SUBJECT: Project Snow Bird - Steam Fuelled Snow Melter Equipment
(PW08099) - (City Wide)

RECOMMENDATION:
(a) That the City formally end its involvement with Project Snow Bird, a collaborative initiative with CaPaRim International Inc. to develop and test prototype steam fuelled snow melting equipment;
(b) That the City not enter into an agreement with the Federation of Canadian Municipalities for funding for the project;
(c) That staff be directed to include within a future capital budget submission an item to effect the demolition of the Stuart Street Property building and subsequent site restoration & improvements (i.e. pavement and sewer installation) to provide suitable storage capacity avoiding the need for snow melter operation.

EXECUTIVE SUMMARY:
In 2006 City staff were approached informally by the consulting firm CaPaRim International Inc. (CPRI) with a concept for the development of a just-in-time steam fuelled snow melting technology. The technology if proven viable would provide significant efficiencies therein generating cost savings and lower environmental impacts relative to current snow storage and hydrocarbon fuelled melting practices. Project Snow Bird was established as a working collaboration between the City and CPRI to examine the feasibility of utilizing waste industrial steam to fuel a specially designed
melter to be tested through an 18 month pilot program. The City applied to the Federation of Canadian Municipalities for funding and was approved for a grant of 50% of the project costs up to $350,000.00, contingent on the submission of a comprehensive project plan confirming:

- A Source of waste steam and an appropriate operating site for the test period.
- A Prototype Melter apparatus design, fabrication drawings and operating plan (including standard operating practice manual)
- A Project Evaluation Plan (methodology, performance parameters, measures and success targets, and project close-out report),

The FCM grant agreement was originally scheduled to be executed by the City by September 28, 2007; however, two deadline extensions (March 31, 2008 and September 30, 2008) have been subsequently granted by FCM to accommodate the provision of outstanding key deliverables from the project proponent/consultant. Despite best efforts in collaboration with CPRI International Inc., the Project Plan remains incomplete; most important of the outstanding deliverables are the confirmation of a waste steam source and operating site, and the provision of project operating and evaluation plans.

With no assurance of probable resolution of these project plan deficiencies in the foreseeable future, formal closure of the Snow Bird initiative and withdrawal from the FCM grant is recommended along with works to expand snow dump capacity at the City owned Stuart Street site.

**BACKGROUND:**

The information/recommendations contained within this report have City wide implications.

The City of Hamilton currently operates 6 snow storage sites within its Winter Control Program of which two (Stuart Street and Bay Front Park) are capable of accommodating diesel fired snow melter operation. When “snow removal” is required within the Winter Control Program, snow storage sites are employed which rely on natural melting to dispense with the material. When the overall storage capacity is reached, snow melting equipment is activated to expedite the melt process and restore site storage capacity for further use as required. The scale of this activity is driven by seasonal demands; historically average annual program costs (fixed and variable) and environmental impacts (Carbon emissions) are significant and certainly warrant mitigation efforts wherever possible.

In 2006, Operations and Maintenance staff were presented with an informal unsolicited proposal from CaPaRim International Inc. (CPRI) to explore alternative approaches to current snow melting and snow management practices. CPRI proposed a technology development initiative to create and test alternative prototype snow melting equipment through a collaboration involving its engineering and technological expertise as project consultants, and the supply of snow and Project Administration by the City. An informal collaboration dubbed “Project Snow Bird” was established with the proponent to prepare a Project Plan to confirm the feasibility of utilizing waste industrial steam to fuel a specially designed prototype snow melter during an 18 month test pilot program. The project presented an opportunity to create a more cost effective and environmentally
friendly alternative to current snow storage and hydrocarbon fuelled melting practices. The planned higher melting capacity of the prototype unit would also provide additional efficiencies and lesser environmental impacts through a “just in time” delivery model, thus lowering the amount of snow handling required by heavy equipment. If proven viable, the technology and improved processing model may be marketable within the municipal and institutional sectors.

In order to facilitate the collaboration in developing the Project Plan, key roles and responsibilities were established as follows:

**CaPaRim International Inc.:**

Service Provider to the Pilot Project with responsibilities to provide the following key deliverables in accordance with all city policies:

- Preparation of a comprehensive Snow Bird Project Plan. The Plan was to fully describe the initiative, confirm roles and responsibilities of the parties, project management model, resources, schedules and expected outcomes. The Plan, constituting an unsolicited proposal, would then form a key basis for staff recommendations for Council’s consideration of its support for participation in the project. The Plan would also address all FCM Grant Program requirements and serve to guide the subsequent preparation of any enabling agreements required to facilitate the project.

- Confirmation of a source of waste steam and an appropriate site to facilitate the operation of the project *(i.e. appropriate central location, zoning, access, storage capacity security, storm water services, etc.)*

- Pending approval for the City of Hamilton’s involvement and in accordance with all applicable legislation, codes and policy requirements, Design, Fabrication, Operation, Monitoring and Reporting of pilot performance *(i.e. melter function and effluent quality)*

- Decommissioning of the melter prototype and test site, in accordance with all applicable legislation, codes and policy requirements

- Preparation of an acceptable project budget

- Definition and description of the benefits of the project and future legacy rights provided to the City.

**City of Hamilton:**

- Prepare agreements as required to facilitate pilot project collaboration

- Supply snow to the project operations site and onsite handling

- Contract with FCM for the Project Grant and related administration

The City applied to the Federation of Canadian Municipalities, Green Municipal Fund, for a grant based on the concept provided by CPRI and received approval for a grant of 50% of the project costs up to $350,000.00, contingent on successful site selection and evaluation, design, construction and operation of a pilot snow melting facility. The FCM grant was originally scheduled to be executed by the City no later then September 28, 2007. However, due to the lack of an appropriate submission from the consultant, the
City has had to request two extensions to the FCM deadline, the first being to March 31, 2008, and currently to September 30, 2008.

CPRI and City staff met numerous times in 2006 and 2007 to attempt to confirm the Project Plan and therein address the requirements of the FCM grant agreement and establish the basis of a project presentation to Council for its consideration. Despite best efforts, progress in developing the project plan slowed, particularly on the challenge of confirming a viable source of waste steam and host site for the operation of the test program.

**ANALYSIS/RATIONALE:**

Project Snow Bird concept analysis presented to the City by CPRI during initial discussions claimed that the use of Snow Bird would provide a potential to save substantial operating costs during the snow melting process by replacing expensive diesel fuel with waste steam from local industrial processes at little to no cost for the fuel source. The uses of steam rather then carbon fuels would also produce absolutely no greenhouse gas emissions whatsoever and would therefore decrease environmental impacts relative to current operations. Following subsequent discussions with steam source providers CPRI advised that waste steam, thought to have a nominal purchase value, would have to be purchased at a cost of approximately 75 percent of the cost of diesel fuel. Therefore potential savings in fuel costs presented during early conceptual discussions were unrealistic and savings in fuel would now only be approximately $43,000.00 annually as compared to $174,000 using winter 2007/2008 actual figures. Table 1 summarizes and compares the costs and CO2 emissions associated with Diesel Melting, Initial Snow Bird Conceptual costing, Revised Snow Bird Conceptual costing and Natural melting.

CaPaRim International Inc. staff, did not attended scheduled June and July Snow Bird project meetings, and they have not delivered an acceptable and complete Snow Bird Project Plan to the City by the deadline date of July 21, 2008. Furthermore, there has been no confirmation of an acceptable and suitable source of waste steam and an appropriate site to facilitate the operation of the project. Therefore the conditions of the FCM grant are not met. For these reasons, the City cannot meet the FCM agreement execution deadline and it is recommended that the City discontinue all formal involvement with CaPaRim and Project Snow Bird, and that the FCM grant agreement not be executed.

In order to achieve the environmental benefits and program cost reductions, it is further recommended that staff be directed to develop a capital project to effect the demolition of the city owned building and site restoration & improvement (i.e. pavement, lighting, and sewer installation) at 241 Stuart Street to provide suitable snow storage capacity to eliminate reliance on artificial snow melting activities in the future. The potential savings from eliminating or substantially reducing reliance on powered snow melting are approximately $302,000 annually, of which $174,000 is a savings in fuel costs. These cost savings from natural snow melting are sustainable and also are environmentally effective in reducing greenhouse gas emissions from 432,000 kg of CO2e to zero.
### Table 1

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<tbody>
<tr>
<td>Consulting fees to CaPaRim</td>
<td>$0</td>
<td>$325,000</td>
<td>$122,500</td>
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<td>Construction (paid to CaPaRim)</td>
<td>$0</td>
<td>Included in above</td>
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<td>Operational Cost (melter operation and snow management on site)</td>
<td>$216,000</td>
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<td>$124,000 (based on 07/08 actual)</td>
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<tr>
<td>Fuel Cost</td>
<td>$174,000</td>
<td>$0</td>
<td>$131,000 (steam at 75% of diesel cost)</td>
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<td>Total Cost</td>
<td>$390,000</td>
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<td>$428,000</td>
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<tr>
<td>FCM subsidy</td>
<td>n/a</td>
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<td>Total Cost to City Of Hamilton</td>
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<tr>
<td>Fuel Savings</td>
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<td>$174,000</td>
<td>$43,000</td>
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<td>Other savings</td>
<td>$0</td>
<td>$175,000 from FCM subsidy</td>
<td>$94,000 from FCM subsidy, not sustainable</td>
<td>$128,000 sustainable savings due to cost avoidance re snow melter</td>
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<td>CO2 produced (2.4 kg of CO2 per litre)</td>
<td>432,000 kg</td>
<td>0 kg</td>
<td>0 kg</td>
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**ALTERNATIVES FOR CONSIDERATION:**

There are no alternatives to status quo operations (i.e. use of a diesel fuelled melter as required to manage over capacity situations at City snow storage facilities).

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

The snow removal budget for 2008/2009 is not impacted by the recommendations.

**POLICIES AFFECTING PROPOSAL:**

The recommendations do not directly align with key priorities within the Public Works Strategic Plan, but rather are supported with the rationale of providing cost effective services with minimal environmental impacts on a sustainable basis.
RELEVANT CONSULTATION:
Operations and Maintenance Division staff have reviewed data presented by CaPaRim on costs for snow melting from the City of Ottawa and other costs and processes in effect in Southern Ontario. Operations and Maintenance staff have also consulted with staff from Water Waste Water and the City Laboratory regarding sewer mapping and melt water sewer discharge, staff from Real Estate and Economic Development regarding site selection and availability, and staff from Purchasing and Legal regarding the collaboration and the FCM grant.

CITY STRATEGIC COMMITMENT:
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
Public services and programs are delivered in an equitable manner, coordinated, efficient, effective and easily accessible to all citizens.

Environmental Well-Being is enhanced. ☐ Yes ☑ No
Consumption of all natural resources is reduced.
Air quality and water quality and quantity are protected.
Climate-related risks are managed; Greenhouse Gas emissions are reduced.

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