



# Clair-Maltby

Transform. Connect. Community.

## Stormwater Management Plan

Prepared by:  
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## **Task C: Stormwater Management Plan**

### **Study Understanding**

The Stormwater Management Plan is inherently linked to the preparation of the CEIS and is a fundamental component of the MESP, along with the Water / Wastewater Master Plan and the Mobility Plan. As noted under the Work Plan for the CEIS (Task A), there is a requirement to conduct an inventory of the existing system, specific to surface water and groundwater, and from this prepare analytical tools which explicitly integrate the movement of water through the CMSP area, notably surface water / groundwater and stand-alone surface water. To this end, there are significant overlaps between the preparation of the Stormwater Management Plan and the CEIS and this has been recognized in the task descriptions which follow. In addition, the Stormwater Management Plan, as a core component of the MESP, will need to address the requirements of the MEA Class Environmental Assessment (EA) process. The Stormwater Management Plan will need to define the problem, assess alternatives, and systematically establish a preferred set of solutions which will constitute the Master Plan for stormwater for the CMSP area. Consultation and documentation will need to follow the provisions of the Class EA process.

### **Phase 1: Background**

**i. Characterize features (water features, NHS, kettles)**

The open water features, including watercourses, wetlands, headwater drainage features, kettles, and others will be identified through the CEIS. This information will be placed into a contextual form within the stand-alone Stormwater Management Plan as part of this subtask.

**ii. Inventory of existing Stormwater Management measures**

The PSA currently has limited urban development, the majority of which is constituted by the Rolling Meadows Estate Residential development, and the Springfield Golf Course. Other isolated development exists, however very little of this is considered to have any formal stormwater management. Other stormwater management systems potentially within the area relate to some of the roadways, including recent reconstruction. Both grey and green infrastructure will be inventoried. This information will be reviewed with City staff to determine the currency of any stormwater management systems within the PSA and surrounding environs.

**iii. Hydrology (existing)**

The existing hydrology specific to surface water will be prepared using the PCSWMM model in order to remain consistent with the application of that tool across the City. As noted under the Work Plan for the CEIS, this will be established for existing land use conditions under the CEIS Work Plan. For the Stormwater Management Plan the information outcomes will be placed into a relational context specific to the groundwater interface, using the MIKE-SHE modelling. The hydrologic regimes of PC-SWMM and MIKE-SHE will be

integrated through consistent inputs such as topography, surface parameters and demonstrated using monthly infiltration and run-off volumes by subcatchment. Similar to Subtask i above, the hydrology will be defined in the context of the overall stormwater management plan under this task by extracting information from the CEIS.

**iv. Inventory of culverts, crossings, watercourse alterations**

AFW will contact the City and its project partners for any available information on culverts and bridges including their location, size and inverts. It is proposed to conduct a field verification of these systems in order to document / confirm location and size. While it is not explicitly included within the scope, it is likely that level surveys would be required for a select number of culverts to be able to conduct detailed hydraulic assessments.

**v. Hydraulics / Floodlines**

The study area has limited definition of watercourses and overland drainage features due to its headwater and hummocky terrain. The Hanlon Creek towards the north-east and the south lands of the Mill Creek offer the greatest potential to consider the definition of local floodplains through a hydraulic analysis including the need for culvert upgrades. AFW proposes to use the HEC-RAS methodology to develop floodplains in accordance with GRCA practice.

**vi. Establish stormwater management criteria**

On the basis of the integrated surface water / groundwater analysis conducted as part of the CEIS for existing conditions, as well as the surface water analysis using the PCSWMM model, it is proposed to establish targets for the existing land use insofar as quantity control for flooding and erosion and quality control based on Provincial criteria (supplemented by any additional direction offered by Agency Regulators), as well as water balance as a byproduct of MIKE-SHE modelling described earlier; these criteria will be used as targets in subsequent phases.

**vii. Report – Phase 1**

The foregoing assessment which will prescribe the existing conditions for the purpose of establishing a stormwater management plan, will be documented as part of a Phase 1 report and ultimately combined into a final report.

**Meetings**

<b>Type</b>	<b>Subject</b>	<b>Number of Attending Staff</b>
City Project Team	Start-Up	2
TAG / TSC	Phase 1 Report review	2

## **Phase 2: Project**

### **i. Hydrology (Proposed Land Use)**

As noted under the CEIS Work Plan, the CEIS will include the analysis of three (3) Community Structure Alternatives which will involve a numerical impact analysis leading to specific direction on the respective land uses for refinements and establishing future management. As part of the preparation of the Stormwater Management Plan, it has been assumed that the preferred Community Structure Alternative will be provided following the CEIS assessment and used along with the stormwater management criteria to develop the stormwater management plan. The PCSWMM model will need to be updated and, as noted earlier, an important component of this will involve the confirmation of preliminary grading which will provide an area-specific framework for establishing the Stormwater Management Plan (reference Phase 3).

### **ii. Stormwater Management system assessment**

Based upon the updated hydrology and the preferred Community Structure Alternative, the impacts associated with the preferred Alternative will be assessed and stormwater management requirements associated with the respective criteria (quantity, quality and water budget) will be confirmed and established accordingly. Stormwater management criteria will consider the MOECC's final version of the Runoff Volume Control Targets, with draft targets indicating the 90<sup>th</sup> percentile rainfall event to be managed using the prioritized approach of retention, detention and other volume detention and release stormwater management approaches. A multi-tiered stormwater management approach will consider reduction of contaminant loadings to potential end-of-pipe facilities, although caution has to be used in using retention and detention techniques due to potential groundwater quality impacts and infiltration of the 90<sup>th</sup> percentile storm event.

Planning of the stormwater management system will integrate the water balance assessment findings and strategies for the three (3) creek systems (Mill Creek, Hanlon Creek and Torrance Creek). In addition integration of findings from Water/Wastewater Assessment regarding lot level controls/ rainwater harvesting and related sustainable practices, that may reduce the runoff response, will be considered in the stormwater management assessment.

### **iii. Water balance assessment**

The preferred Community Structure Alternative will be the basis for a final MIKE-SHE simulation to establish potential infiltration and recharge opportunities. The results of the MIKE-SHE modelling and PCSWMM modelling will support development of the required guidance for stormwater management planning as part of Phase 3. This will include development of groundwater infiltration strategies for the three (3) creek systems (Mill Creek, Hanlon Creek and Torrance Creek) based on findings from the CEIS with the objective of maintaining or enhancing the groundwater recharge/discharge function to extent possible. The assessment will consider the pending MOECC Runoff Volume Control Targets, low impact development, potential lot level controls/ rainwater harvesting and other related sustainable practices. As part of the water balance assessment impacts to existing

groundwater levels within the adjacent and beneath the existing Greenway system are to be determined, along with the system discharge to Hanlon Creek Tributary 'E'.

The strategy will consider sources of chloride and establish water balance criteria and targets as part of the plan. The Water Balance Assessment will also consider guidelines such as the *CVC/TRCA document Water Balance for Protection of Natural Features*. Modelling to support this work will require confirmation of preliminary grading to support the area-specific strategy.

**iv. Climate change assessment**

The AFW Team is a leader in Climate Change Assessments in North America, having recently (2013) been identified by Environmental Analyst magazine as the **Number 1 Firm** in this discipline in North America. AFW has, for numerous land use planning studies across Ontario, conducted climate change assessments under varying degrees of complexity. For the subject study, it is considered appropriate to consider various meteorological trends which have been observed in neighbouring areas, including conducting an extreme storm analysis by transposing observed events from other jurisdictions local to the CMSP area. Manual adjustments may be made to the City of Guelph's IDF or the use of approved Climate Change Tools can be used to adjust Guelph's IDF relationship. The IDF adjustments are applied to the system as revised design storms to identify the influence on the system. Further dialogue on the scope of this undertaking would need to be conducted should the approach to the Climate Change Assessment require the use of a Climate Model for downscaling and refinement of meteorological time series.

**v. Report – Phase 2**

This report would document the assessment of impacts and associated management opportunities which will provide guidance for formalizing the Stormwater Management Plan for the CMSP area.

Meetings

Type	Subject	Number of Attending Staff
TAG / TSC	Preliminary Management Strategy	2
TAG / TSC	Review of Phase 2 Report	2

**Phase 3: MESP and Secondary Plan Input**

**i. Functional Planning of Stormwater Management system**

As noted earlier, once the preferred Community Structure Alternative has been established, the Stormwater Management Plan will prescribe in Phase 3 details associated with functionality including control grades, specific drainage outlets, major / minor flow paths, and associated stormwater management practices. Stormwater management practices will have to consider Green Infrastructure as noted in the Greater Golden Horseshoe Growth

Plan and as defined within the 2014 PPS as: *means natural and human-made elements that provide ecological and hydrological functions and processes. Green infrastructure can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs.* Green Infrastructure, including low impact development best management practices (source, conveyance and end of pipe) will be considered on both public and private property, with discussion with the City required regarding recommending and implementing stormwater management controls on private lands and in the context of the pending Stormwater Management Credit Program. These elements will be established under this subtask.

**ii. Conceptual Stormwater Management Designs**

Through the process of functional planning, various end-of-pipe stormwater management facilities will be identified. Once again, due to the complex topography associated with the Paris Moraine it is likely that there may be a need for innovative stormwater management planning and design which recognizes and preserves the important functionality of kettles and depressions on the landscape. As such, the respective stormwater management blocks and associated limitations, in terms of sizing and grading, will be identified in the context of the preferred Community Structure Alternative.

**iii. Interim Stormwater Management considerations related to Phasing**

Most often logical development sequencing moves from the outlet to upstream areas. Due to the complex topography and hydrology and hydrogeology associated with this area, this may or may not be feasible, hence there needs to be some consideration for the implications of interim downstream impacts and short-term improvements which can ultimately be staged as part of a comprehensive Implementation Plan.

**iv. Sediment and Erosion Control Measures**

Under this subtask, it is proposed to consult with the City and GRCA and other project partners on appropriate sediment erosion control measures and associated practices which can be made contemporary with respect to planning and development of this area specifically, again recognizing the important function of internally draining features. These practices will be documented for future use by the development community and those having oversight of implementation.

**v. Hydrologic Confirmation (Event, Continuous, and Seasonal)**

Once the area's functional grading and dimensional elements with respect to land use and stormwater management practices, including Low Impact Develop Best Management Practices (LID BMPs) are established, it is proposed to conduct a confirmation of the hydrologic performance of the system as planned. The MIKE-SHE and PCSWMM model will be used in both event and continuous mode and also used to develop a seasonal impact confirmation with respect to land use change and proposed management strategies.

**vi. Implementation Plan**

The CEIS will have established various overarching requirements with respect to implementation; the Stormwater Management Plan will add further detail specific to cost sharing, stormwater management facility maintenance, as well as the potential for various complementary programs which protect, enhance and rehabilitate the area resources. In order to support the preparation of the fiscal plan a costing exercise of primary stormwater infrastructure will be prepared using industry rates specific to the Guelph area. It has been assumed that a phasing strategy of short, medium and long-term needs will be developed to roughly equate to seven (7) year build out periods, with the seven (7) year build out period to be verified prior to preparing the Implementation Plan.

**vii. Monitoring Plan**

As noted earlier under the CEIS, a fully integrated monitoring strategy will have been developed as part of that task. It is anticipated that this will be documented under this study subtask and put into the context of the overall Stormwater Management Plan, which will focus on a system-wide landscape based monitoring program. As part of the recommended monitoring plan, the receiving groundwater and surface water systems would need to be monitored for quantity and quality impacts.

**viii. Report – Phase 3**

The foregoing information will be documented into a report which establishes the Stormwater Management Plan and its associated Implementation and Monitoring requirements over the course of the development of the CMSP area.

Meetings

<b>Type</b>	<b>Subject</b>	<b>Number of Attending Staff</b>
TAG / TSC	Stormwater Management Plan	2
TAG / TSC	Phase 3 Report review	2

Comment	Response	Work Plan to be Revised (yes/no)
TAG Member (P.J.), May 25, 2017		
Stormwater Management Plan		
Background		
<p>1. Canadian municipalities are confronted by challenges related to continued growth, climate change and aging infrastructure, and the increasingly limited ability of receiving waterways to absorb the impact of stormwater runoff and pollution. There is increased recognition that innovative and integrated water management approaches are required to ensure cost-effective service delivery as well as sustainable water resources to support public health, economy and environment both now and in the future.</p>	<p>Phase 2 Tasks (ii-iv) will provide direction on stormwater (SWM) quantity, quality and water balance requirements for the current Guelph IDF relationship and for extreme storms (climate change assessment), to meet SWM criteria established in Phase 2 Task (vi). Phase 3 Task (i) will determine the functional details of appropriate stormwater measures to meet the SWM criteria, including innovative low impact development measures.</p> <p>The CEIS work plan states:</p> <p>“There are a variety of techniques from the simple to the complex. For CM there is a mid-effort budgeted for. There are simple adjustments to the IDF or the use of approved CC Tools which can be used to adjust IDF relationships. These are applied to the system as design storms to identify the influence on the SWM system. This is what is proposed. A more aggressive and costly approach would involve Climate Model downscaling and refinement of meteorological time series – this is not in the current scope. There are other options as well, such as the transposition of large events which can be done for a small premium.” Use of a transposition approach may be considered during the next phase of this study if deemed appropriate.</p>	<p>Yes. SWM work plan edited to provide additional clarification on assessment of LID and inclusion of climate change using the mid-level approach.</p> <p>Lot level controls (LIDs/BMPs/Green Infrastructure) such as rain water harvesting will be taken into account from a Stormwater Management context</p> <p>No, work plan not revised - Water supply and treatment opportunities have been addressed through other City initiatives such as the Water Efficiency Strategy, Water Supply Master Plan, etc. and</p>

Comment	Response	Work Plan to be Revised (yes/no)
	<p>The development is planned to be serviced within the City’s current evolving Master Planning framework. The City’s approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This can include considering practices which are new to the City’s traditional approaches. A made-in-Guelph solution that addresses climate, and water supply conditions in Guelph in a sustainable and economic fashion is intended.</p>	<p>will not be revisited in this study.</p>
<p>2. Many Provincial Ministries recognize the importance of green infrastructure and Low Impact Development (LID) practices as an important way to reduce the need for costly, large-scale solutions. Practices such as bioretention and permeable pavement replicate natural processes like infiltration and evaporation close to the source and reduce the burden on grey infrastructure systems.</p>	<p>Phase 3 Task (i) will determine the functional details of appropriate stormwater measures to meet the SWM criteria, including low impact development measures such as bioretention and permeable pavement replicate natural processes like infiltration and evaporation.</p>	<p>Yes, additional clarification on LID considerations in work plan provided.</p>
<p><b>Defining Green Infrastructure</b></p>		
<p>3. To be consistent with terminology used in other Provincial Documents (i.e. 2014 PPS, Water Opportunities Act, Growth Plan, etc.) include a definition of Green Infrastructure and make reference to it within the work plans.</p>	<p>Green Infrastructure as per the 2014 PPS is defined as:  <i>Green infrastructure: means natural and human-made elements that provide ecological and hydrological functions and processes. Green infrastructure can include components such as natural heritage features and systems, parklands, stormwater management</i></p>	<p>Yes. Text revised</p>

Comment	Response	Work Plan to be Revised (yes/no)
	<p><i>systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs.</i></p> <p>Text can be added to the work plan Phase 3 Task (i) noting consideration of Green Infrastructure as per the 2014 PPS definition.</p>	
<p>4. The 2014 Provincial Policy Statement - The recently updated 2014 Provincial Policy statement includes additional sections that speak directly to considering the impact of climate change and that planning authorities should promote green infrastructure to complement infrastructure.</p>	<p>Please see responses to Comments 1-3</p>	<p>Please see responses to Comments 1-3</p>
<p>5. Some of the key goals and objectives of the Water Opportunities Act include:</p> <ul style="list-style-type: none"> <li>a. Fostering innovative water, wastewater and stormwater technologies;</li> <li>b. Creating economic development opportunities in green sector jobs;</li> <li>c. Encouraging the conservation of water resources</li> </ul>	<p>Please see responses to Comments 1-3.</p> <p>The development is planned to be serviced within the City’s current evolving Master Planning framework. The City’s approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This can include considering practices which are new to the City’s traditional approaches. A made-in-Guelph solution that addresses climate, and water supply conditions in Guelph in a sustainable and economic fashion is intended.</p>	<p>Please see responses to Comments 1-3.</p> <p>No, work plan not revised - Water supply and treatment opportunities have been addressed through other City initiatives such as the Water Efficiency Strategy, Water Supply Master Plan, etc. and will not be revisited in this study.</p>
<p>6. Although regulations have not yet been released, the intent is to drive change in how Ontario meets future demand for water services by requiring:</p> <ul style="list-style-type: none"> <li>a. Consideration of the challenges of growth,</li> </ul>	<p>Please see responses to Comments 1-3.</p> <p>The development is planned to be serviced within the City’s current evolving Master Planning framework.</p>	<p>Please see responses to Comments 1-3</p> <p>No, work plan not revised -</p>

Comment	Response	Work Plan to be Revised (yes/no)
<ul style="list-style-type: none"> <li>b. aging infrastructure and climate change;</li> <li>b. planning for water, wastewater and stormwater services and infrastructure in a more proactive and integrated manner;</li> <li>c. applying innovative technology and practices.</li> </ul>	<p>The City’s approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This can include considering practices which are new to the City’s traditional approaches. A made-in-Guelph solution that addresses climate, and water supply conditions in Guelph in a sustainable and economic fashion is intended.</p>	<p>Water supply and treatment opportunities have been addressed through other City initiatives such as the Water Efficiency Strategy, Water Supply Master Plan, etc. and will not be revisited in this study.</p>
<p>7. The Growth Plan for the Greater Golden Horseshoe also describes the use of green infrastructure in several sections in relation to complete communities, stormwater management, and climate change.</p>	<p>Please see responses to Comments 1-3. The Growth Plan for the Greater Golden Horseshoe can be mentioned in the context of green infrastructure in Phase 3 Task (i).</p>	<p>Yes- text revised</p>
<p>Phase 1: Background</p>		
<p>8. Inventory of existing Stormwater Management measures</p> <ul style="list-style-type: none"> <li>▶ Consider inventorying both grey and green infrastructure</li> </ul>	<p>Both grey and green infrastructure will be inventoried.</p>	<p>Provided clarification in work plan text.</p>
<p>9. Establish stormwater management criteria</p> <ul style="list-style-type: none"> <li>▶ Pending MOECC Low Impact Development Stormwater Management Guidelines - The MOECC has been moving forward with the final version of the Runoff Volume Control Targets which inform the development of the Guidance Document. It sounds like the target document will soon be posted on the EBR (i.e. early summer?). Recommend contacting the MOECC to learn more about these new guidelines and how they could</li> </ul>	<ul style="list-style-type: none"> <li>▶ Amec Foster Wheeler has received various versions of the draft Runoff Volume Control Targets document being authored by the MOECC. The draft target is the 90<sup>th</sup> percentile rainfall event (25 mm+/-) should be managed using the following mandatory control hierarchy using the following priority: <ul style="list-style-type: none"> <li>• Retained (does not discharge to the municipal storm sewer system and/ or</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ Provided clarification in work plan text regarding Pending MOECC Low Impact Development Stormwater Management Guidelines and integration of finalized</li> </ul>

Comment	Response	Work Plan to be Revised (yes/no)
<p>impact/inform the stormwater management criteria for the secondary plan area.</p> <ul style="list-style-type: none"> <li>▶ How will the criteria for the stormwater credit program be considered when establishing the Clair Maltby secondary plan stormwater management criteria?</li> </ul>	<p>surface waters)</p> <ul style="list-style-type: none"> <li>• LID Volume Capture and Release (Detention). Can be released to the municipal sewer system and/ or surface waters)</li> <li>• Other Volume Detention and Release. Can be traditional end-of-pipe SWM facilities. The 90<sup>th</sup> percentile rainfall event should be considered in the context of maintaining water balance for the Clair-Maltby Secondary Study Area (SSA) as per the CEIS work plan and Source Water Protection requirements. As such the amount of retention will be determined through the water balance assessment. The amount of Detention will have to be determined in consultation with the City.</li> </ul> <p>▶ We understand the City is reviewing options for the criteria for the Stormwater Management Credit Program, which would be implemented City wide. The Clair-Maltby SWM criteria will include reference to the City’s criteria for the Credit Program.</p>	<p>guidelines in development stormwater management approach.</p> <ul style="list-style-type: none"> <li>▶ Text modified to note that SWM Credit Program will be discussed in the Clair-Maltby SWM assessment.</li> </ul>
<p>Phase 3: MESP and Secondary Plan Input</p>		
<p>10. Conceptual Stormwater Management Designs</p> <ul style="list-style-type: none"> <li>▶ This section refers only to the identification of end of pipe stormwater management facilities</li> <li>▶ Recommend including reference to source, conveyance and end of pipe facilities utilizing green infrastructure low impact</li> </ul>	<ul style="list-style-type: none"> <li>▶ Work plan section can be revised to include green infrastructure (low impact development) including source, conveyance and end of pipe facilities on both public and private lands. Discussion with the City will be required regarding recommending and</li> </ul>	<ul style="list-style-type: none"> <li>▶ Yes. Text revised.</li> </ul>

Comment	Response	Work Plan to be Revised (yes/no)
<p>development practices on both public and private lands.</p> <ul style="list-style-type: none"> <li>▶ Stormwater management practices need to be evaluated both on public and private lands especially given the fact that the City of Guelph has a stormwater management charge program. If private lands are designed and constructed without private stormwater controls they will be assessed a stormwater charge by the city. The cost to the individual landowner to retrofit their property after the fact would be cost prohibitive given the low return on investment. A number of studies have found that there is a poor Return on Investment (ROI) to retrofit commercial, industrial, high density residential properties (typically with ROI in excess of 7 years or more), and for rainwater capture and reuse, ROI typically extended beyond 20 years.</li> <li>▶ To-date stormwater credits have had little impact on ROI, hence uptake rates across the US and Canada in jurisdictions providing incentives for GI/LID are typically below 5% for all types of private property owners.</li> <li>▶ There is no effective financial driver in place for GI/LID retrofit investments by commercial and industrial land owners.</li> <li>▶ Consider smaller decentralized communal systems</li> </ul>	<p>implementing SWM controls on private lands in the context of the pending SWM Credit Program. Smaller decentralized communal systems will be an approach considered.</p>	

Comment	Response	Work Plan to be Revised (yes/no)
<b>Draft Work Plan – Water &amp; Wastewater</b>		
<b>Integrated Water Management</b>		
<p>There was a lot of discussion around the ‘one water’ or closed system approach to water management. Here is a link to a good article about the integrated water management or ‘one water’ approach:  <a href="https://www.wateronline.com/doc/the-one-water-approach-0002">https://www.wateronline.com/doc/the-one-water-approach-0002</a></p>	<p>The ‘one-water’ approach is recognized and integrated into the Water &amp; Wastewater Work Plan.</p> <p>Stormwater, groundwater, surface water, wastewater, and treated drinking water within Guelph exist within a common watershed. The CMSP builds on the City’s water conservation policies, the water and wastewater Master Plan where water resources are optimized for human and natural functions.</p>	<p>Yes – Text revised</p>
<p>11. With more and more development, municipalities are assuming responsibility for more and more infrastructure and a lack of funding to operate/maintain/rehabilitate.</p> <p>With municipalities in the US reporting declining water sales will the city eventually reach a point where it is unable to cover the full cost of providing water/wastewater/stormwater services?</p>	<p>Declining water sales is recognized across Ontario and this recognition is essential to sustainable asset planning. This challenge is acknowledged and inherent in the City’s Master Plan Approach with capital growth plan components staggered according to growth in demand where applicable. (ref. section below W/WW TAG comments – 9).</p> <p>Any infrastructure component will have a capital, operating, and maintenance costs within its life-cycle. Some of the operating cost is fixed, and some of the operating cost is dependent on consumption habits. Typical financing for infrastructure involves fixed start-up costs (paid for by DCs, federal + provincial grants, economic development investment etc.); O&amp;M has fixed costs as well as consumption based costs.</p> <p>A key revision in the work plan is to separate the water</p>	<p>Yes – Text revised</p>

Comment	Response	Work Plan to be Revised (yes/no)
	<p>supply planning for linear/distribution vs facility infrastructure. The concepts of right-sizing (a one water principle) are highly relevant to the sustainable planning of facility (pumping, storage, supply) infrastructure. Linear infrastructure needs, particularly local distribution mains are generally more of a fixed cost and less sensitive to water consumption habits.</p> <p>Stormwater Management Infrastructure life-cycle costs are not tied to human water consumption habits. The life-cycle costs are driven by the initial design, climatic events, and watershed conditions.</p> <p>On the water supply side, there are savings to be acquired by synchronizing the implementation of timing and design of vertical facilities (pumping, implementation of new water sources, pumping storage, major transmission).</p> <p>On wastewater side there are savings to be acquired by water conservation &amp; Inflow infiltration reduction which can reduce treatment costs, environmental damage, and property damage due to flooding.</p>	
<p>12. How can we take an integrated water management approach that provides the best value for money?</p>	<p>This is the intent of the CSMP study which integrates with the City’s Master Plans, Conservation Efforts, and Stormwater Management, and Groundwater Protection and Enhancement Plans.</p>	<p>Yes – Text revised</p>
<p>13. What is the life cycle costing associated with the centralized versus decentralized approach to water management? Operation and Maintenance costs</p>	<p>LCC varies from system to system, component to component. In this case there is an existing urban supply and treatment system for the City which</p>	<p>Yes – Text Revised.</p>

Comment	Response	Work Plan to be Revised (yes/no)
can often times cost more than the initial capital costs.	integrates with this proposed development. There are economies of scale afforded to integration with the urban system.	
14. Can the work plan be revised to explore a decentralized and integrated water management system?	<p>The City’s Master Planning is an integrated water management system. Supply sources are decentralized and blended. Conservation is encouraged through greywater incentives etc.</p> <p>Wastewater Treatment is a centralized component, however the City is evaluating water reclamation for aquifer storage recovery in the wastewater master plan.</p> <p>These concepts will be considered within the context of the City’s water supply and wastewater master plans, City of Guelph policies, and Provincial regulations and policies.</p>	Wording amended with the one-water concepts.
<b>TAG Member (H. W.), May 25, 2017</b>		
TAG Member (H.W.) also provided a power point presentation entitled Transition of Pine Ridge / Clairfield Greenway from dryland meadow to wetland 2000-2016, prepared May 19, 2017		
<b>Integration of Work Plans</b>		
1. The planning for water-based infrastructure should use a One-Water approach. All return flows (return flows from use in buildings and stormwater flows) should be considered together with a common objective of restoration of water quality to meet standards for release to the environment with no	Stormwater, groundwater, surface water, wastewater, and treated drinking water within Guelph exist within a common watershed. The CMSP builds on the City’s water conservation policies, the water and wastewater Master Plan where water resources are optimized for human and natural functions.	

Comment	Response	Work Plan to be Revised (yes/no)
<p>detrimental impact. Intensity of treatment required for restoration of water quality, and the location of the treatment equipment, will differ for the different return-flow components but uniformity in outcome should be the requirement for all installations. Adopting this approach facilitates consideration of reuse of return-flow water as a water-supply source and thus integrates water supply within the One Water approach.</p>		
<p><b>Stormwater Considerations</b></p>		
<p>2. The stormwater section of the draft work plan identifies the complex topography and associated complex flowpath geometry of the Paris moraine that is present in the study area. It would be helpful to also mention the high annual recharge amounts entering the flow system from the study area under existing conditions, the high elevation of the study area at the headwaters of three separate stream systems (Mill Creek, Hanlon Creek, Torrance Creek of which the first two are cold-water trout streams), the paucity/absence of any watercourses in the study area, and the consequent importance of groundwater flux as the dominant discharge from the flow system.</p>	<p>Text can be added to the stormwater section of the work plan identifying the recharge to three (3) creek systems.</p> <p>The study area is a recharge area supporting groundwater discharge to three stream systems, two of which are cold-water trout streams as well as the supporting recharge to the underlying municipal aquifer as demonstrated in a number of studies including the Tier 3 Water Budget Study. The lower density of watercourses within the study area compared to others areas, high permeability of surficial materials, and large depth to the water table in the moraine areas are indicators of predominance of recharge over runoff in this area.</p>	<p>Yes. Text revised</p>
<p>3. These features of the existing flow system must be taken into account in the design of the stormflow-management elements. The development of the MIKE-SHE model, shared with the CEIS, must produce the same hydrologic outcomes as the PCSWMM model to correctly represent the</p>	<p>The MIKE-SHE model and PCSWMM model will be integrated together. We agree that depth to groundwater will influence the capacity to infiltrate and recharge groundwater in the study area. MIKESHE's representation of the interaction between groundwater and surface water systems will represent spatial and</p>	<p>Yes. Text revised.</p>

Comment	Response	Work Plan to be Revised (yes/no)
<p>performance of any stormflow-management options being examined. Of particular significance is the areal and temporal variation in watertable elevation predicted by the model.</p>	<p>temporal variation in the depth to the water table throughout most of the secondary study area using an approximately 50 x 50 m grid cell size or larger. This information can be used to appropriately inform and simulate conditions groundwater conditions/constraints in PCSWMM which will provide more detailed representation of storm flows. The confidence in the simulated depth to water table will be a function of the available observation data, including water levels, stream flows, mapped ponded water extent and bathymetry of Greenway ponds and wetlands. Historical field monitoring data on the Greenway system will be reviewed and discussed with the City as to its usefulness, benefit to the groundwater and surface water assessments and potential assessment implications as part of the CEIS.</p> <p>Consistency of hydrologic regimes between PC-SWMM and MIKE-SHE will be achieved using consistent inputs such as topography, surface parameters and demonstrated by comparison of monthly infiltration and run-off volumes by subcatchment.</p>	
<p>4. As noted in the draft workplan the algorithms in the MIKE-SHE model of the interactions between the surface inputs of liquid water from rain and snowmelt, the overburden groundwater flow system and the bedrock flow system must be able to represent the transient position of the watertable near wetlands and kettle lakes in order to assess the impact of alternative stormflow-management systems on natural features sensitive to changes in</p>	<p>Agreed. The MIKE-SHE model will be able to represent the transient position of the water table in the vicinity of wetlands and ponds. As described in comment response #2 the simulation will use a 50 x 50 m grid. Available water level data and observations of wet and dry ponds and kettle conditions will be used to calibrate the model representation. Hall's Pond would be a good test that said, bathymetry is being completed on three (3) wetlands and does not include Hall's Pond due to</p>	<p>Yes. Text revised.</p>

Comment	Response	Work Plan to be Revised (yes/no)
<p>hydroperiod. {A good test of the model will be replication of the waterlevel variation in Hall's pond while maintaining the watertable below the ground surface in adjacent dry kettle depressions. The integrated modelling approach used in the Tier 3 Guelph model was able to match the outflow from the overburden aquifer in Arkell Glen and MIKE-SHE capabilities are similar so there is good prospect for successful modelling}.</p>	<p>lack of property access. The MIKESHE model will still represent Hall's Pond and provide insight on changes in future run-off, depth to groundwater, groundwater discharge, leakage, hydroperiod etc. but we will assume uniform bathymetry and it will be represented using a 50 x 50 m grid. Request that the dry kettles be provided on a map to ensure we are talking about same features.</p>	
<p>5. The CMSP area is hydrologically connected via the groundwater flow system to the existing subdivisions at and north of Clair Road. Before stormwater-management systems are selected for the CMSP area it is essential that the performance of the stormwater system connected to the Pine Ridge /Clairfield Greenway be assessed regarding possible waterlogging and for trends in water quality in groundwater. Results of this assessment will determine both the sustainable upper limit to infiltration quantity in the CMSP area and the extent of contaminant removal required for infiltrated stormwater.</p>	<p>We agree with the interpretation that CMSP is hydrologically connected via groundwater to subdivisions north of Clair Road. The degree and spatial variability is being characterized through interpretation of hydrogeologic cross-sections and available water level data. The calibrated MIKESHE model will simulate the current spatial and temporal variation in water levels adjacent to and beneath the existing Greenways. During the impact assessment changes in infiltration and recharge due to potential future changes in land use and stormwater management strategies including LID BMPs will be represented in the MIKESHE model and changes in the depth to the water table in the area of the Greenways can be assessed. Changes in depth to water table can be used to assess changes in water logging and potential changes in water quality, based on any change in relative portion of groundwater to surface water entering the Greenways. A detailed assessment of the performance of the stormwater system for Pine-Ridge/Clairfield is not part of the scope but modelling will represent existing groundwater limitations on</p>	<p>Yes. Text revised.</p>

Comment	Response	Work Plan to be Revised (yes/no)
	infiltration and any predicted changes due to land use changes in the CMSP.	
<p>6. Traditional concern related to the infiltration of stormflow in developed areas has been to insure maintenance of the predevelopment amount of recharge. The existing subdivision at and north of Clair have been infiltrating all stormflow since the start of development more than 25 years ago. The recharge to groundwater resulting from this development has exceeded predevelopment recharge and the cumulative result of the excess recharge has been higher watertable levels in the Pine Ridge/Clairfield Greenway. I attach images of the downstream end of the Greenway that show the increase in permanent wetland area since 2000.</p>	<p>The information will be considered during the hydrogeologic/ hydrologic assessment for existing conditions as per the current CEIS work plan. We would also request that any water level or flow measurements/observations that have not been provided previously be identified and provided to the study team prior to initiation of the model calibration phase.</p>	<p>No</p>
<p>7. The assessment of the performance of the existing stormwater system should include modelling to confirm the ability of MIKE-SHE to replicate the observed time trend of rise in watertable in the Greenway and current levels of discharge discharging from the Greenway as surface flow to the headwaters of Tributary E. This will be confirmation of the utility of the model for use in assessing stormflow-management alternatives for the CMSP but of equal importance the model will provide estimates of future watertable levels and discharge rates as additional area now being developed is connected to the groundwater flow system.</p>	<p>The MIKESHE model uses hourly precipitation data and a 50 x 50 m grid cells size to represent the spatial and temporal variation in groundwater levels and overland run-off. We agree that the model will simulate the function of the Greenways to the degree achievable with a 50 x 50 m grid cell size and calibrated against observed changes in the depth to the water table, and the discharge to Tributary 'E'. Historical field monitoring data on the Greenway system will be reviewed and discussed with the City as to its usefulness, benefit to the groundwater and surface water assessments and potential assessment implications as part of the CEIS.</p>	<p>Yes. Text revised.</p>

Comment	Response	Work Plan to be Revised (yes/no)
<p>8. Given the existing state of waterlogging there may be need to modify the existing Greenway-focused stormwater system. One option would be to pump groundwater from a well at the downstream end of the Greenway to Tributary E, taking care to extract groundwater from a sufficient depth to have near-constant temperature (cold) water as the discharge to the coldwater stream.</p>	<p>This information can be considered during impact assessment Phase, and simulated if agreed upon with the TAG. Mitigation options would be within the CMSP.</p>	<p>Yes. Text revised</p>
<p>9. In addition to the water-quantity assessment a sampling program of groundwater along the Greenway system will be needed to assess the level of contamination introduced into the groundwater system by several decades of infiltration of all stormflow. As stated earlier this water quality data will be needed to establish the level of treatment needed for any stormflow recharged in the CMSP area.</p>	<p>We assume this recommendation would be included in the implementation phase of the project as a recommendation. No data has been provided to date. Regarding the level of water quality treatment within SWM, as previously responded, a multi-tiered approach will be required.</p>	<p>Yes. Text revised</p>
<p><b>Water Supply Considerations</b></p>		
<p>10. As mentioned above there may already be excess recharge (more than can be sustainably maintained without environmental impact) entering the groundwater system of which the CMSP area is a part. One option for restoring sustainability of the groundwater system may be pumping of groundwater. If the quality of the pumped groundwater was comparable to that produced by existing wells it would be feasible to have at least a portion of the pumped water used as water supply.</p>	<p>Assessment of pumped groundwater as a water supply option could be considered as part of the Water work plan at a function level, that said this approach is not in line with the City's Water/Wastewater Master Plan.</p>	<p>Yes. Text revised</p>

Comment	Response	Work Plan to be Revised (yes/no)																		
<b>Population Estimates</b>																				
11. The work plans acknowledge the uncertainty in projections of future population and use phasing to make allowance for this uncertainty. Support for this approach is provided by the recently available comparison between Places to Grow projections and Ministry of Finance Ontario Population Projections Update (2016). {The 2017 update incorporating 2016 Census data will be available in early June}.	Acknowledged	No change to SWM and Water and Wastewater Work Plans																		
<b>Comparison of 2041 Projections of Population for the Greater Golden Horseshoe</b>																				
12. <table border="1" data-bbox="96 786 821 1206"> <thead> <tr> <th>Location</th> <th>Places to Grow</th> <th>Finance</th> </tr> </thead> <tbody> <tr> <td>Total GGH</td> <td>13,477,000</td> <td>13,060,000</td> </tr> <tr> <td>GTA&amp;H</td> <td>10,146,000</td> <td>10,173,000</td> </tr> <tr> <td>Outer Ring</td> <td>3,331,000</td> <td>2,887,000</td> </tr> <tr> <td>Wellington County</td> <td>321,000</td> <td>289,000</td> </tr> <tr> <td>Region of Waterloo</td> <td>815,000</td> <td>699,000</td> </tr> </tbody> </table>	Location	Places to Grow	Finance	Total GGH	13,477,000	13,060,000	GTA&H	10,146,000	10,173,000	Outer Ring	3,331,000	2,887,000	Wellington County	321,000	289,000	Region of Waterloo	815,000	699,000	Acknowledged	No change to SWM and Water and Wastewater Work Plans
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<b>TAG Member (C. C.), May 22, 2017</b>																				
The following are a few papers that have been published on stormwater management ponds and their relationship with wildlife. No doubt there are more. I'm sending them to you for your information on this aspect of the planning process of the Clair-Maltby Secondary																				

Comment	Response	Work Plan to be Revised (yes/no)
<p>Plan. You may wish to forward them to Ron Scheckenberger and other members of the planning team.</p> <p>I feel this is a very important consideration in the creation of the secondary plan in terms of protection of wildlife, particularly amphibians, in the study area and overall protection of Guelph's Natural Heritage. This is a unique area of the City and warrants new and perhaps innovative planning in the development of this area in order to protect wildlife. It is likely that whatever system of stormwater management occurs in the Clair-Maltby planning area, the impact on amphibians and other wildlife will be felt in surrounding areas outside of the study area.</p>		
<p>i. Bishop, C., J. Struger, L. Shirose, L. Dunn &amp; G.D. Campbell. <u>Contamination and Wildlife Communities in Stormwater Detention Ponds in Guelph and the GTA, Ontario, 1997-98. Part II, Contamination and Biological Effects of Contamination, 2000.</u> Water Quality Research Journal of Canada, 35: 437-474. <a href="https://www.researchgate.net/publication/285700217_Contamination_and_wildlife_communities_in_stormwater_detention_ponds_in_Guelph_and_the_Greater_Toronto_Area_Ontario_1997_and_1998_Part_II_-_Contamination_and_biological_effects_of_contamination">https://www.researchgate.net/publication/285700217_Contamination_and_wildlife_communities_in_stormwater_detention_ponds_in_Guelph_and_the_Greater_Toronto_Area_Ontario_1997_and_1998_Part_II_-_Contamination_and_biological_effects_of_contamination</a></p> <ul style="list-style-type: none"> <li>▶ Concluded that stormwater ponds do not offer clean ecosystems for wildlife</li> </ul>	<p>It is acknowledged that stormwater management facilities do not always offer clean ecosystems for wildlife, as the purpose and function of stormwater management facilities is to contain contaminants from receiving surface water and groundwater systems</p> <p>The stormwater management approach will consider not only end-of-pipe facilities, but will consider source, and conveyance controls (including retention), therefore limiting the storage volumes required in potential end-of-pipe facilities and the level of contaminants conveyed to the facilities. Based on the limited overland flow routes (watercourses) from the SPA area, resulting from the hummocky terrain, the number of traditional end-of-pipe facilities is anticipated to be reduced compared to other development areas</p>	<p>Work plan notes stormwater management approach will be multi-tiered reducing end-of-pipe contaminant loadings.</p>

Comment	Response	Work Plan to be Revised (yes/no)
	within the City of Guelph.	
<p>ii. M. Gallagher, J.W. Snodgrass, A. Brand, R. Casey, S.M. Lev, R.J. Van Meter. 2014. <u>The Role of Pollutant Accumulation in Determining the Use of Stormwater Ponds by Amphibians</u>. Wetland Ecology and Management, 22: 551-564. <a href="http://link.springer.com/article/10.1007/s11273-014-9351-9">http://link.springer.com/article/10.1007/s11273-014-9351-9</a></p> <ul style="list-style-type: none"> <li>▶ road salts (and other pollutants) play a role in determining amphibian assemblages associated with SWM ponds</li> <li>▶ although stormwater ponds are designed to retain runoff and associated pollutants, they are frequently colonized by amphibians</li> <li>▶ understanding of ecological function of these created habitats is limited</li> <li>▶ no Wood Frog larvae survived to metamorphosis when CL levels (road salts) were above 260 mg/L.</li> <li>▶ while ponds may provide critical habitat for wildlife, they may also attract wildlife only to expose them to pollutants they are designed to sequester</li> <li>▶ our results clearly demonstrate the potential for pollutants to limit the habitat quality of stormwater ponds for amphibian development</li> <li>▶ adds to growing body of literature suggesting a great deal of variation in pollutant conditions and toxicity among ponds, with some ponds providing quality habitat while others may act as sink habitats or ecological traps</li> </ul>	<p>Please see response to Comment (i)</p>	<p>Work plan notes stormwater management approach will be multi-tiered reducing end-of-pipe contaminant loadings.</p>

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<p>iii. Sharon Levy, 2015. <u>Ecology of Artificial Wetlands</u>. BioScience, 65: 346-352.  <a href="https://academic.oup.com/bioscience/article/65/4/346/255153/The-Ecology-of-Artificial-Wetlands">https://academic.oup.com/bioscience/article/65/4/346/255153/The-Ecology-of-Artificial-Wetlands</a></p> <ul style="list-style-type: none"> <li>▶ in Maryland (US), ponds collect urban poisons</li> <li>▶ from roads, toxins include gas, antifreeze, fertilizers, pesticides</li> <li>▶ estimated that 10,000 tons of zinc are released to US roadways through tire wear in 1999</li> <li>▶ found that Wood Frog larvae exposed to zinc had decreased hatching success, slowed development and lower weight at metamorphosis</li> <li>▶ Wood Frog adults are drawn to stormwater management ponds to breed and tadpoles are unlikely to survive to adulthood</li> <li>▶ recent evidence suggests that salt from roads is the deadliest toxin for sensitive species; the concentration of road salt in SWM ponds appears to be a major factor determining which amphibians can successfully reproduce and survive in urban landscapes</li> </ul>	<p>Please see response to Comment (i)</p>	<p>Work plan notes stormwater management approach will be multi-tiered reducing end-of-pipe contaminant loadings.</p>
<p>iv. Emily K. Dobbs, Maria G. Brown, Joel W. Snodgrass, David R. Ownby and William Lutterschmidt, 2012. <u>Salt Toxicity To Tree Frogs (Hyla Chrysoscelis) Depends on Depth</u>. Herpetologica, 68: 22-30.  <a href="https://www.jstor.org/stable/41406816?seq=1#page_scan_tab_contents">https://www.jstor.org/stable/41406816?seq=1#page_scan_tab_contents</a></p>	<p>Please see response to Comment (i)</p>	<p>Work plan notes stormwater management approach will be multi-tiered reducing end-of-pipe contaminant loadings.</p>

Comment	Response	Work Plan to be Revised (yes/no)
TAG Members (TAG Meeting: J.E., K.C., P.J., A.C., A.K., H.H., D.S., I.W., H.W., C.C., M.G., B.B., R.P., P.Q.), May 18, 2017		
<b>Stormwater Management Work Plan</b>		
1. Work plan doesn't include information about the soil's capability to infiltrate. We don't want to end up with infiltration targets that can't be met. Consultant responded that this will come out of the CEIS and relate back to the site design.	Infiltration targets will be established in the CEIS.	No
2. preliminary grading plan/functional grades- a functional plan, preliminary functional grades- determine how some of the unique topography will be maintained- attention to form and placement of SWM while looking at the grading around it	Functional grading plans will prepared with consideration to the unique hummocky terrain and significant landforms.	No
3. The 7 year build-out should be consistent with the 4 year phasing of the other plans	The SWM Plan notes that, it has been assumed that a phasing strategy of short, medium and long-term needs will be developed to roughly equate to seven (7) year build out periods. That said, as the MESP moves forward, with input from stakeholders, the build out period could be revised.	Yes, note flexibility regarding build out period.
4. Use CVC/TRCA water balance assessment tool or similar type of tool as a guiding document	The CVC/TRCA document Water Balance for Protection of Natural Features will be used as a guideline in the water balance assessment	Yes- Text Revised.
5. First deliberate closed water SWM system in Ontario- ex. Virginia, first closed loop return flows. Technology is current and feasible and provides a solution to the overflow and deals with the SWM system	This comment is unclear. City to request literature from TAG member if available	Unclear.

Comment	Response	Work Plan to be Revised (yes/no)
6. A holistic approach of water management as a principle should be mentioned in the work plan	A holistic plan requires water conservation, harvesting and reuse. The development is planned to be serviced within the City's current evolving Master Planning framework. The City's approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This can include considering practices which are new to the City's traditional approaches.	Wording amended with the one-water concepts.
7. Discussion about the language used by the Province around green infrastructure	Green infrastructure reference will be included in the work plan.	Yes. Text revised.
8. Source water protection and possible compensation, ways to off-set other areas of the City	Groundwater quality and quantity protection is part of the CEIS work plan.	No
<b>Water / Wastewater Servicing Work Plan</b>		
<p>9. Identify what infrastructure is needed to occur prior to each stage of development to occur instead of specific dates</p> <ul style="list-style-type: none"> <li>-PQ- proposed infrastructure as part of the Master Plan- approach 2 of the Master Plan- intent for all proposed projects to fulfill EA requirements and proceed directly to detailed design or likely for select projects depending on identified impact</li> <li>-water/wastewater Servicing Master Plan- is outdated- other initiatives that should be brought to your attention <ul style="list-style-type: none"> <li>▶ Zone 3 is now active</li> <li>▶ Water/wastewater master plan recommendation, investigate alternatives. This should be part of the work plan, for example purple pipe</li> </ul> </li> </ul>	<p>Work Plan is revised to include a "Staging and Implementation Plan" that links each component project to a growth trigger in the CMSP.</p> <p>Approach 2 refers to a Master Planning Process Provision in the MEA Class EA Document (October 2000, as amended in 2007, 2011 &amp; 2015). It allows for Schedule B projects to be identified in the Master Planning stage and presented as part of the conclusion of the Master Plan. As such Schedule A &amp; B undertakings identified in the Master Plan process would be allowed to proceed to implementation with the Notice of Completion Documents Filed upon completion of the Master Plan. Each of these undertakings can be described with a project sheet (showing alignment, approximate size / capacity, location etc. and included</p>	<p>The City should advise as to whether work plan would need to be revised to incorporate approaches that are not within the current Water &amp; Wastewater Master Planning framework (i.e. stand-alone water supply and treatment opportunities)</p> <p>Work plan can include opportunities for parallel systems for rainwater recovery or grey water recycling.</p>

Comment	Response	Work Plan to be Revised (yes/no)
<p>system</p> <ul style="list-style-type: none"> <li>▶ Example from California- direct and indirect potable use manual</li> <li>▶ Smaller scale system within a community, could be stormwater based</li> </ul>	<p>in the public consultation documents).</p> <p>Note that we are using the term “Master Plan” in two contexts in this discussion. There are city-wide Master Plans for water supply, water distribution, and wastewater that are separate from this study. The Water and Wastewater Servicing Plan for the Clair Maltby MESP is a Master Plan for the servicing of the CMSP which will be prepared according to MEA Approach 2 as described in the MEA Class EA document.</p> <p>The City’s Master Planning framework is a dynamic and continuously evolving framework. The latest most comprehensive planning documents background into the CMPS water &amp; wastewater servicing plan. This includes Master Planning documents, updated models and area/issue specific studies.</p> <p>Zone 3 is active via pump station and transmission mains. Additional Mains and a Storage System will be identified through this process. These activities are generally Schedule A or Schedule B undertakings under the Municipal Class Environmental Assessment Process.</p> <p>The CMSP lands are to be serviced within the City’s current evolving Master Planning framework. The City’s approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This includes considering practices which are new to</p>	

Comment	Response	Work Plan to be Revised (yes/no)
	<p>the City's traditional approaches. A made-in-Guelph solution that addresses climate, and water supply conditions in Guelph in a sustainable and economic manner.</p>	
<p>10. Wastewater Infrastructure:</p> <ul style="list-style-type: none"> <li>▶ There are good examples of decentralized systems</li> <li>▶ Opportunity to do something bold and innovative and be a leader</li> <li>▶ Opportunity to look at actual flows instead of the MOE flows. City confirmed that the study is monitoring real time data add will be able to determine what type of flow generating per capita</li> <li>▶ Reminder about the existing Maltby-Southgate pumping stations</li> </ul>	<p>The CMSP lands are to be serviced within the City's current evolving Master Planning framework. The City's approach includes planning to encourage water conservation measures such as lot level controls / rainwater harvesting, purple pipe, greywater systems. This includes considering practices which are new to the City's traditional approaches. A made-in-Guelph solution that addresses climate, and water supply conditions in Guelph in a sustainable and economic manner.</p> <p>It is standard practice to use actual flow data rather than the MOECC unit rates for system planning considerations. The City's water supply and wastewater treatment program includes a plan to reduce losses through DMA studies, and to monitor reductions in demand associated with more efficient practices both by City Operations (Water loss reduction) and by consumers (modern plumbing, rainwater reclamation for irrigation, grey water systems etc.). Furthermore the City is endeavouring to reduce inflow and infiltration of rainwater into the wastewater collection system to minimize the impact on the treatment system and sewer back-ups.</p> <p>Updated Mapping will remove the proposed infrastructure in presentations and utilize only the existing as base.</p>	<p>The City should advise as to whether work plan would need to be revised to incorporate approaches that are not within the current Water &amp; Wastewater Master Planning framework (i.e. stand-alone water supply and treatment opportunities)</p> <p>Work plan can include opportunities for parallel systems for rainwater recovery or grey water recycling.</p>