SUBJECT: Garner Neighbourhood Master Drainage Plan (Former Town of Ancaster) - (PW06126) - (Ward 12)

RECOMMENDATION:

(a) That the General Manager, Public Works Department be authorized and directed to file the Garner Neighbourhood Master Drainage Plan with the Municipal Clerk for a thirty (30) day public review.

(b) That upon the completion of the thirty (30) day public review, the General Manager, Public Works Department be authorized and directed to include the stormwater management projects identified in the Master Drainage Plan to the capital budget for future years.

(c) That upon the completion of the thirty (30) day public review, the General Manager, Planning & Economic Development Department be authorized and directed to include the recommendations of the Master Drainage Plan in Secondary or Community Planning processes for the areas covered by the Master Drainage Plan.

(d) That upon the completion of the thirty (30) day public review, the General Manager, Planning & Economic Development Department be authorized and directed to include provisions in subdivision agreements for development within the study area to collect necessary funds to construct the proposed stormwater management facilities, the erosion protection, channel protection and stabilization works and culvert upgrades.

Bryan Shynal
Acting General Manager
Public Works
EXECUTIVE SUMMARY:

The purpose of the Garner Neighbourhood MDP is to identify and address drainage related issues associated with both the existing and proposed land use in the neighbourhood. The area of study is bounded by Fiddler’s Green Road to the west, Southcote Road to the east, Highway 403 to the north and Garner Road (formerly Highway No. 53) to the south. The area consists of approximately 145 ha, of which 75 ha is currently residential dwellings and 25 ha has become the Highway No. 6 (New) interchange to Highway 403. The remaining area consists of wooded areas, creeks, valley and agricultural lands. The study area is illustrated in Appendix A.

The primary goal of the MDP is to achieve a balance between the protection of existing natural resources and the implementation of the proposed land use. In order to accomplish this goal, the Garner Neighbourhood MDP has been completed as a Schedule B undertaking under the Municipal Class Environmental Assessment (EA) Process and has followed the process by consulting various Agencies, Public and City departments.

Urbanization alters the natural hydrologic cycle of the pre-development lands. The increase of impervious area (roads, driveways, and buildings) that accompanies urbanization creates an increase in stormwater runoff, and a decrease in infiltration. Unmanaged stormwater creates a potential risk of increased flooding, erosion, and water quality degradation. A strategy is needed to address drainage related issues associated with existing and future land use.

At a subwatershed scale, co-ordinated strategies employing a number of techniques are required to mitigate potential impacts on water quality, flooding and erosion. As each impact is addressed, whether it is flooding, erosion, fisheries or water quality, overlapping mitigation typically occurs. A completely integrated plan must take these effects into consideration.

This Master Drainage Plan evaluates the stormwater runoff impacts related to proposed urban land uses, and sets appropriate mitigative measures. The preparation of this plan involved the review of the existing planning; engineering, and environmental documents and reports related to the study area and identified existing drainage conditions, future drainage conditions under proposed land use development, identification of land use and environmental constraints. Solutions were generated and were evaluated based on environmental, social and economic impacts to select the Preferred Alternative which led to the development of the final Master Drainage Plan.

Based on the evaluation criteria, Alternative 4: Combination of on-site stormwater quality and erosion control, with off-site mitigation of erosion impacts, has been selected as the preferred solution: three stormwater management quality and erosion control facilities, and supplemental off-site works, on selected reaches of the main branch of Ancaster Creek downstream of Highway 403, to Golf Links Road. Through this preferred alternative, Master Drainage Plan on a broad range provides the following:

Flood Management

- No flood control storage be proposed within the Garner Neighbourhood. The on site flood plain be managed through regulation.
- Future on-site culverts be sized to convey unregulated discharge
Stormwater Quality and Erosion Control

- Three stormwater quality end-of-pipe facilities will also be utilized for erosion control, by directing all flows up to and including the 2 year event (minor storms) through the facilities. In other words, the facilities will be designed to accommodate the runoff from all storms that occur, on average, once every two years, or more frequently.
- Coordinated watercourse stabilization (in the form of bio-engineering, live staking, minor grading or locally intensive grading at select bends) be implemented in the watercourse downstream of the Highway 403 to Golf Links Road in order to fully mitigate erosion potential within the creek, resulting from new development.

BACKGROUND:

Study Process

The "Secondary Plan for the Spring Valley West, Shaver and Garner Neighbourhoods - Issues and Options Report, Town of Ancaster", Dillon, 1992 outlined the general framework for the Secondary Plan and recommended to prepare a separate Master Drainage Plan based on the preferred land use for the Garner Neighbourhood study area. The Secondary Plan for the Garner Neighbourhood was completed in June 1995. In the meantime, the Master Drainage Plan was initiated by the former Town of Ancaster.

The Garner Neighbourhood is located in the former Town of Ancaster, within the City of Hamilton’s Urban Boundary Area. The area of study is bounded by Fiddler’s Green Road to the west, Southcote Road to the east, Highway 403 to the north and Garner Road (formerly Highway No. 53) to the south. The area consists of approximately 145 ha, of which 75 ha is currently residential dwellings and 25 ha has become the Highway No. 6 (New) interchange to Highway 403. The remaining area consists of wooded areas, creeks, valley and agricultural lands.

A Master Drainage Plan evaluates the stormwater runoff impacts related to proposed urban land uses, and sets appropriate mitigative measures. The preparation of this plan involved the following:

- Review of the existing planning, engineering, and environmental documents and reports related to the study area.
- A multi-disciplinary approach has been used to identify existing and future drainage conditions under proposed land use development by making use of hydrologic and hydraulic models, and to define land use constraints, including those associated with Engineering/Technical issues, Aquatic Biology, Terrestrial Biology, Hydrogeology, and Archaeology.
- Identification and assessment of potential impacts of the proposed development, including drainage problems and summary of stormwater objectives from both an environmental and legislative perspective.
- Generation of alternative solutions, evaluation of options for mitigating adverse impacts, screening and selection of the preferred solution to develop a Master Drainage Plan.
Development increases the risk of flooding and erosion potential in the streams; results in water quality and environmental degradation. In order to determine the adverse impacts of the proposed future development and to develop a preferred stormwater management strategy to mitigate these impacts, Hydrologic and Hydraulic models are developed for existing and future land use scenarios. Detailed erosion assessment is carried out and field investigation also done. A geotechnical investigation has been completed in order to verify the soils at the sites from the erosion assessment. The local hydrogeology and geotechnical conditions have been assessed to identify associated constraints to development. Preliminary constraints to impacts on groundwater have been related to quality and quantity.

**Policies and Standards**

Stormwater management is regulated under a number of policies and standards. This Master Drainage Plan is developed taking into consideration legislated requirements from provincial and federal agencies and the Hamilton Conservation Authority regulations on the designated areas based on flood potential, erosion, hazard potential and resource protection. Relevant Provincial and Federal legislation includes the Federal Fisheries Act, the Ontario Water Resources Act, the Environmental Assessment Act and the Environmental Protection Act.

**Class Environmental Assessment Process**

The undertaking(s) associated with this project are covered under sections within the June 2000, MEA Municipal Class Environmental Assessment document, specifically Section C.1.3 Stormwater Management Projects. The various elements of the preferred solution are considered Schedule B undertakings.

To address the problems and impacts of urban development on stormwater, a list of 4 alternatives has been developed as follows:

- **Alternative No. 1:** “Do-nothing”
- **Alternative No. 2:** On-site stormwater quality, stream/erosion and flood control storage, with no in-stream mitigation.
- **Alternative No. 3:** No on-site controls: improve conveyance capacity and erosion-resistance of downstream channels and infrastructure.
- **Alternative No. 4:** On-site stormwater quality, stream/erosion and flood control storage, with supplemental in-stream mitigation of erosion impacts.

The stormwater management techniques, which have been considered to have potential application within the study area, have been screened based on their ability to address stormwater related impacts with consideration of the site conditions, local climate, and operational considerations, such as maintenance and capital costs.

Based on the screening and evaluation, Alternative 4: Combination of on-site stormwater quality and erosion control, with off-site mitigation of erosion impacts, has been selected as the preferred solution.

**Public Consultation**

As part of the development of the Master Drainage Plan, and in order to fulfil the requirements of the Class EA process, there has been a comprehensive process of
Agency and Public consultation. The process reached an important point of public consultation in March 2005, with a Public Information Centre hosted by the City to present the preliminary evaluations of the alternatives and preferred solution on March 22, 2005. The general public was the intended audience of the PIC.

A total of 35 people in attendance signed-in at the PIC. There were 9 comment sheets handed-in or mailed-in prior to the advertised deadline for submission of comments. All comments, including both the Public and Agencies, have been addressed in the MDP Class EA.

**ANALYSIS/RATIONALE:**

**Study Findings**

The preferred solution reflects agency concerns and criteria, and has been integrated with the Garner Neighbourhood constraints, issues, objectives, and goals associated with development. This MDP has concluded the following:

a) Local (on-site) increases in peak flows are not expected to be a flooding concern, since the Ancaster Creek valley is well-defined and the Regional flood plain has been incorporated into Open Space, and Conservation lands within the Secondary Plan.

b) Due to the large, rural subcatchment upstream of the Garner Neighbourhood, the future peak flows at Highway 403 (off-site), would only increase for the 2 year event, with negligible change in the Regulatory event.

c) A check of the Regional event flows and water surface elevations indicates that there will not be any overtopping, and that there would only be localized increases in flood levels upstream of the interchange. These increases would not negatively impact the proposed stormwater management facilities.

d) Existing erosive-prone reaches of the creek are located at culvert entrances and exits, as well as in several locations upstream of the MTO Highway 6 (New) corridor.

e) Based upon the supplementary erosion assessment, it is concluded that erosion exposure of the channel bed and banks would increase downstream of Highway 403 as a result of either the Highway 6 (New) interchange, or the proposed development of the Garner Neighbourhood (even with stormwater management controls).

f) Increasing extended detention storage within the proposed Garner Neighbourhood stormwater management facilities would reduce erosion potential for the channel bed and banks at all locations investigated compared to uncontrolled conditions.

g) Increasing extended detention storage within the Garner Neighbourhood stormwater management facilities up to 5 times the recommended minimum Master Drainage Plan volumes would be ineffectual on its own and would still need to be accompanied by watercourse stabilization works from Highway 403 to Golf Links Road in order to fully mitigate erosion potential.

h) Increasing extended detention storage within the Garner Neighbourhood
stormwater management facilities any further (e.g. up to 20 times the recommended minimum Master Drainage Plan volumes) would eliminate the need for channel improvements at the study reach section immediately downstream of Highway 403 (Node 105.2), however watercourse stabilization would still be required at the other two study reach sections within the golf course (Nodes 106, 112).

i) Providing erosion protection within the Ancaster Creek from Highway 403 to Golf Links Road, in addition to the recommended minimum Master Drainage Plan storage volumes, would provide the most cost effective means of reducing erosion potential following development.

j) Future erosive flows and velocities can be reduced by as much as 30% +/- with the use of frequent event storage.

Study Recommendations

It has been recommended in this Master Drainage Plan that:

(i) No flood control storage be proposed within the Garner Neighbourhood. The on-site flood plain be managed through regulation.

(ii) Future on-site culverts be sized to convey unregulated discharge, and feature natural substrate inverts for fisheries habitat. Smooth bottom culverts possess high velocities and are not suitable for migrating fish. Hence, the bottom of the culverts/crossings should be designed to be flatter and easily merge with natural channel substrate material like, sands, gravel and stone etc. Several designs are available, e.g, bottomless arch design and concrete box culvert etc.

(iii) A total of three end-of-pipe extended detention stormwater quality facilities would be required to service all future development lands.

1) Between the Highway 6 (New) interchange corridor and the existing development in the western extent of the Garner Neighbourhood. This facility has been proposed to serve 10.4 ha +/- of development area, bounded by Garner Road/Highway 53 to the south, existing development to the west, and the MTO corridor to the north and east.

2) On the south side of the creek tributary, this facility has been proposed to serve 14.3 ha +/- of development area, bounded by the MTO corridor to the west, Garner Road/Highway 53 to the south, and the existing creek to the north and east.

3) Directly across the creek tributary from Facility #2, on the north side. This facility has been proposed to serve 25.6 ha +/- of development area, bounded by the MTO corridor to the west and north, existing development and Southcote Road to the east, and the existing creek to the south.

(iv) The stormwater quality end-of-pipe facilities also be utilized for erosion control, by routing all flows up to and including the 2 year event (minor storms) through the facilities.

(v) It is recommended that Scenario B in Section 7 be adopted as the preferred
alternative, such that the extended detention storage volumes within the Garner Neighbourhood stormwater management facilities be maintained at the MOE standard volume. It is also recommended that coordinated watercourse stabilization (in the form of bio-engineering, live staking, minor grading or locally intensive grading at select bends) be implemented in the watercourse downstream of the Highway 403 to Golf Links Road in order to fully mitigate erosion potential within the creek, resulting from new development.

(vi) The SWM facilities be constructed as either extended detention wetlands, or extended detention wet ponds with an initial preference as follows: Facility 1 - Wetland, Facility 2 and Facility 3 - Wet Pond. The facilities should incorporate measures to mitigate potential temperature impacts. This will be determined at detailed design stage through Draft Plan application approval process.

(vii) In order to maintain overland drainage, grading should attempt to mimic the existing drainage patterns, where possible, and direct major overland runoff to the Ancaster Creek.

(viii) The use of supplementary lot level or conveyance SWMP’s where practical to promote infiltration of “clean” (non-roadway) runoff. Pesticides, herbicides and fertilizer use should be restricted in recharge zones.

(ix) The use of natural channel design techniques for any on-site or off-site watercourse channelization.

(x) As part of the Draft Plan application approval process, the wetlands evaluation will be required within the study area by the proponent.

(xi) As part of the Draft Plan application approval process, detailed evaluations of individual trees would be required by the proponent to determine their preservation value and potential

(xii) Areas identified as high constraint, which pose a major constraints for either drainage, slope/topography, erosion potential, and/or significant botanical features, and have minimal capability for mitigation, must be assessed in detail at a local level.

(xiii) Areas identified as having moderate constraints of the above can have impacts mitigated with appropriate precautionary and rehabilitative measures.

(xiv) All portions of the study area will require archaeological work prior to construction.

(xv) It is recommended that the stormwater facility 1 and the planned impacts to creek downstream to Golf Links Road be subject to a Stage 2 Archaeological Assessment.

(xvi) The proposed locations for stormwater facilities 2 and 3 should be subject to a Stage 3 Archaeological Assessment (and Stage 4 for significant sites found in the Stage 3 Archaeological Assessment).
(xvii) All future development proposals shall prepare individual stormwater management reports, and circulate the reporting to the approving agencies.

(xviii) Future development proposals must address the potential for out-of-phase development.

(xix) Should the MTO dispose of its surplus land for development, the stormwater quality facilities should be sized or expanded accordingly.

**ALTERNATIVES FOR CONSIDERATION:**

Two out of four alternatives were carried forward for detailed assessment. These alternatives not only address the general stormwater objective of mitigating impacts of development on flooding, erosion, fisheries and water quality, but they both address the majority of the “neighbourhood specific” concerns. Alternative 2 is to provide on-site stormwater quality, stream/erosion and flood control storage by constructing stormwater management ponds only. This will address the flood and water quality impacts, protect aquatic and terrestrial habitat and is relatively less expensive than the preferred alternative. But, this alternative does not fully address the downstream erosion impact which is negative for both environmental and social reasons. Increasing the storage up to 20 times of extended detention volumes would also not satisfy the erosion concerns. Thus, this alternative is not recommended.

Alternatively, if the Master Drainage Plan is adopted, the additional MDP works in terms of erosion protection and channel works downstream would achieve a greater number of environmental, social and economic objectives for a relatively small increase in the cost. Further information on financial implications and funding is provided in the subsequent sections.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

**Financial Implications**

The developable portion of the Garner Neighbourhood is comprised of approximately 28 separate landowners. As with any large development, there exists the potential for out-of-phase development. This is critical when the lands on which primary ultimate services (such as the stormwater quality facilities) have been proposed do not develop first. Should this occur, the initial development(s) shall have to take measures to ensure that adequate stormwater management is provided. Usually, where ultimate infrastructure works are too costly for any single proponent, temporary works are installed which in the short-term address potential impacts. This scenario would also require the same proponent to fund a component share of the ultimate infrastructure works. At some point in the financial assessment though, it is preferable to complete the ultimate works immediately, rather than the temporary “throw-away” works, plus the component share; this is usually dependent on the size and timing of the project, as well as the land use development. This will be coordinated through the Development Engineering Draft Plan Approval process.

Offsite erosion protection works in the Golf Course downstream of Highway 403 are proposed through the Garner Neighbourhood Master Drainage Plan. To fund these works, a cost sharing agreement would be required between the Golf Course, Ministry of Transportation (MTO) and City of Hamilton.
Legal Implications

Watershed Management works recommended in Garner Neighbourhood Master Drainage Plan will be subject to various agency approval requirements as summarized in Appendix C.

Stormwater Management Facility No.1 is proposed on the Ministry of Transportation (MTO) lands. The City of Hamilton will have to acquire these lands for the construction of the facility. Further negotiations will be required.

To fund Offsite erosion protection works in the Golf Course downstream of Highway 403, a cost sharing agreement would be required between the Golf Course, Ministry of Transportation (MTO) and City of Hamilton.

POLICIES AFFECTING PROPOSAL:

Implementation of Garner Neighbourhood Master Drainage Plan will not require the development or modification of any existing policies. These projects will be funded through the Development Charges and are included in the Hamilton Development Charge Background Study 2004 and updated 2006 Study.

RELEVANT CONSULTATION:

As part of the development of the Master Drainage Plan, and in order to fulfil the requirements of the Class EA process, there has been a comprehensive process of Agency and Public consultation. The process reached an important point of public consultation in March 2005, with a Public Information Centre (March 22, 2005 PIC) hosted by the City to present the preliminary evaluations of the alternatives and preferred solution. The Notice was also mailed to local government agencies. The general public was the intended audience of the PIC. All comments, including both the Public and Agencies, have been addressed in the MDP Class EA.

The following external agencies were consulted as part of this study:

- Ministry of the Environment
- Ministry of Natural Resources
- Ministry of Transportation
- Ministry of Culture
- Ontario Realty Corporation
- Department of Fisheries and Oceans
- Hamilton Conservation Authority

The following City departments either participated in the study or were consulted:

- Public Works - Capital Planning & Implementation Division - Strategic Planning (Project Management), Environmental Planning and Management and Open Space Development Sections
- Planning and Economic Development - Community Planning and Design, Long Range Planning & Design Division, Legislative Section
- Finance and Corporate Services
This project meets the City’s strategic commitment to a healthy, Safe and Green City through putting forward a strategy that addresses issues related to our natural environment, including water quality and the health of aquatic resources. The Garner Neighbourhood Master Drainage Plan supports the goals of the Vision 2020 Sustainable plan by addressing water quality impacts, impacts on aquatic and terrestrial habitat, mitigate erosion concerns and strategy for flood control resulting from new and existing development.

In order to assess the alternatives, an evaluation system has been used to determine the suitability of each alternative, against appropriate “evaluation factors”. Each factor consists of an evaluation category defined by specific evaluation criteria. The evaluation categories are as follows:

**Functional/Environmental** - Impacts that an alternative may have on how a system is intended to work, including how it would address impacts on flooding, water quality, and erosion, aquatic and terrestrial habitat.

**Social** - Impacts/issues relating to the interaction of the community/neighbourhood with the implementation of the proposed alternatives.

**Economic** - Immediate and future costs and cost-benefit of the alternatives presented including maintenance.

**Constructability** - The ease of construction and accessibility for machinery and the potential impact of construction techniques and access on the private property.

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

- **Community Well-Being is enhanced.** Yes ☑ No □
- **Environmental Well-Being is enhanced.** Yes ☑ No □
- **Economic Well-Being is enhanced.** Yes ☑ No □

**Does the option you are recommending create value across all three bottom lines?** Yes ☑ No □

**Do the options you are recommending make Hamilton a City of choice for high performance public servants?** Yes ☑ No □
Appendix “A” - LOCATION MAP

[Diagram showing a map with nodes and reaches labeled as 106, 112, 105.2, Reach 1, Reach 2, Reach 3, Reach 4, Ancaster Creek, WILSON ST E, GOLF LINKS RD, and SOUTHCOTE RD.]