicts with the Little River drain.

The drainage area depicted under Option B, in figure attached, is based on the existing topography and drainage patterns within the southeast corner of the Windsor International Airport (Airport) property. It has been identified that areas, north of the former Rivard Drain, will not be incorporated into this analysis and those areas will drain northeast through the existing McGill drain. The existing drain that bisects the Provincial Significant Wetlands and discharges to the Rivard Drain will remain in place to provide drainage for these wetlands. A minimum 30 metres (m) planted buffer zone is required around the Provincially Significant Wetlands (PSWs) and the proposed SWM Facilities cannot encroach on this buffer area. Areas within the Airport property, north of the drainage area (purple area) will continue to drain to the existing McGill drain Airport lands.

The portion of CR42, between the existing Lauzon Parkway right-of-way and the City and Town of Tecumseh boarder will continue to drain to the Little Tenth Concession Drain. Upon construction of CR42, the existing Little Tenth Concession Drain crossing shall be maintained. SWM of these lands are assigned to the SWM corridors identified in the ULRMP as shown in Option A Figure attached.

From a development staging perspective, the areas within the Airport property boundaries are not projected to be developed in the short term and therefore there is opportunity to stage the construction of the proposed stormwater ponds to exclude those future development areas within the Airport.

Through a more detailed analysis of the stormwater management computational modelling and design of the supporting storm trunk sewer network, necessary functional design of the pond in the southeast corner of the Airport to support future development of the commercial/industrial areas, south of the former Rivard Drain, has been undertaken.

Pumping stations (PSs) are required to provide as the outlet from all SWM facilities to the respective municipal drainage outlets. The PSs are sized based on the corresponding drainage area and the maximum outflow rate from the ULRMP of 6 litres per second per hectare(L/s/ha). Pump stations are required to provide the following:

- Control outlet flows based on the maximum outflow rate;
- Drain deep storm sewers that provide gravity drainage of roadways and private property areas; and
- Hydraulically disconnect the SWM facility from the Little River to mitigation risks associated with back up of the drain into the facility, leaving the upstream and downstream areas susceptible to flooding.

Considerations for overland flood routing were reviewed as well. Under major rainfall events, overland flow of stormwater along road corridors will need to be directed to the proposed facilities s via municipal right-of-ways. Safety and access must be maintained under these conditions and will need to be refined as part of the detailed design of the proposed SWM and Road networks. Since CR42 is an arterial road which acts as a main emergency access route for emergency vehicles (fire, police and ambulance), the overland flow from areas south of CR42 shall continue to drain to the ponds south of CR42 to avoid overtopping CR42. Storage volumes and storage facility footprints provided have been sized based on this design constraint.

3.1.1 Evaluation – Drainage Areas Delineation

The three options above were comparatively evaluated using the criteria outlined previously in the materials presented in the Public Information Centre # 2. The following summarizes the results of the evaluation with a more detailed evaluation **Table 1.** In **Table 1**, under each criteria the most preferred outcome is highlighted in green. The overall preferred solution is based on the relative comparative result of each criteria.

The first alternative considered is a 'Do Nothing' option that assumes that SWM facilities will not be constructed to provide water quality and quantity control for the Lauzon Parkway Improvements or development areas. This would pose both flooding and environmental risks to the downstream watercourse as the uncontrolled and untreated increased runoff would not meet the minimum ERCA and Provincial Standards.

The facility proposed under Option A, has a smaller footprint compared to the facility proposed in Option B, as the associated drainage area only includes those areas north of the CR42 right-of-way. This would meet minimum ERCA and Provincial Standards and mitigate negative downstream impacts, however would not provide the opportunity to reduce the size of the SWM facilities proposed south of CR42.

Option B was determined to be the preferred alternative based on the following:

- Reduces direct impact on private property lands that can provide a more desired development scenario. Pond P4 can be reduced in size as shown in Option B Figure.
- SWM facility utilizes non-developable lands designed as 'open space' through the City's Official Plan;
- Will provide for a feasible SWM solution and sufficient storm outlet for the first phase of the Lauzon Parkway Improvements;
- From a staging perspective, these SWM facilities will be required to facilitate the implementing transportation needs within this area, while also servicing all portions of the CR42 secondary plan area that front CR42.

The following was considered in the evaluation of alternative SWM strategies.

- The SWM facility P7 has been located adjacent to Lauzon Parkway to facilitate the shortest and most direct outlet location for the proposed storm sewer system and outlet into the Little River. It is currently not feasible to locate P7 west of the roadway

as there is existing municipal infrastructure that will remain along the abandoned portion of Lauzon Parkway.

3.2 Alternative Solutions – Stormwater Management Facility Configuration

Four (4) servicing alternatives to implement SWM facilities were reviewed based on the preferred drainage area delineation Option B noted above, these include:

- **Option B1: Wet Ponds - One Linear Pond**:
  - Utilize wet ponds (P7 and P8) to provide both water quantity and quality control of stormwater using a permanent water quality control pool and forebay. P8 will consist of one long linear pond that discharges to the Little River drain via a stormwater pumping station.
- **Option B2: Wet Ponds - Two Parallel Ponds:**
  - Utilize wet ponds to provide both water quantity and quality control of stormwater using a permanent water quality control pool and forebay. This option is similar to Option B1, however P8 will consist to two parallel twin ponds that discharge to the Little River drain via a stormwater pumping station.
- **Option B3: Dry Ponds and Underground Quality Control:**
  - Utilize a dry pond to provide water quantity control of stormwater. The pond is expected to remain dry between rain events. To provide water quality control of runoff, each storm sewer outlet to the pond will need to be equipped with oil and grit separator unit(s) (OGS) and underground quality control unit chambers (ADS Isolator Row Plus or approved equivalent) adjacent to the footprint of the dry pond. The OGS and chamber water quality control units must be sized to meet the minimum quality control requirements (Normal Level of Treatment per the MECP Manual and particle size distribution per the Regional SWM Guidelines).
- **Option B4: Underground SWM Quality and Quantity:**
  - Utilize a fully underground SWM facility that provides both water quantity and quality control of stormwater to meet the minimum quality control requirements (Normal Level of Treatment per the Ministry of the Environment, Conservation

and Parks (MECP) Manual and particle size distribution per the Regional SWM Guidelines).

- To supplement water quality control of runoff, each storm sewer outlet to the underground facility will need to be equipped with oil and grit separator unit(s) (OGS) and quality control unit chambers (ADS Isolator Row Plus or approved equivalent).

Option B Alternatives Figure shows the approximate footprint of the SWM facilities for Options B1-B4 outlined above to treat the designated drainage area.

Pumping stations of the same capacity and in the same locations are required for all the surface flooding SWM alternatives.

The following assumptions and considerations were identified during the evaluation as it relates to the alternative SWM strategies discussed:

- Functional design of the preferred SWM facility will be formalized after feedback is obtained from this round of consultation.
- The design team has been coordinating with the Windsor International Airport staff to develop a functional design and adaptive management plan that will mitigate water fowl habitat and provide a long-term plan for operation of the ponds over their lifecycle for all surface storage SWM options. The adaptive management plan will be included in the final SMP report.

Table 2 details the comparative evaluation between the SWM facilities, as described above.

3.2.1 Evaluation - Stormwater Management Facility Configuration

The four (4) SWM facility configurations were comparatively evaluated using the criteria previously noted.

Preliminary Preferred Alternative: Option B2

The preliminary preferred alternative includes the incorporation of two (2) Parallel Wet Ponds to service the Lauzon Parkway/CR42 area, as shown in Option B Alternatives Figure. This layout is the most preferred, compared to Option B1, as it provides for a consolidated and regional SWM facility that is in closer proximity to the Little River

Drain, and better consolidates areas required for the SWM facility. The twin pond configuration is considered at this time, the more cost effective alternative than the underground storage Option B3 and Option B4.

Subject to comments and feedback received during consultation, this preliminary preferred alternative will become the proposed servicing plan for SWM for the CR42 and Lauzon Parkway within the Sandwich South area shown.

The future Environmental Study Report will identify whether any further environmental assessment work is required for the proposed infrastructure and will include further information on potential effects and proposed mitigation, staging and implementation.

4.0 Stormwater Management Alternatives

4.1 Evaluation of Alternative Solutions for Stormwater Management for Lauzon Parkway/County Road 42

Table 1: Evaluation of Alternative Drainage Area Scenarios

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
Manage Flood Risk			
To what extent can the alternative address surface flooding?	Lowest flood protection. Additional runoff resulting from road and development would not meet minimum Regional and Provincial SWM requirements or support road improvements. Additional runoff would discharge to the Little River uncontrolled.	High flood protection. SWM Controls will reduce runoff to greater than pre-development conditions to meet regional and provincial SWM requirements. Additional runoff would be controlled prior to discharge to the Little River Drain. Runoff would be over-restricted beyond existing conditions to provide a greater level of service and meet existing SWM guidelines.	High flood protection. Same as Option A.
Preference	Least Preferred	Most Preferred	Most Preferred
Protect Quality of Life			
Is there potential private property that would be required?	No private property north of CR42 would be required for SWM needs.	Highest overall requirement of private property acquisition to accommodate SWM. In addition to road drainage, this option does not permit for the reduction of SWM corridors on private owned lands.	Moderate requirement of private property acquisition to accommodate SWM. Less private property requirements compared to Option A. This option permits for the reduction of SWM corridors on private owned lands, south of CR42. More privately-owned lands can be used for development.
What are the potential impacts to cultural heritage (archaeology and built heritage)?	Low. No additional ground disturbance will be required to maintain existing conditions.	High. Ground disturbance is required within areas identified as high potential and therefore Stage 2 archaeological assessments will be required in advance of any ground disturbance. Low potential for impact to build heritage features.	High. Same as Option A.
What are the potential construction related impacts	Low.	Highest.	High. Same as Option A.

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
to the public/ community? (Noise, dust, vibration)	No immediate impacts due to construction activities.	Construction of SWM facilities will occur prior to development of lands. Sediment and erosion control will be required throughout construction and as required in advance of vegetation maturing. Construction of facilities outside of the municipal right-of-way will require minimal disruption to traffic.	
What are the potential construction related impacts? (Municipal Capital Works impacts)	Low. SWM facilities will not be required in advance of the Lauzon Parkway and CR42 Road Improvements.	High SWM Facilities will be constructed in conjunction with the Lauzon Parkway and CR42 Road Improvements. SWM Facilities are required prior to developing areas north of CR42 SWM facility is in closer proximity to the proposed development lands.	Highest SWM Facilities will be constructed in conjunction with the Lauzon Parkway and CR42 Road Improvements. SWM Facilities are required prior to developing areas north and south of CR42. Therefore greater length of sewer including crossing CR42 will be required to service first phases of development.
Are there long term operational impacts on local residents and businesses?	Low.	Moderately High. Pond maintenance will be required including landscape and maintenance of waterfowl mitigation features. Regular inspection will be required.	Moderately High. Pond maintenance will be required including landscape and maintenance of waterfowl mitigation features. Regular inspection will be required.
Are there potential recreational opportunities?	Yes A continuous recreational trail network will be located within the SWM management corridors.	Yes, same as ‘Do Nothing’.	Yes, same as ‘Do Nothing’.
Preference	Most Preferred	Least Preferred	Less Preferred
Be Cost Effective and Provide Value			
What is the relative cost of the alternative?	Lowest. Marginally smaller SWM Facilities would be required to only service developable areas and not incorporate road drainage.	Highest. Regional and centralized SWM facilities are cost-effective to construct and maintain. More cost-effective than Option B due to this being a smaller sized facility. The overall SWM Strategy cost is comparable to Option B, however property acquisitions costs would be greater overall.	High. Regional and centralized SWM facilities are cost-effective to construct and maintain. Requires a larger sized facility than Option A. The overall SWM Strategy cost is comparable to Option A, however property acquisitions costs would be less overall.

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
		Less relative cost for trunk storm sewers compared to Option B.	Relatively higher cost for trunk storm sewers required to direct drainage for areas south of CR42 to north facility compared to Option A.
Are there opportunities to reduce overall cost and/or reduce costs to taxpayers?	Low. Short-term: Least cost to implement the Lauzon Parkway Improvements. Long-term: SWM cost for development areas cannot be reduced under this solution. Lowest storm sewer costs. Capital costs for onsite SWM Facilities will be paid by individual property owners.	Low. Short-term: Moderate cost to implement the Lauzon Parkway Improvements. Long-term: SWM costs for development areas cannot be reduced under this solution. Moderate storm sewer costs. Capital costs to implement SWM facilities will be paid for via area-specific development changes that will be enforced by the City.	Lowest. Short-term: Highest cost to implement the Lauzon Parkway Improvements. Long-term: SWM for development areas cannot be reduced under this solution. Highest storm sewer costs. Capital costs to implement SWM facilities will be paid for via area-specific development changes that will be enforced by the City.
What is the local economic benefit?	Low. Discharging uncontrolled flows to the Little River will have negative impacts downstream increasing the risk of flooding, property damage, and drain maintenance. Will not benefit developable lands.	High. Shared regional SWM facility will provide an outlet for all development areas and a consolidated operation and maintenance plan can be implemented. Implementation of the ponds will allow development to proceed and fulfill local market needs.	Highest. Same as Option A, however permits a relatively higher amount of developable land.
What is the level of complexity for construction and operation? (Capital projects)	None.	Low Offline facility can be constructed with minimum impact to existing drains and infrastructure. Shortest and smallest trunk storm sewers are required. Less complex than Option B, as the storm sewer routing will be in closer proximity to the downstream SWM Facility outlet. SWM facility will be required prior to the planned reconstruction of 9th Concession Road.	Low. Same as Option A. Longer and largest and trunk storm sewers are required to drain areas that are comparatively further from the downstream SWM facility. SWM facility will be required prior to the planned reconstruction of 9th Concession Road.
What is the level of complexity for construction and operation? (Private development)	Highest. Shallow drainage outlets will require onsite pumping or limited development. High operational complexity due to greater reliance on private flood protection measures.	Moderately Low. SWM facilities will not require private property operation or maintenance of SWM facilities.	High. Same as Option A, however due to the proximity of the pond to development areas, additional cost and coordination required in advance of property development south of CR42.

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
Preference	Most Preferred	Less Preferred	Least Preferred
Protect the Natural Environment			
What are the environmental effects of the alternative?	Negative. Directing directly to the Little River without quality or quantity treatment will have negative environment effects.	Positive. Meets water quality treatment requirements. Does not control water balance, however, there are no local requirements, and limited opportunities to efficiently recharge groundwater and reduce SWM runoff volumes.	Same as Option A.
Will there be impacts to species at risk (SAR)?	Less construction related impacts to SAR. Reduced opportunity to provide habitat to offset impacts of development and maintain natural corridor connectivity.	Existing drains and associated natural environment corridors will provide habitat to offset impacts of development and maintain corridor connectivity. SWM Facility areas will provide additional buffer between natural corridors and development land.	Same as Option A, however minimal regulatory offsets from Little River Drain must be maintained to reduce impacts to SAR.
Will the proposed SWM protect Provincially Significant Wetlands (PSW)?	Development will need to maintain minimum regulatory separation from natural areas as well as complete necessary assessments to demonstrate PSWs will not be impacted.	SWM facilities will be designed to minimum regulatory setbacks from all PSW lands. Treed buffer areas are required along PSWs. Facilities will provide addition buffer between PWSs and development lands.	Same as Option A.
Is there an opportunity to protect natural spaces?	Development will need to maintain minimum regulatory separation from natural areas.	Yes. SWM facilities will provide a boundary between developable lands, drains and natural corridors. Solution provides a better opportunity to protect natural areas. SWM corridor can be integrated with adjacent natural spaces.	Similar to Option A, however less SWM corridor buffers will be provided along the Little River Drain south of CR42.
Preference	Least Preferred	Most Preferred	More Preferred
Support the Creation of a Complete Community			
Does the alternative support a self-sufficient community?	No. Increased risk associated with flooding downstream areas if local runoff is not controlled. Reliance required on individual property owners for mitigation flood risks.	Yes. SWM services are provided in the local community. Quality and quantity control will be provided within the local community – no impacts upstream or downstream.	Yes. Same as Option A.
Preference	Least Preferred	Most Preferred	Most Preferred

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
Protect Health and Safety			
Will this alternative reduce flood risk and standing water with developable areas?	No. Increase in flood risk with uncontrolled flows entering the Little River Drain.	Yes. Flood control criteria will reduce risks associated with flooding in watercourses and drains as well as allow ponding in development areas to be controlled to acceptable levels.	Yes. Same as Option A.
Will this alternative improve public safety?	No. Developable lands and roadways are vulnerable to back-ups of the Little River drain and therefore could cause increase flooding impacting emergency access.	Yes. The SWM drainage network and end of pipe facility will be designed to reduce upstream surface flooding during major rain events. Implementation of the SWM drainage network and end of pipe facility, coupled with maintenance of minimum flood protection elevations, will minimize surface flooding and allow for safer travel on roadways and maintain emergency access.	Yes. Same as Option A. SWM facilities are further from developable areas.
Are there safety related risks associated with the proximity to the Windsor International Airport (WIA)?	Minimal risks associated with proximity to WIA.	Proposed SWM facilities will need to be implemented to mitigate water fowl habitat. Maintenance of measures and monitoring of effectiveness will need to be done over the lifecycle of the facility.	Same as Option A. Largest footprint of pond north of CR42. Location of the pond utilizes the existing PSWs to provide buffer to the SWM facility.
Preference	Least Preferred	More Preferred	Most Preferred
Align with Existing Infrastructure and Studies			
How compatible is the alternative with existing and surrounding infrastructure?	Least compatible. The option is not compatible with upstream and downstream drainage systems. Impacts the capacity of the Little River due to controlled release of increased runoff.	Most compatible. The option is compatible with upstream and downstream drainage systems. SWM Ponds provides the most direct overland flood route.	Compatible. This option requires large trunk storm sewer crossing CR42 to direct drainage to pond. Large trunk sanitary sewer and storm sewer do not conflict but minimal flexibility to revise storm sewer depths. Overland flood routing cannot cross CR42 and therefore overland flow for areas south of CR42 will need to drain to P4.
Preference	Least Preferred	Most Preferred	More Preferred

Criteria	Do nothing: No Stormwater Management - Lauzon Parkway or Drainage Area North of CR42	Option A: Stormwater Management For the Lauzon Parkway and Dra0069nage Area North of CR42	Option B: Stormwater Management For Drainage Areas North and South of CR42
Build in Resiliency			
How does the infrastructure alternative address climate change?	Least resilient to climate change.	SWM facilities incorporate design safety factors to account for potential higher future rainfall intensities.	Same as Option A.
Preference	Least Preferred	Most Preferred	Most Preferred
Build in Flexibility			
What is the potential for phasing the infrastructure alternative?	Low. Phasing of development may increase in complexity and have limitations.	Moderate. SWM facility construction can be phased to accommodate each service area. The areas have been subdivided into sub-drainage areas that have an individual outlet to the existing drain network. Development upstream will not have impacts to the downstream system as phasing occurs.	High. With the construction of this solution, two areas would be ready for development, both the north and south side of County Road 42, as opposed to Option A that can only service the north side of County Road 42.
How flexible and adaptable is the alternative to change?	Least Flexible.	Limited Flexibility. Once the surrounding areas have been developed, there is limited flexibility to increase the capacity of the SWM Facility.	More Flexible. The surrounding areas are not designated for development. Future pond expansion is possible and can be integrated into the proposed open space.
Does the alternative allow us to accommodate future population and employment growth?	No. Lack of capacity within SWM management facilities and existing floodplain area will negatively impact the possible future population and employment growth (impacting area available for development). Requirement for developments to have localized SWM quantity and quality controls will impact the developable lands available thus reducing the achievable growth.	Yes. Future population and employment growth are accommodated by SWM controls under this option.	Yes. Same as Option A. This option services more area than the other options, accommodating more future population and employment growth.
Preference	Least Preferred	Less Preferred	Most Preferred
Overall Preference	**Least Preferred**	**Less Preferred**	**Most Preferred Solution**

Table 2: Evaluation of Alternative Stormwater Management Configurations

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
Manage Flood Risk				
To what extent can the alternative address surface flooding?	Well. Wet Pond will be sized to meet Climate Change storm criteria. Outlet SWM pump station will ensure controlled outflow to Little River does not post risk of flooding to downstream areas.	Same as Option B1.	Same as Option B1.	Same as Option B1.
Preference	Most Preferred	Most Preferred	Most Preferred	Most Preferred
Protect Quality of Life				
Is there potential property that would be required?	Moderate footprint size. Limits some development area along the future roadway and industrial/commercial development area north of CR42.	Smallest footprint. Provides the most development area along the future roadway and industrial/commercial development area north of CR42.	Same as Option B1.	Largest footprint, but can accommodate aboveground amenities in the designated open space areas. In developable areas, could use underground storage areas for large parking areas. Limits the level of development that can be accommodated north of CR42.
What are the potential impacts to cultural heritage (archaeology and built heritage)?	Moderate Footprint. No impact to built heritage features. Area considered high potential for Archaeological Resources. A Stage 2 assessment is required.	Same as Option B1. Smallest footprint.	Same as Option B1.	Same as Option B1. Largest footprint.
What are the potential construction related impacts to the public/ community? (Noise, dust, vibration)	Moderate. Wet Pond will result in construction related impacts such as noise, dust and vibration. Pond will be constructed prior to the development of the lands.	Same as Option B1.	High Construction Impact. Large construction scope area.	Highest Construction Impact. Largest construction scope area.

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
Are there long term operational impacts on local residents and businesses?	Moderate. Wet Pond requires sediment removal as needed to maintain quality control capabilities. Wet Pond maintenance will be required including landscape and maintenance of water fowl mitigation features. Regular inspection will be required.	Same as Option B1.	Moderately High. Underground facilities require more frequent sediment removal. Sediment removal is more difficult for closed underground systems, but are constructed with inspection ports for sediment removal via vacuum truck. Regular cleanout of oil and grit separators and underground water quality chamber units is required to maintain quality control. Pond maintenance will be required including landscape. Monitoring and maintenance of water fowl mitigation measures is less for dry ponds.	High. Underground facilities require more frequent sediment removal. Sediment removal is more difficult for closed underground systems, but are constructed with inspection ports for sediment removal via vacuum truck. Regular cleanout of oil and grit separators and underground water quality chamber units is required to maintain quality control. No maintenance related to water fowl mitigation measures is required.
Are there potential recreational opportunities?	Yes, active transportation facilities will be integrated into the stormwater corridors.	Same as Option 1B.	Same as Option 1B.	Same as Option 1B. More surface area for plantings, recreational amenities and active transportation facilities.
Preference	Most Preferred	Most Preferred	Less Preferred	Less Preferred
Be Cost Effective and Provide Value				
What is the relative cost of the alternative?	Moderate.	Similar cost to Option B1.	Moderately High.	Highest Cost.
Are there opportunities to reduce overall cost and/or reduce costs to taxpayers?	Low. Costs for Wet Pond will be shared between developers based on development land areas as well as the City to drain municipal ROW Areas.	Low. Same as Option B1.	Low. Less relative opportunity to reduce cost compared to Option B1. All quality control infrastructure will need to be implemented at the onset of development.	Moderate. Greatest opportunity to utilizing excess soil onsite.
What is the local economic benefit?	Limits some development area along the future roadway north of CR42 and along CR42.	Provides the most development area along the future roadway, north of CR42 and along CR42.	Same as Option B1.	Limits development area along the future roadway north of CR42 and along CR42.

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
What is the level of complexity for construction?	Moderate level of complexity.	Same as Option B1.	Higher level of complexity in comparison to Option B1 and B2.	Same as Option B3.
What is the level of complexity for operation?	High. Wet Pond maintenance will be required including landscape and maintenance of water fowl mitigation features. Regular inspection will be required over the lifetime of the facility.	Same as Option B1.	Moderate. Dry Pond maintenance will be required including landscape. Monitoring and maintenance of water fowl is less for dry ponds. Regular cleanout of oil and grit separators and underground water quality chamber units is required to maintain quality control.	Moderately High. Regular cleanout of oil and grit separators and underground water quality chamber units is required to maintain quality control.
Preference	More Preferred	Most Preferred	Less Preferred.	Least Preferred
Protect the Natural Environment				
What are the environmental effects of the alternative?	Wet Pond to be designed to provide a minimum "Normal" quality control level, as per Regional SWM Guidelines. Wet Pond can be integrated into the municipal drainage system and natural environment corridor. Less frequent sediment removal needed.	Same quality level as Option B1. Wet Pond can be integrated into the municipal drainage system and natural environment corridor. Less frequent sediment removal needed.	Same quality level as Option B1. Dry Pond can be integrated into the municipal drainage system and natural environment corridor. Frequent sediment removal needed. Sediment removal process is more difficult.	Same quality level as Option B1. Surface area above underground facility will need to be integrated into the natural environment corridor. Most frequent sediment removal needed. Sediment removal process is more difficult.
Will there be impacts to species at risk?	Does not impact existing species at risk. Natural environment corridor shall be implemented to provide habitat.	Same as Option B1.	Same as Option B1.	Same as Option B1.
Will the proposed stormwater management protect Provincially Significant Wetlands (PSW)?	Highest protection. This solution provides the highest level of protection for the existing Provincially Significant Wet Land areas by providing an additional buffer from those areas to the developable areas beyond what is considered minimum.	High Protection.	Same as Option B1.	Moderate Protection.

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
Is there an opportunity to protect natural spaces?	Yes. Opportunity to protect natural spaces along the existing Little River Drain.	High Protection.	Same as Option B1.	Less Protection. Most impact during construction and limits natural features with deeper rooting that can be accommodated above underground facility.
Preference	Most Preferred	Most Preferred	Less Preferred	Least Preferred
Protect Health and Safety				
Will this alternative reduce flood risk and standing water with developable areas?	Yes, SWM facilities must be designed to meet minimum SWM Guidelines. Additional freeboard in the ponds will reduce risk of standing water beyond the established level of service.	Same as Option B1.	Same as Option B1.	Yes, SWM facilities must be designed to meet minimum SWM Guidelines however does not provide any additional level of service comparted to Option B1.
Will this alternative improve safety?	Least safe alternative. Necessary signage, safety devices and community education required to mitigate risk of drowning. Permanent water features introduce risk of water fowl habitat. Necessary features to discourage use of those the ponds are required to be implemented and monitored over the life of the facility. Adaptive management to mitigate these risks.	Same as Option B1.	Safer than Options B1 and B2. After the maximum 48 hours pump station drawdown period, minimal open water areas should be present.	Most safe Option. No surface depression and all SWM underground, reducing the risk of a trip and fall hazard.
How will alternative impact safety related to risks associated with the proximity to the Windsor International Airport.	Permanent water features introduce risk of water fowl habitat. Necessary features to discourage use of those the ponds are required to be implemented and monitored over the life of the facility. Adaptive management to mitigate these risks. Maximum 48 hour draw down period to reduce wet area.	Same as Option B1.	Dry ponds will not have permanent wet areas and therefore would need to incorporate necessary measures to discourage “stop off” areas for water fowl. Maximum 48 hour draw down period to reduce wet area.	Flat open space required to accommodate underground infrastructure would need to incorporate necessary measures to discourage “stop off” areas for water fowl.
Preference	Least Preferred	Least Preferred	More Preferred	More Preferred

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
Align with Existing Infrastructure and Studies				
How compatible is the alternative with existing and surrounding infrastructure?	Compatible. This option requires large trunk storm sewer crossing CR42 to direct drainage to pond.	Same as Option B1.	Same as Option B1. Not consistent with the Upper Little River Watershed Drainage Master Plan and Stormwater Management Study (Ongoing).	Same as Option B1. Not consistent with the Upper Little River Watershed Drainage Master Plan and Stormwater Management Study (Ongoing).
Preference	More Preferred	More Preferred	Less Preferred	Less Preferred
Build in Resiliency				
How does the infrastructure alternative address climate change?	Most Resilient. Wet Pond has additional freeboard (distance between the high water line and the top of pond bank) that will provide additional storage capacity to accommodate changes to climate and storm intensity that the level of service (1:100 year storm). Opportunity to expand the pond footprint within open space areas if required.	Same as Option B1.	Less Resilient. Dry Pond has freeboard that will provide additional storage for storm events greater that the level of service (1:100 year storm). Opportunity to expand the pond footprint within open space areas if required. Additional underground quality control infrastructure would need to be implemented to provide quality for greater runoff requirements.	Least Resilient. Additional underground quantity and quality control infrastructure would need to be implemented to provide quality for greater runoff requirements. Would require a comparatively greater footprint.
Preference	Most Preferred	Most Preferred	Less Preferred	Less Preferred
Build in Flexibility				
What is the potential for phasing the infrastructure alternative?	Yes. Wet Pond can be phased to accommodate development phasing. Pump station outlet will need to be constructed to operate under phased conditions.	Same as Option B1.	Yes. Dry Pond and underground quality units can be phased to accommodate development phasing.	Yes. Underground quality units can be phased to accommodate development phasing.

Criteria	Option B1: Wet Ponds - One Linear Pond	Option B2: Wet Ponds - Two Parallel Ponds	Option B3: Dry Ponds and Underground Quality Control	Option B4: Underground Quality and Quantity
How flexible and adaptable is the alternative to change?	Most Flexible. Wet Pond has freeboard that will provide additional storage for storm events greater that the level of service (1:100 year storm). Opportunity to expand the pond footprint within open space areas if required.	Same as Option B1.	Less Flexible. Dry Pond has freeboard that will provide additional storage for storm events greater than the level of service (1:100 year storm). Opportunity to expand the pond footprint within open space areas if required. Additional underground quality control infrastructure would need to be implemented to provide quality for greater runoff requirements.	Least Flexible. Additional underground quantity and quality control infrastructure would need to be implemented to provide quality for greater runoff requirements.
Does the alternative allow us to accommodate future population and employment growth?	Yes. Future population and employment growth are accommodated by SWM controls under this option.	Same as Option B1.	Yes. Some ability to expand underground quality infrastructure is possible.	Limited ability to expand underground quality and quantity control infrastructure is possible. Consideration for future expansion areas could be accommodated in open space areas but would be limited in developable areas where buildings/or other infrastructure is already established.
Preference	Most Preferred	More Preferred	Less Preferred	Less Preferred
Overall Preference	**More Preferred**	**Most Preferred**	**Less Preferred**	**Less Preferred**