SUBJECT: Securing the Freelton Rural Settlement Area Water Supply Municipal Class Environmental Assessment - Schedule B (PW08039) - (Wards 14 and 15)

RECOMMENDATION:

(a) That the General Manager, Public Works, be authorized and directed to file the Freelton Rural Settlement Area Water Supply System Municipal Class Environmental Assessment with the Municipal Clerk for the mandatory 30 day public review period;

(b) That upon completion of the 30 day public review period, the General Manager, Public Works, be authorized and directed to proceed with the implementation of the preferred alternative within the Freelton Rural Settlement Area Water Supply System Municipal Class Environmental Assessment, provided that no substantial comments by the public or Part 2 Orders received by the Ministry of the Environment are received;

(c) That the estimated $1.4M cost to implement the 2008-2009 capital upgrades of the Freelton Water Supply System Municipal Class Environmental Assessment preferred alternative (Schedule B items - install new production well, decommission FDF02) be funded from Water System - Public Works Rates: Outstations - Water Quality Initiatives Account No. 5140667651;
(d) That the development ban approved by Council on April 23, 2003, and recommended in Report “Development Phasing Control to Mitigate Impacts to Peak Water Consumption in the Carlisle and Freelton Rural Settlement Areas (PD03039/TOE02162(a))” remain in effect for the Freelton Rural Settlement Area until the preferred alternative is fully implemented and operational.

Scott Stewart, C.E.T.
General Manager
Public Works

**EXECUTIVE SUMMARY:**

The Freelton Rural Settlement Area (RSA) at present contains about 250 homes. The Freelton municipal communal water system services part of the community, with the majority of the connections (approximately 172) to the system located in the Noble Kirk and Wildan Estates developments. Another thirty connections to the system are pending with proposed new development. The remainder of homes are currently served by individual private wells. The total future build-out of the RSA is expected to reach approximately 335 homes, with many of the current private water-serviced homes within the existing distribution network area expected to transition over time to the municipal communal system. There is no municipal sewerage system in Freelton as wastewater is treated and discharged through individual domestic septic tanks and tile beds. Within RSAs, partial servicing is an accepted practice where municipal communal water services have been established.

The Freelton community water system consists of wells FDF01 and FDF02, a 1,773m³ standpipe and associated distribution mains (see Study Area, Appendix A). Due to the GUDI (groundwater under direct influence of surface water) status of FDF02, it has been taken off-line. The current water source FDF01 is capable of supplying raw water at a rate of 10.2 L/s, which is technically insufficient to supply either the existing maximum day demand (Qm) of 10.6 L/s or the project design flow Qm of 12.9 L/s.

A development ban currently prohibits plans of subdivision to be registered or severances to be approved until a Water Servicing Plan has been approved and an adequate water capacity is available.

To ensure that the Freelton municipal communal water supply system conforms to Ontario Regulations and Ministry of the Environment requirements, a backup supply of water must be secured and an assessment of the current treatment and capacity of the system must be carried out. A Class EA planning process has been undertaken to address the problem and identify and assess opportunities and develop a preferred solution.
To facilitate the Class EA study process, a hydrogeological study commenced in 2006 and was completed in the Spring of 2007. The hydrogeological study included the drilling of a test well and a monitoring well at the existing Freelton standpipe site (see Study Area, Appendix A). It was determined through pump testing, concurrent with the monitoring of area private wells and surface waters, that the new well could provide a highly adequate supply (up to 19 L/s) from a non-GUDI source and without significant impact to the surrounding wells or environment.

A long list of eight alternatives to address the problem was developed from which five alternatives were dismissed for their inability to meet applicable technical or policy criteria. The following three alternatives were short-listed for further analysis:

A. Upgrade Treatment At Well FDF02;
B. Establish A New Well and Decommission Well FDF02;
C. Drill Individual Wells for Each Property and Decommission the Existing System.

The short-listed alternatives were evaluated and assessed with respect to Natural and Social Environment, Technical and Financial criteria, accordant with the tenets of the City’s Triple Bottom Line approach.

On the basis of the evaluation, and with the integration of public and agency input received through the EA consultative process, Alternative B: Establish New Well FDF03 and Decommission FDF02 was identified as the preferred alternative.

Based upon current operation and management of the existing Freelton system, the footprint and configuration required to establish and integrate the backup well, pumphouse, and associated appurtenances can be readily accommodated at the existing standpipe site. The costs for pre-design, design, and construction of the backup well at this location are estimated at $1.2M. The cost for decommissioning FDF02 is estimated to be $0.2M.

Account No. 5140667651 with a total budget of $2.18M has been identified in the 2006 budget for the purposes of upgrading the communal well system to ensure regulatory compliance, a Microbial Contamination Control Plan, installing a new well, and decommissioning FDF02.

BACKGROUND:

The Freelton Rural Settlement Area (RSA) at present contains about 250 homes. The Freelton municipal communal water system services part of the community, with the majority of the connections to the system (approximately 172) located in the Noble Kirk and Wildan Estates developments. In the future, new connections to the water supply system may include an immediate additional twelve new homes, a twenty-resident retirement home, and another 86 homes in the RSA transferring from private well service to the municipal communal system. The total build-out is expected to reach approximately 335 homes. There is no municipal sewerage system in Freelton; wastewater is treated and discharged through individual domestic septic tanks and tile beds. Within RSAs, partial servicing is an accepted practice where municipal communal water services have been established.
The Freelton RSA community water system consists of wells FDF01 and FDF02, a 1,773m$^3$ standpipe and associated distribution mains (see Study Area, Appendix A).

Well FDF01 is located in the Wildan Estates community on 15 Fireside Drive on Block D of Plan 1422, (former) Town of Flamborough. The Permit To Take Water dated June 18, 2003 states a maximum pumping rate of 10.17 L/s. In January 2003 Jagger Hims Limited completed **GUDI Investigations Freelton Municipal System Well 3A/FDF01**. The conclusions of the report are as follows:

- The well is drawing groundwater only;
- Effective in-situ filtration does exist; and,
- Total Coliforms and E. Coli are not regularly detected in the raw water samples.

In 1997, a Director’s Order from the Ministry of the Environment stated that chlorination must be provided. As a result, the well was upgraded with both chlorine and UV disinfection and was brought back on-line as the main production well in January 2003.

Well FDF02 is located immediately adjacent to Highway 6, approximately a half kilometre south of Huntsman Gate, on Part Lot 13, Concession 10 in the (former) Town of Flamborough. FDF02 is located on property currently leased by the City of Hamilton. The Permit To Take Water dated April 19, 2001, provides a maximum pumping rate of 11.33 L/s. In November 2002 Jagger Hims Limited completed **GUDI Investigations Freelton Municipal System Well 3C/FDF02**. The conclusions of the report were:

- The well is drawing groundwater under the direct influence of surface water (GUDI);
- Effective in-situ filtration does not exist;
- Total Coliforms and E. Coli are regularly detected in the raw water samples; and,
- Poor microbiological water quality exists after high precipitation events.

Due to its GUDI status, FDF02 has been taken off-line. It currently remains as a backup supply. However, if it were to be brought on-line a “boil water” advisory would have to be issued.

A report entitled “Development Phasing Control to Mitigate Impacts to Peak Water Consumption in the Carlisle and Freelton Rural Settlement Areas (PD03039/TOE02162(a))” was completed in February 2004. The report restricts plans of subdivision to be registered or severances to be approved until a Water Servicing Plan has been approved, relevant recommendations completed, and an adequate water capacity available, as confirmed by the General Manager of Transportation, Operations, and Environment (now Public Works). A long-term solution is required to secure water servicing for existing and future development.

To ensure that the Freelton municipal communal water supply system conforms to Ontario Regulations and Ministry of the Environment requirements, a backup supply of water must be secured and an assessment of the current treatment and capacity of the system must be carried out.
ANALYSIS/RATIONALE:

Municipal Class Environmental Assessment

A Municipal Class EA planning process has been undertaken to arrive at a solution for the problem statement. The Schedule B planning process was followed for the Class EA, which includes the two phase EA planning process:

• Phase 1: Problem Definition.
• Phase 2: Identification and Evaluation of Alternative Solutions to determine a preferred solution.

Water Demands

Historical Water Demand

Historical water demand for the years 1997-2003 was researched as part of an investigation into design and projected flows for the community of Freelton. An estimate of the historical Maximum Day Demand was determined using a Ministry of the Environment (MOE) Maximum Day Factor (MDF) of 2.75. The historical Average Day Demand (Qa) and Maximum Day Demand (Qm) for Freelton are summarized below in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Qa</th>
<th>Qm</th>
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<tr>
<td></td>
<td>3.85 L/s</td>
<td>10.6 L/s</td>
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</table>

It is important to note that well FDF01 has a current rated capacity of 10.2 L/s, being less than the historical Qm of 10.6 L/s. This analysis indicates that, when applying a Maximum Day Demand based upon the MOE MDF, the current well supply is inadequate to the needs of the Freelton RSA.

Design and Projected Flows

To arrive at a design flow for the Freelton RSA, the users whose water demand would comprise the design flow were determined. These users are:

• Those already connected to the communal water system; and,
• Those who are not currently, but will soon be connected to the communal water system. These pending connections include:
  - Twelve connections to the new Bridle Ridge Phase 3 residential development;
  - Eight additional connections to the existing Wildan Estates residential development;
  - Nineteen additional connections to the existing Noble Kirk residential development; and,
  - One connection to the Freelton Lions Senior Citizens Villa.

The implementation of water conservation and demand side management initiatives were assumed only for the new residential developments as part of the design flow calculations.

In addition to the design value, a long-term projected demand was also calculated to evaluate the ability of any new water source to provide service to Freelton in the future. The implementation of water conservation and demand side management initiatives...
were assumed for the entire built-out population of Freelton (335 connections). Table 2 below, summarizes the results of the design and long-term projected flow investigations.

Table 2 - Current and Long-Term Projected Flows

<table>
<thead>
<tr>
<th>Demand Flow Type</th>
<th>Qa</th>
<th>Qm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>4.70 L/s</td>
<td>12.9 L/s</td>
</tr>
<tr>
<td>Long-Term Projected</td>
<td>7.45 L/s</td>
<td>18.6 L/s</td>
</tr>
</tbody>
</table>

Per Capita Consumption

Based on the recorded values for water demand and number of users, the calculated average per capita demand is 529 litres per capital per day (LCD), which is exceptionally high. The MOE states that generally, average water demands range from 270-450 LCD. Furthermore, considering that there is an absence of any significant industrial, commercial, or institutional demand, average flows should be in the range of 270-300 LCD. The local soil type in the Freelton area may partly contribute to high water use as it generally consists of a “sandy silt till with coarse granular layers scattered throughout.” This soil type offers exceptional drainage and higher water usage may be attributable to lawn watering during hot and dry weather. In support of this theory, historical spikes in water usage are observed during the summer months where data exists. In June 2007, a temporary outdoor water use ban was placed in effect due to a sudden and unsustainable increase in water use during an extended period of abnormally low rainfall.

Assessment Of Existing And Possible Water Sources

Any new or existing water source must be assessed on its ability to produce raw water of adequate quality and quantity. The Maximum Day Demand of 12.9 L/s is the minimum production quantity required for any new water source or primary production well provided there is no Freelton-wide water efficiency program introduced to encourage water conservation. Since the current water source FDF01 is capable of supplying raw water at a rate of only 10.2 L/s, it is technically inadequate to supply either the existing Qm of 10.6 L/s or project design flow Qm of 12.9 L/s. Therefore, the objective of the hydrogeological investigation was to secure a new source of water adequate in both quality and quantity, and which can also assume the role of primary supply for the community of Freelton. Alternatively or in addition, a water efficiency program may be necessary.

Hydrogeological Study

To facilitate the Class EA study process and better ascertain the representation of viable alternatives, a hydrogeological study was undertaken and completed in draft form in the Spring of 2007. The study included the drilling of a test well and monitoring well at the existing Freelton standpipe site. It was determined through pump testing, concurrent with area private well and surface water monitoring, that a well at this site could provide a highly adequate supply (up to 19 L/s) from a non-GUDI source and without significant impact to the surrounding wells or environment.

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The potential new well was recognized as one of the alternatives for water supply in the Class EA assessment process. The hydrogeological report (Dillon, 2008) for the proposed well is a primary reference document in support of the identification of the preferred alternative for the Class EA study.

**ALTERNATIVES FOR CONSIDERATION:**

### Long List of Alternatives

Subsequent to the development of the Problem/Opportunity statement in Phase 1 of the Master Plan exercise and at the outset of Phase 2, the following long list of alternatives was identified:

1. Upgrade Treatment at Well FDF02  
2. Limit Community Growth  
3. Do Nothing  
4. Decommission all Freelton Wells and Obtain Water From The City of Hamilton Via A New Watermain From Waterdown  
5. Reduce Water Demand  
6. Decommission Well FDF02 and Establish A New Well  
7. Drill Individual Wells For Each Property and Decommission the Existing System  
8. Increase Pumping At Well FDF01

High level technical and policy criteria were applied to the eight alternatives, with the following summary outcomes:

- Alternatives 2, 3, 5, and 8 do not address the Problem Statement, which specifies that a backup supply of water must be developed to address a potential failure of the existing well FDF01.

- Provincial Policy Statement (2005) and Greenbelt Plan (2006) policies restrict partial services (i.e. water service without sewer service) and prohibit a lake-based (Great Lakes - or Lake Simcoe-sourced) supply to Rural Settlement Areas, respectively. Consequently, Alternative 4 is not viable.

The alternatives remaining for more in-depth evaluation are 1, 6, and 7 which were renamed A, B, and C.

### Short List of Alternatives

A. Upgrade Treatment At Well FDF02;  
B. Establish A New Well and Decommission Well FDF02;  
C. Drill Individual Wells for Each Property and Decommission the Existing System

The short list alternatives were evaluated and assessed with respect to Natural and Social Environment, Technical and Financial criteria, accordant with the tenets of the City’s Triple Bottom Line. Table 3 provides a summary of the highlights of this evaluation, identifying criteria where key differences in the level of impact were observed between the alternatives:
Table 3 - Summary Evaluation of Short-listed Alternatives

<table>
<thead>
<tr>
<th>Specific Evaluation Criteria</th>
<th>Alternative A Upgrade Treatment at FDF02</th>
<th>Alternative B Establish New Well FDF03 and Decommission FDF02</th>
<th>Alternative C Drill Individual Wells and Decommission the Existing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degradation of groundwater resources</td>
<td>None</td>
<td>None</td>
<td>More than A &amp; B due to multiple penetration points into the aquifer</td>
</tr>
<tr>
<td>Social/Technical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect upon public and private property</td>
<td>Major: requires additional area (either leased or purchased from the existing owner)</td>
<td>Minor: may require an easement from the Province (in the proximity of Hwy 6)</td>
<td>Minor</td>
</tr>
<tr>
<td>Effects upon public health protection and reliability/security of water supply</td>
<td>Several barriers to microbial infection are installed between the water source and the consumers and currently only a single well serves Freelton; quality and security vulnerable to highway spills</td>
<td>Several barriers to microbial infection are installed between the water source and the consumers and currently only a single well serves Freelton; quality and security of source water is excellent</td>
<td>Varies with the quality of individual wells and the quality of the well construction. The potential for contamination of the aquifer increases with the number of wells drilled.</td>
</tr>
<tr>
<td>Financial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital costs of proposed system</td>
<td>$2.5-3.0M</td>
<td>$1.2-1.5M</td>
<td>$2.8M immediate + up to $2.2M at RSA built-out, to a total of $5.0 M</td>
</tr>
<tr>
<td>Operation and maintenance</td>
<td>$90,000/year</td>
<td>$25,000/year</td>
<td>$14,000/year</td>
</tr>
<tr>
<td>20 Year Life Cycle Cost</td>
<td>$4.0-4.5M</td>
<td>$1.7-2.0M</td>
<td>$5.3M</td>
</tr>
</tbody>
</table>

On the basis of the evaluation, and with the integration of public and agency input received through the EA consultative process, **Alternative B: Establish New Well FDF03 and Decommission FDF02** was identified as the preferred alternative, with the following summary rationale:

- The location of the new well beside the existing elevated tank on City property best minimizes public inconvenience in its development and integrates well with the existing system.
- The capital cost of the proposed well, its operation, maintenance, and life cycle costs are the lowest of the alternatives.
- Environmental impacts are the least of all alternatives.
- Security of the source water quality and quantity is excellent.
- Implementation and maintenance of the preferred alternative is the easiest and least complex of all alternatives.
- Well site drainage can be conveyed by underground pipe to the natural discharge area in proximity of Highway 6.

The preferred alternative conforms to the Municipal Class EA Schedule B undertaking item 10 for Water Projects, specifically ‘…to establish a well at a new municipal well site’ and item 4 ‘Retire a water facility which would have been planned under Schedule B or C of the Municipal Class EA for its establishment’. The planning process followed through this study fulfils Phases 1 and 2 of the Municipal Class EA Planning and Design Process and thus, Schedule B requirements.
FINANCIAL/STAFFING/LEGAL IMPLICATIONS:

Financial

Capital Requirements

Based upon current operation and management of the existing Freelton system, the footprint and configuration required to establish and integrate the backup well, pump house, and associated appurtenances can be readily accommodated at the existing standpipe site. The costs for pre-design, design, and construction of the backup well at this location are estimated at $1.2M. The cost for decommissioning FDF02 is estimated to be $0.2M.

Account No. 5140667651 with a total budget of $2.18M was identified in the 2006 budget for the purposes of upgrading the communal well system to ensure regulatory compliance, a Microbial Contamination Control Plan, installing a new well, and decommissioning well FDF02.

Staffing

There are no staffing implications.

Legal

The City is bound by the Municipal Act, 2001 to provide water of a quality meeting Ontario Drinking Water Standards to residents currently served by a municipal supply. This obligation remains even where the designated supply source and system may become unavailable due to operational malfunction or failure, where there is no parallel backup system, and other additional cost means of supply are necessary such as transporting water to the user.

Establishing a backup well provides system security and is a best management practice under Ten State Standard protocols.

POLICIES AFFECTING PROPOSAL:

The Public Works Strategy Plan, Innovate Now

The recommendations from this report will assist in meeting the Public Works’ key goal, to be recognized as the centre of environmental and innovative excellence in Canada. In addition, implementing the recommendations will also assist Public Works in building on our Strategic Vision Drivers as follows:

- Communities (Services our communities connect with and trust) -

Establishing the new well and decommissioning a GUDI well will improve the local environment. Efficient and reliable operation of the new well within the Freelton water supply system will ensure excellent service to the community well into the future. The transparent and consultative nature of the Class Environmental Assessment process builds trust within the community and Review Agencies demonstrating Hamilton’s and Public Works’ commitment to Service Excellence.
People (Skilled teams ready for any situation) -
This program demonstrates the ability of our City staff to respond to an important and complex opportunity that affects our community. Implementing proposed water supply improvements requires the knowledge and skill of many staff that work with the system on a daily basis. Through an extensive consultation process stakeholders, including many employees, were invited to provide their input and contribute throughout the process of decision making. The proposed solution represents forward thinking and contemporary practice. Projects such as this have the ability to contribute to the positive image that Hamilton seeks to maintain and will promote a sense of pride in staff.

Process (Smart processes to match our needs) -
Throughout the development process, plans have been formulated to ensure that all aspects of the Triple Bottom Line approach to problem solving are considered. Social, Environmental, and Economic impacts were all assessed to provide a balanced approach to the preferred alternative. A detailed evaluation process was employed in order to effectively arrive at the optimal solution which meets Hamilton- and Freelton-specific goals and objectives. The result is a sustainable long-term approach that addresses the pressures of City and RSA growth, legislated requirements, and environmental protection.

Finances (Sound finance management for the long haul) -
Government policy and legislation have been considered in the development of the preferred solution. The economic impact to the City was a significant factor in the decision-making process.

Other policies affecting or impacting this report include:

The ** Provincial Policy Statement** and **Greenbelt Plan** limit the extension of lake-based services into rural areas, with exceptions made only for health emergencies.

The **Municipal Act, 2001** provides for resident petitioning of connection to a municipal communal system where lands or lots are fronted by system distribution infrastructure.

Current **Regional Official Plan** servicing policies provide for a prioritized eligibility for connection to a municipal communal system, including connection-paid but currently unconnected lots within the RSA, lots within the RSA boundaries, and lots abutting the RSA boundaries.

**RELEVANT CONSULTATION:**
The following Public Consultation events were undertaken as components of the Class EA process:

- **A Notice of Study Commencement** was published in The Hamilton Spectator on July 23, 2004. The purpose was to introduce the study, pose the problem statement, and solicit public input.

- **A Public Information Centre (PIC)** was held at Marian Hall in Freelton on February 21, 2008. The PIC was advertised in both The Hamilton Spectator and
selected Hamilton Community News editions on February 8 and February 15, 2008. The purpose of the PIC was to present the alternative solutions, the evaluation of social/cultural, economic and natural environmental impacts of the alternatives, the recommended solution, and to further solicit public comment.

- Of the nineteen PIC attendees, ten provided written comments. All comments were supportive of the recommended alternative as the most sensible and effective approach to securing the Freelton water supply.

- Through mailings undertaken at the points of the Notice of Commencement and the PIC, relevant agencies and City departments were solicited for input and kept informed of the study and its findings. Any information, comments or concerns provided by agencies through these contacts were integrated into the study and the assessment of alternatives.

Project Stakeholder and Review Agency lists were developed at the onset of the study and maintained throughout the process to ensure all interested and relevant parties are kept informed. All Stakeholders are invited and encouraged to comment on the project at any time during the study.

**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
  Human health and safety are protected. Water quality and quantity are protected.

- **Economic Well-Being is enhanced.** ☑ Yes  No
  Efficiencies in infrastructure are realized, and compact, mixed use development serviced by an existing municipal communal water system in a designated Rural Settlement Area minimizes land consumption and servicing costs. Hamilton’s high quality environmental amenities are maintained and enhanced.

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

The Municipal Class EA process by its very nature entails a process wherein a recommendation that best creates value across all three bottom lines is realized; in this case leading to improved water quality and increased security of quality water supply for the residents of Freelton.

Do the options you are recommending make Hamilton a City of choice for high performance public servants? ☐ Yes  ☑ No