

YONGE STREET AQUIFER  
WELL CAPACITY RESTORATION  
Class Environmental Assessment

# Welcome

## Public Information Centres:

September 23, 2013

East Gwillimbury Sports  
Complex  
6 p.m. to 8:30 p.m.

September 25, 2013

Aurora Cultural Centre  
6 p.m. to 8:30 p.m.

**We are here to:** review the project, discuss the recommended solution, receive your comments and answer your questions



# Project Background

## What is the Yonge Street Aquifer?

The Yonge Street Aquifer refers to a system of deep regional aquifers that extend in part along Yonge Street, from the Town of Aurora in the south, to the Town of East Gwillimbury in the north. These aquifers are separated by a number of aquitards.

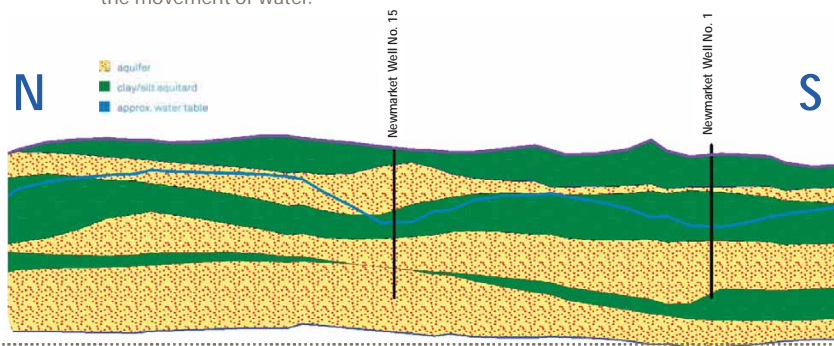
### Aquifers

Formations that contain sufficient permeable material (e.g. sand, gravel) to yield usable quantities of water to wells.

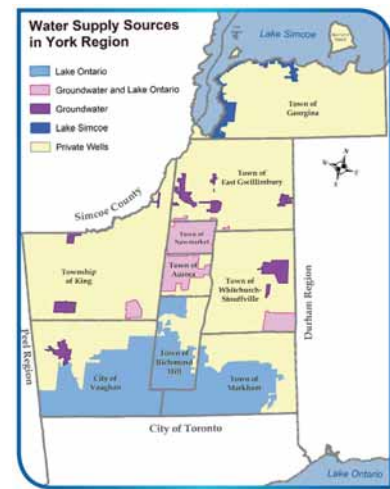
### Aquitards

Formations inhibiting the movement of water.

**SCHEMATIC CROSS-SECTION OF THE YONGE STREET AQUIFER AREA**

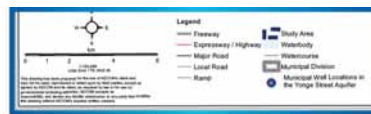


York Region's drinking water includes a blend of surface water from Lake Ontario and Lake Simcoe, as well as groundwater from regional aquifers.

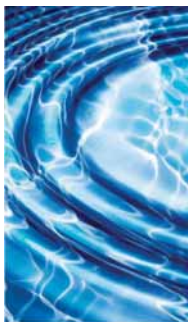


York Region production wells, which obtain groundwater from the Yonge Street Aquifer, supply drinking water to the Towns of Aurora, Newmarket and East Gwillimbury.

The York Region wells currently operating within the Yonge Street Aquifer are distributed as follows:



- Six wells in Aurora;
- Six wells in Newmarket;
- Six wells in East Gwillimbury (two in Holland Landing and four in Queensville).



## Why is York Region undertaking this Class Environmental Assessment?

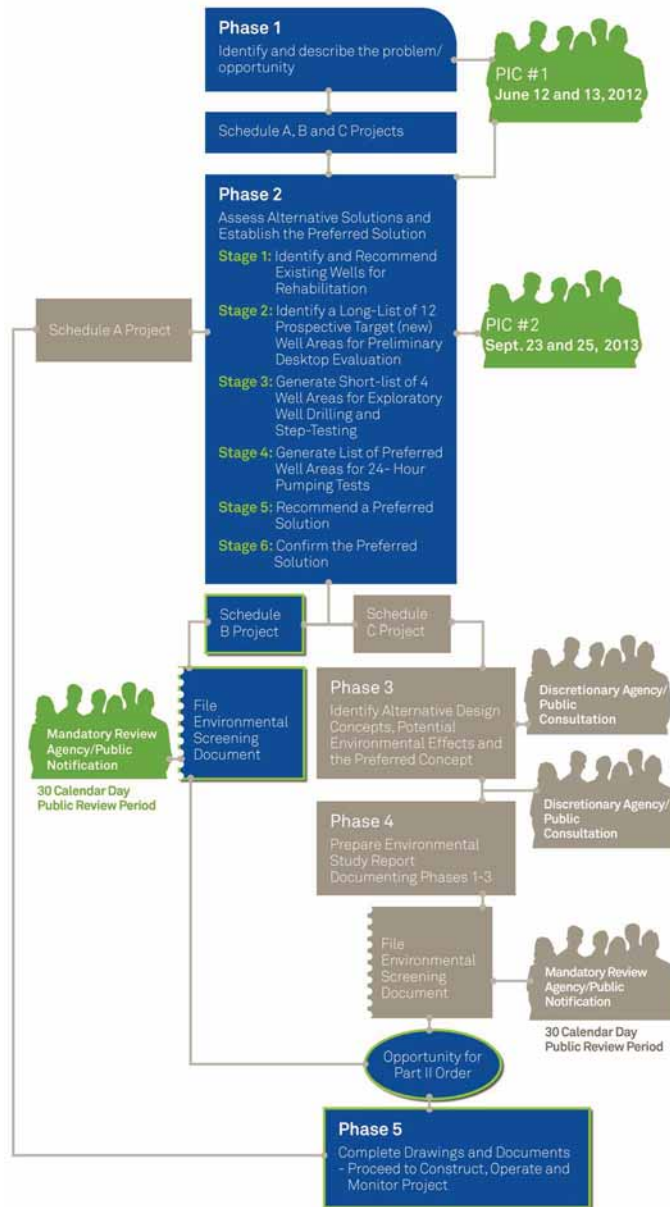
The Yonge Street Aquifer Well Capacity Restoration project was identified in York Region's 10-year Infrastructure Improvement Plan as a key project to maintain service levels and water supply capacity. Some of the Yonge Street Aquifer wells are not able to deliver their permitted capacities due to a number of reasons. The wells are also aging, which increases the risk that some of these may further be unable to pump their permitted capacity in the future.

This project is being conducted in accordance with the Municipal Class Environmental Assessment process.

# Municipal Class Environmental Assessment Process

The Project is being conducted in accordance with the *Municipal Engineers Association Municipal Class Environmental Assessment Document* (October 2000, and as amended in 2007 & 2011) (Municipal Class EA). The Municipal Class EA process, approved under the *Ontario Environmental Assessment Act*, enables the planning of municipal infrastructure projects in accordance with a proven procedure for protecting the environment.

This project is being undertaken in accordance with the first two Phases of the Class EA process for a Schedule 'B' project (as shown in blue).





# Phase 1: Identification of the Problem/Opportunity- Performance of the Yonge Street Aquifer Wells



*Proactively addressing the performance of the Yonge Street Aquifer wells will ensure their ability to operate at permitted capacity over the long term.*

## Existing Well Capacity Assessment

Four wells in the Yonge Street Aquifer system (Aurora 5, Aurora 6, Newmarket 14 and Newmarket 15) pump at a reduced rate compared to the allowable rate in the Permit to Take Water due to operational restrictions.

### Operational Restrictions on Well Capacity

Some wells pump at rates below the permitted maximum due to:

- Sand entering the well screen and well screen plugging at higher pumping rates
- Well water aesthetic characteristics

87.7 MLD -  
82.5 MLD  
= 5.2 MLD

**87.7 million litres/day:** Maximum permitted capacity of the Yonge Street Aquifer Wells.

**82.5 million litres/day:** Actual capacity of the Yonge Street Aquifer Wells.

**5.2 million litres/day (6%):** Total reduction in capacity of the Yonge Street Aquifer Wells.

## Future Well Capacity/System Reliability Assessment

The remaining 14 wells in the Yonge Street Aquifer system are able to pump at their permitted rates, but some have a potential to experience reduced capacities in the future due to the following factors:

### Reduced Well Efficiency

Wells typically decline in efficiency over time. Extra energy is needed to pump water from the wells with lowered efficiency.

### Increased Well Age

As wells age, they have a greater risk of lowered performance.

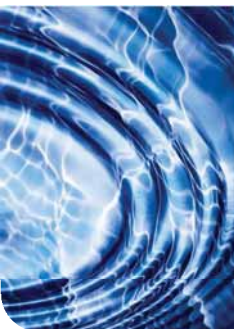
### Elevated Corrosion Potential

Wells can be susceptible to corrosion over time, particularly wells constructed with different metals.

## Managing Risk (System Redundancy)

In addition to recapturing lost well capacity, York Region is striving to develop extra well capacity in the Yonge Street Aquifer groundwater supply system for backup purposes (redundancy).

Ideally, the backup capacity would equal the capacity of the largest well in the Yonge Street Aquifer system (about 7.86 MLD), so that it could temporarily replace any single well taken offline for rehabilitation.



## Problem/Opportunity Statement

The purpose of this project is to re-establish the full permitted well capacity of York Region's water system in the Yonge Street Aquifer area while ensuring that future water demands can be met, the reliability of the water supply is maintained or enhanced, and the responsible management of groundwater in the Yonge Street Aquifer is continued.

## Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

The following five alternative solutions were identified for consideration based on the problem/opportunity statement and a review of the Municipal Class Environmental Assessment.



### Alternative 1: Do Nothing

No improvements or changes to the existing well system would be implemented. Although the “Do Nothing” alternative would not address the problem/opportunity statement, it has been included for consideration in the Yonge Street Aquifer Well Capacity Restoration Class Environmental Assessment and will serve as a benchmark against which other alternatives will be assessed.

### Alternative 2: Rehabilitate Existing Wells

Selected wells, where possible, would be rehabilitated to restore their capacity. This alternative would enhance the reliability of the water supply system, while managing the water levels in the Yonge Street Aquifer.

### Alternative 3: Expanding Existing Storage System

The capacity of the existing storage system would be increased and York Region would pump more water at non-peak times to hold water in reserve for peak demand periods. This alternative assumes no changes to existing wells.

### Alternative 4: Increase Water Supply from Lake Ontario

The quantity of water supplied to York Region from Lake Ontario would be increased to make up for the reduced groundwater capacity.

### Alternative 5: Install New Wells

New wells would be installed at existing and/or new well sites to restore the full permitted capacity of the system. This alternative would enhance the reliability of the water supply system, while managing the water levels in the Yonge Street Aquifer.




### Alternative Solutions Not Carried Forward: Alternatives #3 & 4

Alternatives 3 and 4 were not carried forward for further consideration as they do not address the problem/opportunity statement. They do not re-establish any well capacity of York Region’s water system, they do not maintain or enhance the reliability of the water supply and do not contribute to the responsible management of groundwater in the Yonge Street Aquifer.

### Preliminary Preferred Solution

Following an evaluation, it was determined that the Preliminary Preferred Solution includes...



*Alternatives # 2 & 5:  
Rehabilitate Existing  
Wells and Install New  
Wells*

# Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

## Data Collection and Review

## Evaluation

## Result

### Stage 1:

Identify and Recommend Existing Wells for Rehabilitation

Collect and review existing data including:

1. Lost capacity
2. Identified production issues affecting well capacity
3. Estimated cost to test and rehabilitate wells

Screen existing well sites to identify preferred locations for well rehabilitation

Existing wells for rehabilitation:

- Aurora Well No. 5
- Aurora Well No. 6
- Newmarket Well No. 15

### Stage 2:

Identify a Long-list of 12 Prospective Target (new) Well Areas for Preliminary Desktop Evaluation

Collect and review existing data including:

1. Hydrogeology data
2. Geology data

Screen prospective well areas for their potential to provide the capacity of a municipal groundwater supply well

Identified 12 well areas for further evaluation

### Stage 3:

Generate Short-list of Four Well Areas for Exploratory Well Drilling and Step-Testing

Collect and review existing data and conduct modelling:

1. Hydrogeology data
2. Geology data
3. Property ownership
4. Wellhead Protection Area modelling
5. Infrastructure hydraulic modelling

Evaluate 12 prospective well areas in the following categories:

1. Groundwater Quantity
2. Groundwater Quality
3. Natural Environment
4. Potential Well Interference
5. Water Supply System Integration
6. Municipal Well Development Logistics

Well Areas for exploratory drilling and step-testing:

- Well Area 6 (Green Lane)
- Well Area 11 (Aurora Well No. 5)
- Well Area 5 (Warden)
- Well Area 3 (Mount Albert)

### Stage 4:

Generate List of Preferred Well Areas for 24-Hour Pumping Tests

Conduct field work and the following studies:

1. Six-inch test well drilling program & step-tests
2. Terrestrial and aquatic assessments
3. Cultural Heritage Review
4. Stage 1 Archaeological Assessment

Evaluate four prospective well areas in the following categories:

1. Technical
2. Natural Environment
3. Built Environment
4. Social Environment
5. Cultural Environment
6. Financial

Well Areas for 24-hour pumping tests:

- Well Area 11 (Aurora Well No. 5)
- Well Area 6 (Green Lane)
- Well Area 5 (Warden)

### Stage 5:

Recommend a Preferred Solution

Conduct the following studies:

1. Monitoring well drilling and 24-hour pumping tests
2. Stage 2 Archaeological Assessment

Update evaluation of two prospective well areas in the following categories:

1. Technical
2. Natural Environment
3. Built Environment
4. Social Environment
5. Cultural Environment
6. Financial

**We are here**

Recommended Preferred Solution:

- Rehabilitate wells at Aurora Well No. 5, Aurora Well No. 6 and Newmarket Well No. 15
- Construct new wells at Well Area 6 (Green Lane) and Well Area 11 (Aurora Well No. 5)

### Stage 6:

Confirm the Preferred Solution

Conduct field work, numerical modelling the following studies:

1. Large-diameter test well drilling & 72-hour pumping test
2. Groundwater modelling
3. Infrastructure hydraulic modelling

Evaluate the feasibility & sustainability of municipal water taking from Well Area 6 (Green Lane) and Well Area 11 (Aurora Well No. 5)

Confirm Preferred Solution

## Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

### Stage 1: Identify and Recommend Existing Wells for Rehabilitation

#### In order to identify existing wells for rehabilitation, York Region:

- Evaluated construction details and performance of all Yonge Street Aquifer Wells
- Discussed operational issues with well operators
- Quantified lost well capacity associated with under-performing wells
- Evaluated the possibility of improving well performance through testing and rehabilitation
- Estimated preliminary costs associated with rehabilitating wells

### Recommended Wells for Rehabilitation

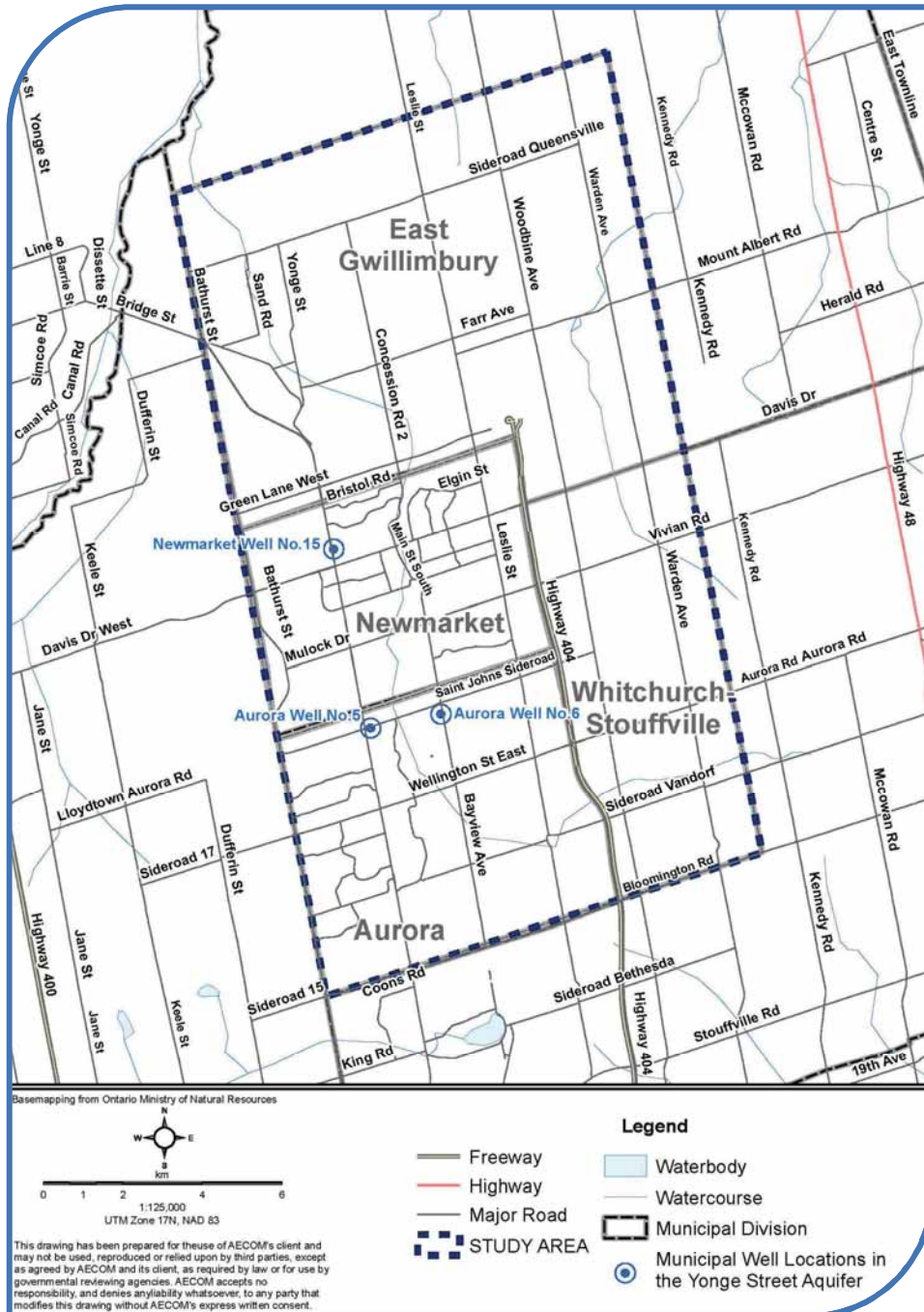
| Evaluation Criteria                          | Aurora Well No. 5  | Aurora Well No. 6 | Newmarket Well No. 15 |
|--|--|-------------------|-----------------------|
| Lost Well Capacity (m <sup>3</sup> /d)*      | 708  | 1,050             | 1,113                 |
| Reason for Lost Well Capacity                | Premature screen plugging  | Sand production   | Sand production       |
| Number of Previous Rehabilitation Events     | 0  | 1                 | 3                     |
| Estimated Cost to Test and Rehabilitate Well | \$140,000  | \$105,000         | \$105,000             |
| Alternative 2 Summary Recommendation         | <ul style="list-style-type: none"> <li>• Rehabilitation of three wells could recover an estimated capacity of up to 2,500 m<sup>3</sup>/day in the short term until new wells are constructed</li> </ul> |                   |                       |

\*Calculated as the difference between Maximum Permit to Take Water Pumping Rate and Practical Maximum Pumping Rate



### Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

## Stage 1: Identify and Recommend Existing Wells for Rehabilitation (Continued)



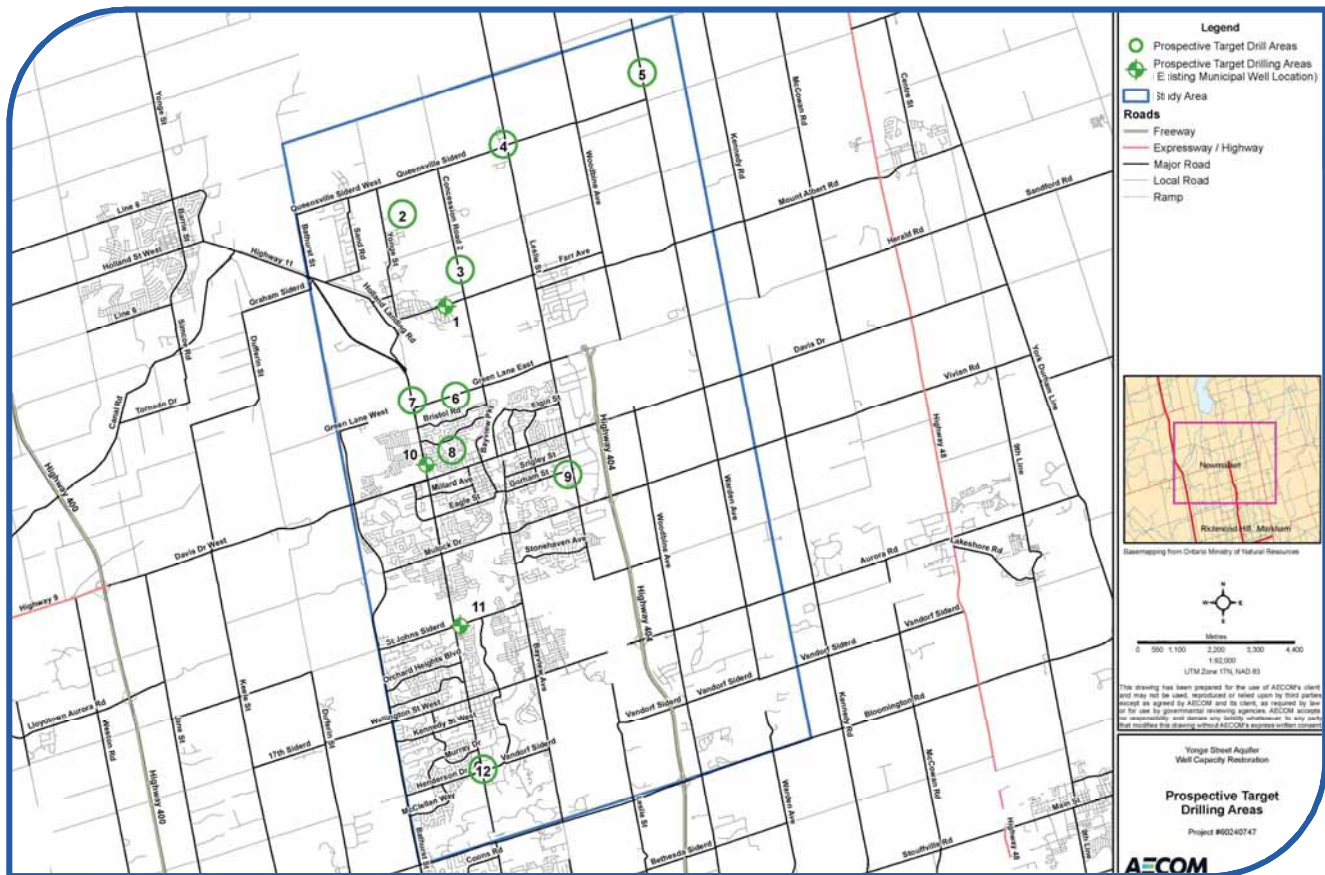


**Phase 2: Assess Alternative Solutions and Establish the Preferred Solution**

**Stage 2: Identify a Long-List of 12 Well Areas for Preliminary Desktop Evaluation**

To investigate Alternative 5, York Region began with identifying 12 well areas that had potentially favourable hydrogeological conditions for installing new wells.

These well areas are shown in the figure below:



**Phase 2: Assess Alternative Solutions and Establish the Preferred Solution**

**Stage 3: Generate Short-List of Four Well Areas for Exploratory Well Drilling and Step-Testing**

The 12 prospective target well areas were evaluated based on the following criteria:

| Potential Alternative Well Area Assessment Criteria   |  |
|---|--|
| <p><b>Groundwater Quantity:</b></p> <ul style="list-style-type: none"> <li>• Geological or hydrogeological conditions</li> <li>• Potential average well capacity</li> <li>• Potential estimated aquifer thickness</li> <li>• Apparent transmissivity (estimated rate of groundwater flow within aquifer)</li> </ul> | <p><b>Well Interference:</b></p> <ul style="list-style-type: none"> <li>• Local private well density</li> <li>• Distance to Permit to Take Water sources</li> </ul>  |
| <p><b>Groundwater Quality:</b></p> <ul style="list-style-type: none"> <li>• Land uses within one kilometre</li> <li>• Potential for land use to effect groundwater quality (i.e. threats)</li> </ul>  | <p><b>Water Supply System Integration:</b></p> <ul style="list-style-type: none"> <li>• Infrastructure and distribution requirements</li> </ul>  |
| <p><b>Natural Environment:</b></p> <ul style="list-style-type: none"> <li>• Proximity to wetlands/streams</li> <li>• Thickness of the aquitard below the shallow aquifer</li> </ul>   | <p><b>Site Development Logistics:</b></p> <ul style="list-style-type: none"> <li>• Property ownership</li> <li>• Adjacent existing and future land uses</li> <li>• Property size</li> <li>• Property access</li> </ul> |



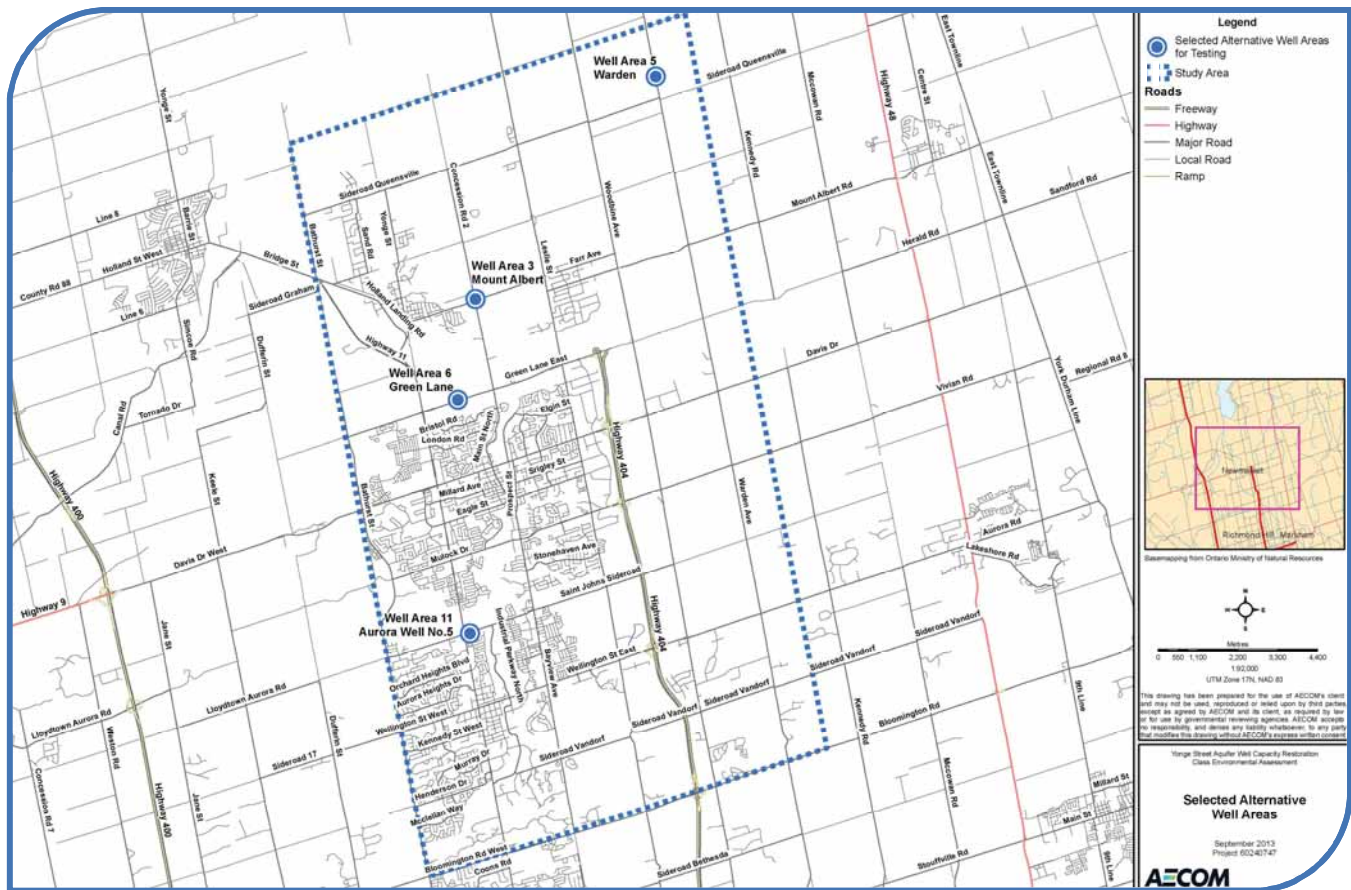
**Phase 2: Assess Alternative Solutions and Establish the Preferred Solution**

**Stage 3: Generate Short-List of Four Well Areas for Exploratory Well Drilling and Step-Testing (Continued)**

Following this evaluation, it was determined the four well areas recommended for exploratory well drilling and step-testing were...

- Well Area 3 (Mount Albert)
- Well Area 5 (Warden)
- Well Area 6 (Green Lane)
- Well Area 11 (Aurora Well No. 5)

These well areas are shown in the figure below:





## Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

### Stage 4: Generate List of Preferred Well Areas for 24-Hour Pumping Tests

The following studies were conducted to determine the characteristics of the local environment. The results were used to confirm which well areas should be recommended for the 24-hour pumping tests.

#### Hydrogeological Investigations:

Pilot boreholes and/or test wells 15 centimetres (six inches) in diameter and ranging from approximately 65 to 115 metres deep were drilled to gain information on the aquifer characteristics at the prospective well areas. Step tests were completed on these test wells to establish potential for production capacity and measure water quality.

#### Natural Heritage and Aquatic Investigations:

A desktop analysis of aerial photographs and field investigations of surface water features such as wetlands, ponds and streams were conducted to review ecological receptors that may be affected by changes in groundwater elevation due to pumping activities.

#### Built Heritage Investigations:

A desktop analysis and field investigation were conducted to identify cultural heritage landscapes and built heritage features older than 40 years of age located within and adjacent to the prospective target well areas.

#### Archaeological Investigations:

A Stage 1 Archaeological Assessment was conducted to determine the potential for recovery of historic Euro-Canadian and/or Aboriginal archaeological resources within the prospective target well areas.

The Stage 1 Archaeological Assessment concluded that Stage 2 Archaeological Assessments should be undertaken at well areas: 3 (Mount Albert); 5 (Warden); and 6 (Green Lane).

Well Area 3 (Mount Albert)



Well Area 5 (Warden)



Well Area 6 (Green Lane)



Well Area 11 (Aurora Well No. 5)



**Phase 2: Assess Alternative Solutions and Establish the Preferred Solution**

**Stage 4: Generate List of Preferred Well Areas for 24-Hour Pumping Tests (Continued)**

The four well areas were evaluated using criteria grouped under the following categories:

**Prospective Target Well Area Assessment Criteria**

**Technical Category**

- Constructability of proposed well house
- Aquifer productivity
- Treatment requirements
- Approval requirements

**Natural Environment Category**

- Effect of construction and operation of well house on aquatic species and habitat
- Effect of construction and operation of well house on terrestrial species and habitat
- Effect on aquatic species from groundwater drawdown
- Effect on terrestrial species and habitat from groundwater drawdown
- Effect on groundwater quality
- Effect on surface water quantity
- Effect on surface water quality

**Built Environment Category**

- Effect on existing and/or future planned residences, businesses, and/or community, institutional and/or recreational facilities
- Effect on property (ownership, size and willingness of property owner)
- Effect on existing utility infrastructure
- Effect on existing agricultural operations
- Effect on private wells (groundwater quality and quantity)
- Effect on municipal wells (groundwater quality and quantity)

**Social Environment Category**

- Effect of noise/vibration on sensitive receptors

**Cultural Environment Category**

- Effect on cultural heritage landscapes and built heritage resources
- Effect on potential archaeological resources

**Financial Category**

- Capital costs (Life cycle cost per m<sup>3</sup>)

**Phase 2: Assess Alternative Solutions and Establish the Preferred Solution**

**Stage 4: Generate List of Preferred Well Areas for 24-Hour Pumping Tests (Continued)**

The ranking of the Comparative Evaluation are presented in the table below:

| Category   | Ranking: 1 <sup>st</sup> to 4 <sup>th</sup> Place  |  |  |  |
|--|--|--|--|--|
|  | Well Area 3 -<br>Mount Albert Test Site  | Well Area 5 – Warden Test<br>Site  | Well Area 6 -<br>Green Lane Test Site  | Well Area 11 -<br>Aurora Well No. 5 Test<br>Site   |
| Technical  | 4 <sup>th</sup>  | 3 <sup>rd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  |
| Natural Environment  | 1 <sup>st</sup>  | 2 <sup>nd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  |
| Built Environment  | 3 <sup>rd</sup>  | 3 <sup>rd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  |
| Social Environment   | 2 <sup>nd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  | 1 <sup>st</sup>  |
| Cultural Environment   | 2 <sup>nd</sup>  | 2 <sup>nd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  |
| Financial  | 3 <sup>rd</sup>  | 2 <sup>nd</sup>  | 1 <sup>st</sup>  | 1 <sup>st</sup>  |
| Does the Well Area<br>fulfill the<br>requirements of the<br>Problem/Opportunit<br>y Statement? | No   | Yes  | Yes  | Yes  |
| <b>Overall Ranking</b>   | <b>4<sup>th</sup></b><br>Hydrogeological<br>conditions are not<br>adequate for a<br>municipal supply well. | <b>3<sup>rd</sup></b><br>Good water quality; a<br>new facility would<br>require significant<br>infrastructure to<br>connect to existing<br>system. | <b>2<sup>nd</sup></b><br>Favourable conditions for<br>a productive aquifer; may<br>require treatment to<br>reduce iron (aesthetic<br>consideration). | <b>1<sup>st</sup></b><br>Existing well /<br>watermain; additional<br>capacity would require<br>expansion of existing<br>iron treatment system. |
| <b>Recommendation</b>  | <u>Mount Albert Test Site</u><br>Not recommended to<br>be carried forward for a<br>24-hour pumping test.   | <u>Warden Test Site</u><br>Recommended to be<br>carried forward for a<br>24-hour pumping test<br>(see note below).                                 | <u>Green Lane Test Site</u><br>Recommended to be<br>carried forward for a 24-<br>hour pumping test.  | <u>Aurora Well No. 5 Test<br/>Site</u><br>Recommended to be<br>carried forward for a<br>24-hour pumping test.                                  |

**Note:**

- Well Area 5 (Warden), was originally recommended for 24-hour pumping test; however, testing was first conducted at Well Area 6 (Green Lane) and Well Area 11 (Aurora Well No. 5).
- Preliminary results suggested that target production capacities could be realized at these two locations.
- Testing at Well Area 5 (Warden), was suspended pending the results of further analysis of Well Area 6 (Green Lane) and Well Area 11 (Aurora Well No. 5).

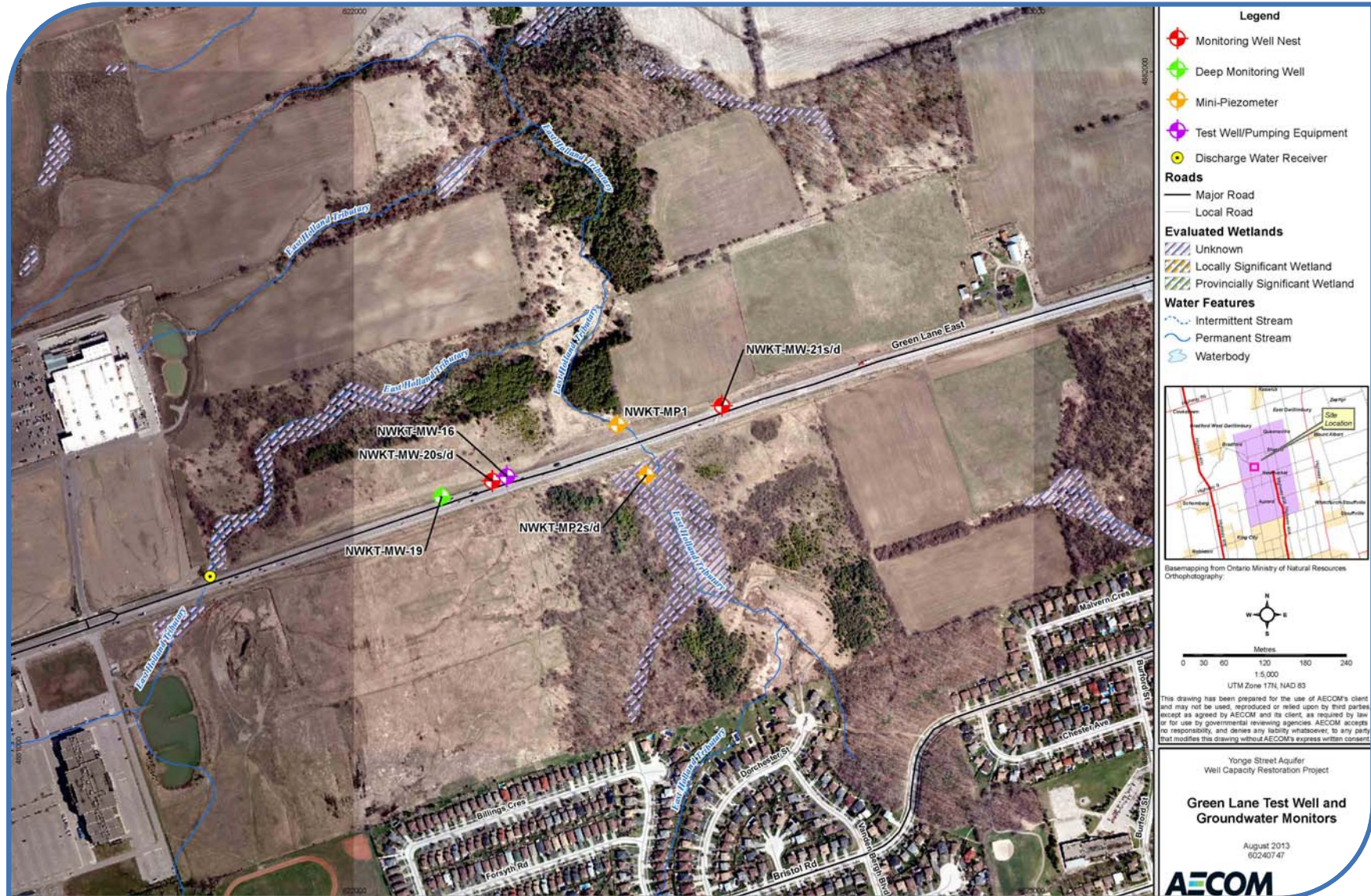


# Well Area 5 – Warden Test Site





# Well Area 6 – Green Lane Test Site



**Legend**

- Monitoring Well Nest
- Deep Monitoring Well
- Mini-Piezometer
- Test Well/Pumping Equipment
- Discharge Water Receiver

**Roads**

- Major Road
- Local Road

**Evaluated Wetlands**

- Unknown
- Locally Significant Wetland
- Provincially Significant Wetland

**Water Features**

- Intermittent Stream
- Permanent Stream
- Waterbody

**Basemap**

Basemapping from Ontario Ministry of Natural Resources Orthophotography.

**Scale**

0 30 60 120 180 240  
Metres  
1:5,000  
UTM Zone 17N, NAD 83

**Disclaimer**

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**Project Information**

Yonge Street Aquifer  
Well Capacity Restoration Project

**Green Lane Test Well and Groundwater Monitors**

August 2013  
60240747

**AECOM**







## Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

### Stage 5: Recommend a Preferred Solution

The following studies were conducted to recommend a preferred solution:

#### Monitoring well drilling and 24-hour pumping tests

Monitoring wells were drilled to further characterize the local geology and provide monitoring points in the target aquifer. Pumping tests, approximately 24-hours in duration, were conducted to monitor the response of the groundwater system to pumping the test wells.

| Technical Consideration                           | Well Area 6 - Green Lane                                     | Well Area 11- Aurora 5                                       |
|---|--|--|
| Test Well Depth (m)                               | 95.4 metres  | 101.8 metres and 94.5 metres                                 |
| Test Pumping Rate (L/s)                           | 25 L/s   | Combined rate of 25 L/s for 8 hrs and 85 L/s for 16 hrs      |
| Predicted Production Well Rate (L/s)              | 60-90 L/s  | 20-45 L/s  |
| Local Density of Private Supply Wells             | Low – Few private supply wells identified in area            | Low – Located in area largely serviced by municipal supply   |
| Potential Interference with Municipal Wells       | Low – Located within two kilometres of one well site         | Moderate – Located within two kilometres of three well sites |
| Potential Impacts with Shallow Groundwater System | Low – drawdown not observed in shallow system during testing | Low – drawdown not observed in shallow system during testing |
| Aquifer Water Quality                             | Good   | Good   |

#### Stage 2 Archaeological Assessment:

The Stage 2 Archaeological Assessment will involve a site inspection of the proposed project footprint at Well Area 6 (Green Lane) using standard archaeological test pit survey methods. The surveys will consist of digging test pits at five metre intervals. Each test pit is shovel width in diameter and excavated five centimetres into the subsoil, then the soil is pushed through a six millimetre aperture screen and any cultural material present is collected. The results of the survey will be included in the overall project evaluation.

Below are examples of archaeologists conducting a Stage 2 Archaeological Assessment by test pitting.



## Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

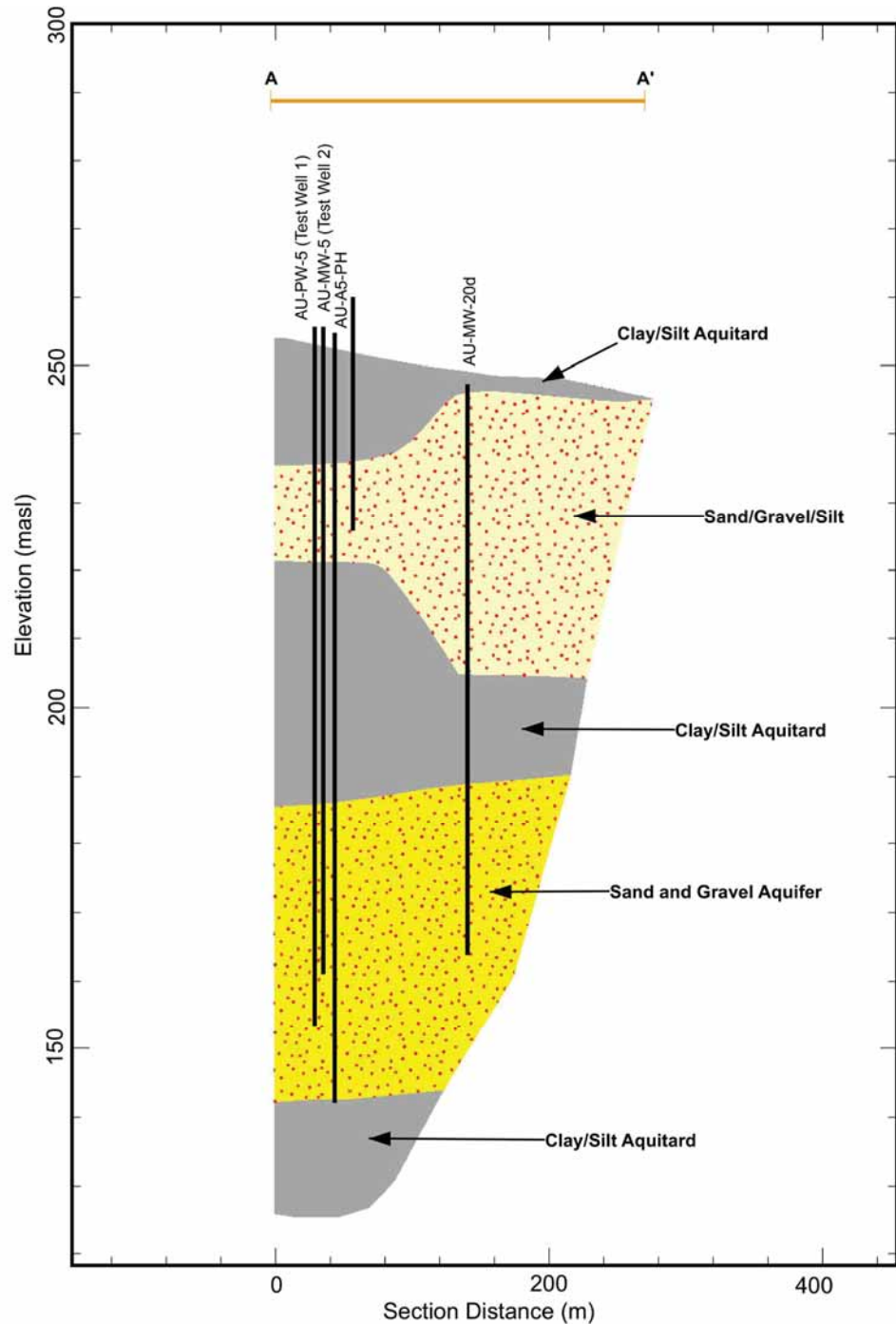
### Stage 5: Recommend a Preferred Solution (Continued)

At this stage, the Comparative Evaluation Table was updated with the new information detailed below. This new information was used to identify viable Well Sites to be carried forward for further evaluation.

| Criteria  | Ranking: 1 <sup>st</sup> to 2 <sup>nd</sup> Place                      |  |   |
|---|--|--|---|
|   | New Input  | Well Area 6 -<br>Green Lane Test Site  | Well Area 11 -<br>Aurora Well No. 5 Test Site   |
| Technical   | 24-hour pumping test data.   | 1 <sup>st</sup>  | 2 <sup>nd</sup>   |
| Natural Environment                                       | Groundwater /surface water data from 24-hour pumping test.             | 2 <sup>nd</sup>  | 1 <sup>st</sup>   |
| Built Environment   | Built Heritage Investigation.  | 1 <sup>st</sup>  | 1 <sup>st</sup>   |
| Social Environment  | N/A  | 1 <sup>st</sup>  | 1 <sup>st</sup>   |
| Cultural Environment                                      | To be updated with results from the Stage 2 Archaeological Assessment. | Findings from the Stage 2 Archaeological Assessment will determine if further archaeological assessments are required.   | N/A – site is already disturbed and did not require a Stage 2 Archaeological Assessment.  |
| Financial   | Updated costs based on revised capacity.                               | Assumed well capacity = 80 L/s<br>Capital cost estimate = \$2.9 million<br>(Additional considerations: Cost per capacity = 425 \$/m <sup>3</sup> /day;<br>Life cycle cost = 11.1 million \$/20 year;<br>Cost per m <sup>3</sup> produced = 0.33 \$/m <sup>3</sup> ). | Assumed well capacity = 40 L/s<br>Capital cost estimate = \$1.7 million<br>(Additional considerations: Cost per capacity = 490 \$/m <sup>3</sup> /day;<br>Life cycle cost = 5.8 million \$/20 year;<br>Cost per m <sup>3</sup> produced = 0.34 \$/m <sup>3</sup> ). |
| Recommended to be carried forward for further evaluation? |  | <b>Yes</b>   | <b>Yes</b><br>Although the site on its own cannot provide full restoration of 5,200 m <sup>3</sup> /day.  |

# Geologic Cross-Section of the Well Area 11 – Aurora Well No. 5 Test Well Area

- Test Well Names:  
 AU-MW-5 and AU-PW-5
- Test Well Depths:  
 101.8 m and 94.5 m
- Test Pumping Rate:  
 Combined rate of 25 L/s for 8 hrs and 85 L/s for 16 hrs
- Test Duration: 24 hours
- Water Level Change at Test Wells: 6.2 m and 5.6 m
- Estimated (Additional) Pumping Rate for Site:  
 20 to 45 L/s
- Active Private Wells Documented Within 500 m of Site: 3



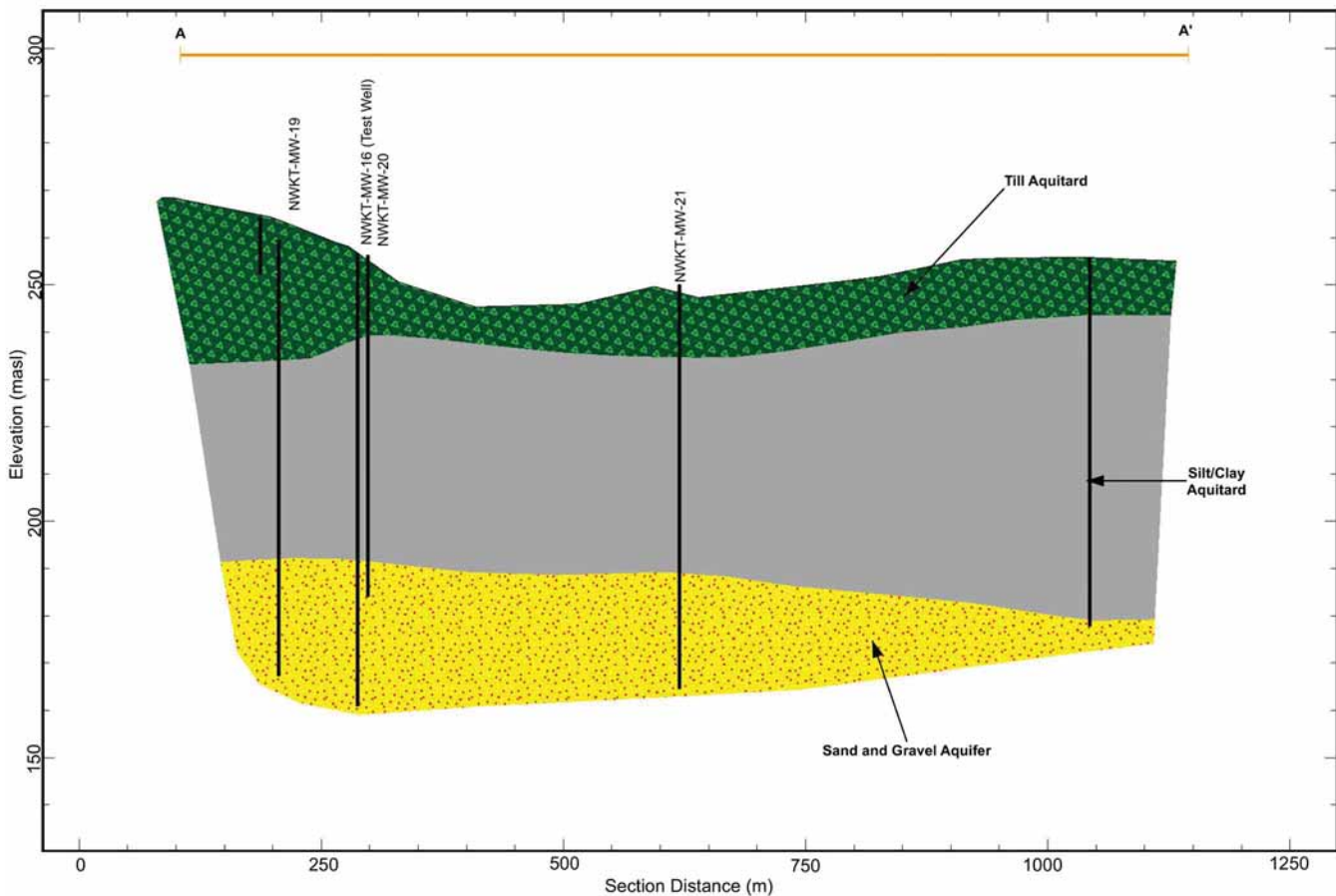


# Geologic Cross-Section of the Well Area 6 – Green Lane Test Well Area

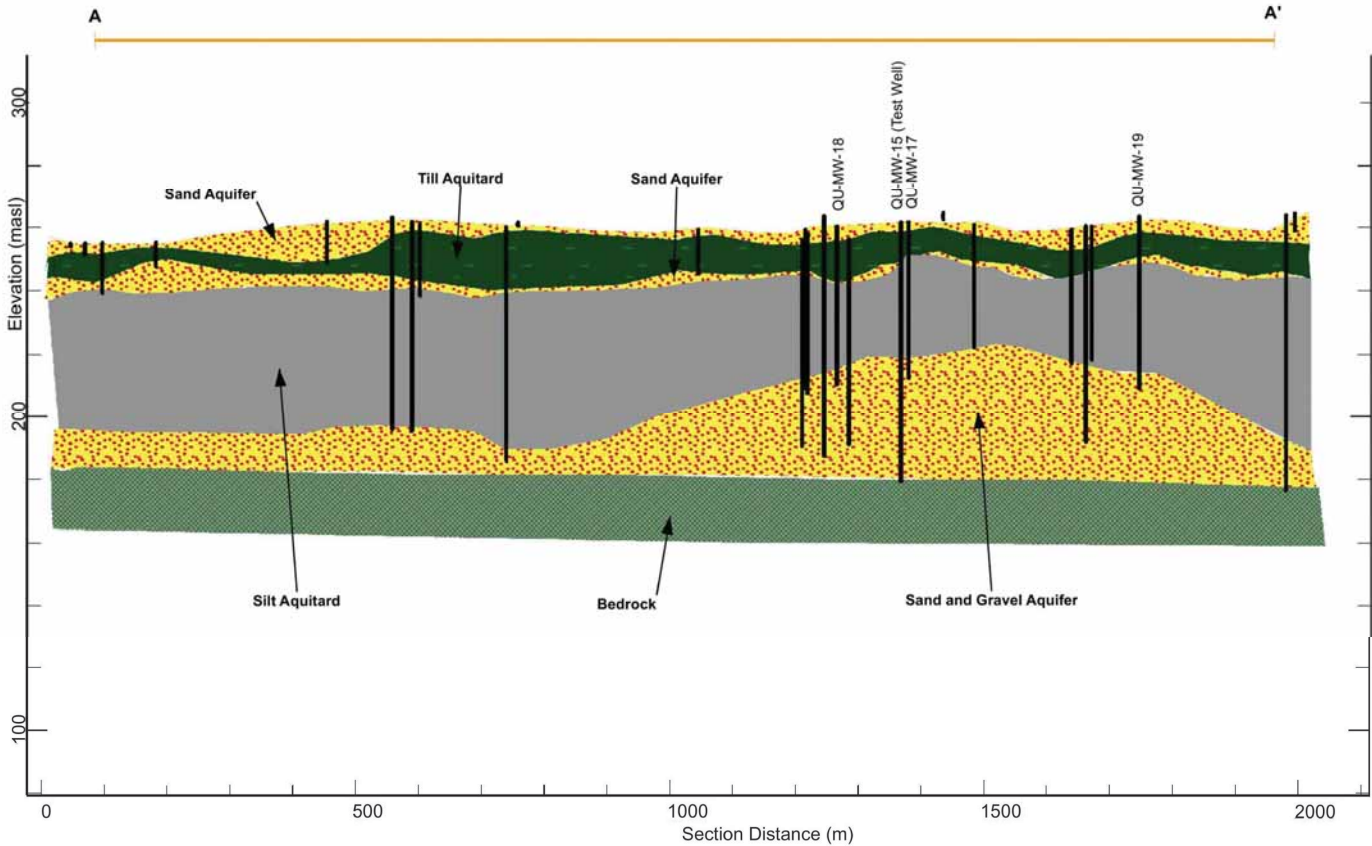
- Test Well Name: **NWKT-MW-16**
- Test Well Depth: **95.4 m**
- Test Pumping Rate: **25 L/s**
- Test Duration: **48 hours**
- Water Level Change (at Test Well): **3.65 m**
- Estimated Potential Pumping Rate for Site: **60 to 90 L/s**
- Active Private Wells Documented Within 500 m of Site: **1**



Basemapping from Ontario Ministry of Natural Resources



# Geologic Cross-Section of the Well Area 5 – Warden Test Well Area



- Test Well Name: **QU-MW-15**
- Test Well Depth: **67.1 m**
- Test Pumping Rate: **no 24-hour test conducted**



Basemapping from Ontario Ministry of Natural Resources



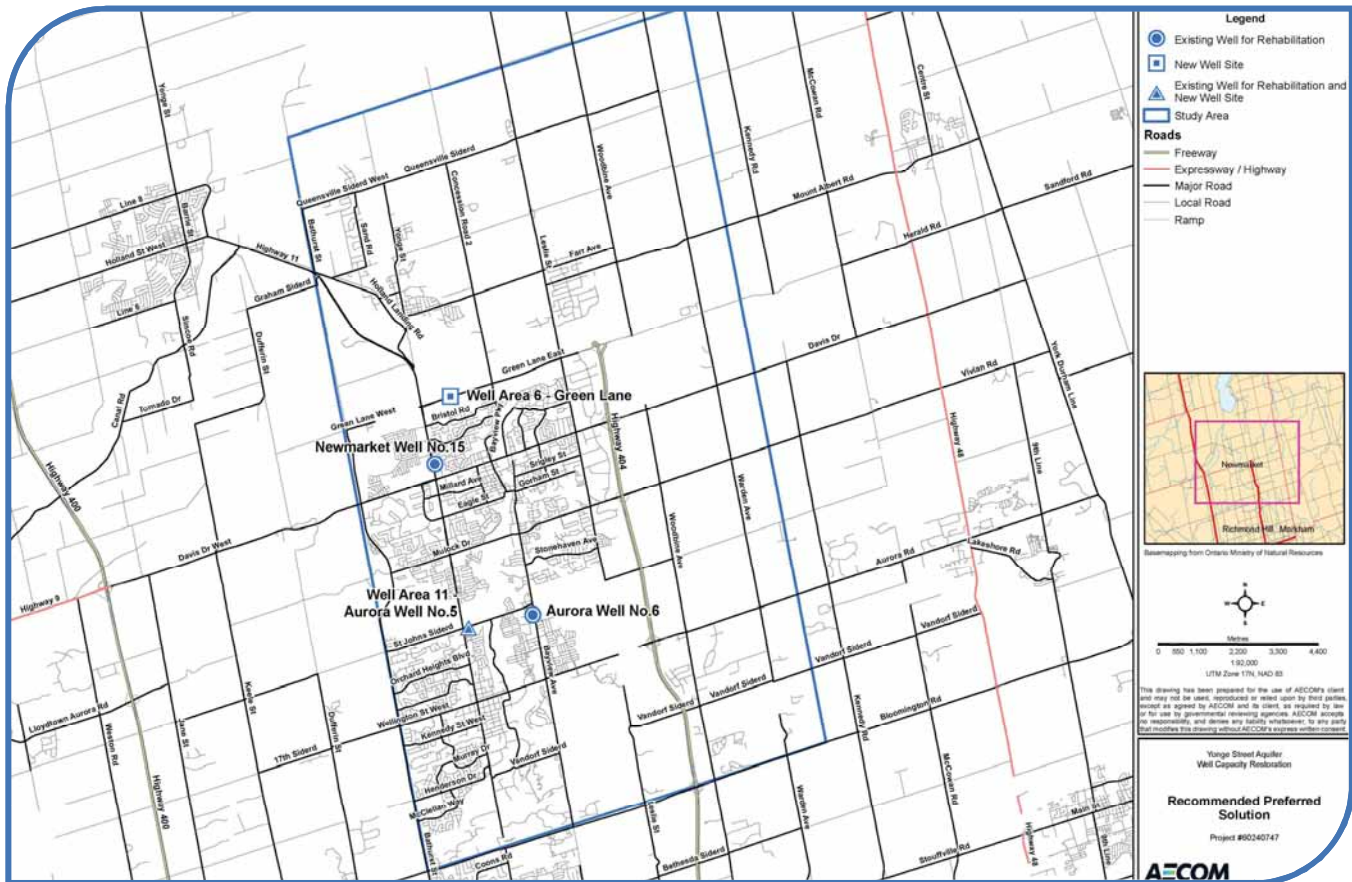
Phase 2: Assess Alternative Solutions and Establish the Preferred Solution

Stage 5: Recommend a Preferred Solution (Continued)

The recommended preferred solution is a combination of:

- Constructing new wells at Well Area 6 (Green Lane) and Well Area 11 (Aurora Well No. 5); and,
- Rehabilitating Aurora West Well No. 5, Aurora Well No. 6 and Newmarket Well No. 15.

These well areas are shown in the figure below:



Stouffville



Mount Albert



Aurora



Holland Landing

These photos are examples of some of York Region's water supply facilities

# Next Steps

**1**

Comments received tonight will be considered together with the results from Stage 6 to confirm the preferred solution.

**2**

Stage 6: Conduct large diameter well drilling and 72-hour testing to confirm the preferred solution.

**3**

A Phase 2 report will be prepared to document the selection process and will be made available for public review. A Notice of Completion will be issued to the public and review agencies. If no Part II order request is received by the Minister of the Environment in the 30-day review period, the preferred solution may be implemented.

## Who can I contact for more information?

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