

COMMITTEE OF THE WHOLE – MAY 7, 2001

CITY- WIDE WATER PRESSURE STATUS AND SUMMARY REPORT

Recommendation

The Commissioner of Development Services, in consultation with the Director of Public Works, recommends:

1. That this report be received for information purposes;
2. That the City's Design Criteria be revised to specifically require the installation of 25 millimetre diameter water service connections, as a minimum, in new residential developments where static water pressures under peak hour demand periods are expected to be 310 kilopascals (45 pounds per square inch) or less, or where water service connections are 30 metres or greater in length (measured from watermain to building envelope), or where lot sizes are 500 square metres or larger; and
3. That Council reaffirm its resolution of August 28, 2000, regarding the reimbursement of the cost of the supply and installation of an in-house booster pump to each homeowner in the Woodland Acres Subdivision affected by low water pressure to a maximum of \$750.

Background

On August 28, 2000, Council requested Staff to conduct a City-wide study with respect to water pressure ranges, and to provide a report on the findings of the study in 2001. In response to this direction the following report has been prepared.

Water Distribution System

The Region of York purchases water from the City of Toronto and in turn supplies it to the individual municipalities throughout the Region including Vaughan, through a series of pumping stations, trunk watermains and water reservoirs. The pumping stations deliver water under pressure to the reservoirs and watermains in the system. The reservoirs provide reserves for the high demand periods and the equalization of pumping rates. The local municipalities within York Region are responsible for distributing the water to the end user - the customers. The main objective of a municipal water distribution system is to deliver adequate quantities of potable water to the residents and businesses of the municipality at pressures sufficient for operating plumbing fixtures and fire-fighting equipment, but not so high as to increase the occurrence of leaks and watermain breaks.

Pressure Districts

In large water systems, the establishment of pressure districts is required because of varying topography. Generally, each pressure district is set up with ground elevations spanning approximately 30 metres (100 feet). This elevation difference equates to water pressures in each district ranging between 275 and 690 kilopascals (kPa) or 40 to 100 pounds per square inch (psi). Vaughan's water system is divided into six pressure districts as shown on Attachment 1. As the water provider, the Region of York establishes the service area of each pressure district through the design of the primary water supply system.

Water pressure is provided in each pressure district by the combination of the pumping station

and the height of the water in a reservoir. The height of the water in a reservoir acting on the water distribution system is referred to as the pressure head. The greater the pressure head, the greater the pressure will be in the water distribution system. To illustrate this, a simplified water distribution system consisting of one pressure district, including a pumping station, watermains and a reservoir is illustrated on Attachment 2. Two residential subdivisions are connected to the system. Subdivision "A" is located closer to the reservoir hence there is less head of water acting on the water system at this point resulting in water pressures within Subdivision 'A' closer to the lower end of the pressure range. In contrast, Subdivision "B" is located further away from the reservoir resulting in a greater head of water acting on the system and pressures at the high end of the allowable range.

Survey of Other Municipalities

Staff has conducted a telephone survey of ten neighboring municipalities and regions within the Greater Toronto Area to determine if Vaughan's current level of service with respect to water pressure is consistent with other water providers. The results of the survey revealed that Vaughan's current pressure range criteria of 275 to 690 kPa (40 to 100 psi) is consistent with the large majority of the other neighbouring municipalities with the exception of Toronto and Barrie which require a minimum of 45 and 50 pounds per square inch, respectively.

Daily Water Pressure Fluctuation

Water pressures normally fluctuate over the course of the day due to changes in water demands, water levels in the reservoirs and pump operation. Typically, lower water pressures are expected during the morning and evening periods when water demands are highest due to domestic activities such as showers, cooking and laundry. These high demand periods will lower the water levels in the reservoirs and decrease water pressure throughout the system. Conversely, higher water pressures can be experienced during the late evening and early morning periods due to full reservoirs and little water use within the system.

Service Connections

The size and length of individual service connections carrying water from the City's watermains to the internal plumbing system of a home can also be a factor in reducing the amount of pressure the customer will receive at their tap.

The City's current Design Criteria requires that all new residential service connections be a minimum of 20 millimetres in diameter. Further, larger diameter connections are recommended for large single family lots and for areas throughout the City where existing pressures are at the lower end of the allowable operating range. This criterion is consistent with all of the neighbouring municipalities surveyed, however, the design criteria of the Regions of Halton, Durham and Peel, and the Town of Newmarket more specifically require that 25 millimetre diameter service connections be provided in new development areas where lot sizes are greater than 500 square metres, or where service connection lengths are greater than 30 metres, or where watermain pressure is expected to be less than 45 psi.

Since this criterion better defines when larger water service connections are required, it is recommended that Vaughan adopt it and Staff amend the City's Design Criteria accordingly.

Customer Complaint Resolution

Although water pressures throughout the City of Vaughan fall within the standard operating range of 275 to 690 kPa (40 to 100 psi), the City's Public Works Department continues to receive low pressure complaints. Each complaint received by Public Works is logged and followed by a request for service with the homeowner as soon as possible, preferably when someone will be at

home. A thorough investigation is conducted by Public Works Staff as part of each low pressure service call. Each investigation generally involves the following activities:

- static pressure tests are carried out at the closest fire hydrant to the home to ensure that the City's water system is providing a minimum pressure of 275 kPa (40 psi);
- verification of the existing service connection size and type;
- confirmation that the curb box (water shut off valve located outside the home on the property line) is fully opened and not obstructing water flow and pressure;
- verification of the size, type and condition of the internal house plumbing including faucet screens, hot water tank, water meter and internal main stop;
- analysis of the findings and reporting.

Based on the experience of Public Works Staff, low water pressure in the house in many cases is attributable to inadequacies and obstructions in the internal plumbing that is outside of the City's control. In addition, complaints are received from homeowners who have recently moved from a high water pressure area to a lower pressure area due to the change in the level of service

Customer Complaint Areas

In consultation with Public Works Staff, a summary of areas within the City where historically the number of low pressure complaint were above average are shown on Attachments 3 and 4, and are addressed below.

West Woodbridge Service Area – Attachment No. 3

The West Woodbridge Service Area is located along the upper limit of the Pressure District 5 service area. The Region of York is currently construction new trunk watermains along Highway 27 between Rutherford Road and Highway #7. It is anticipated that the completion of these trunk watermains will improve the supply of water to the area and help maintain water pressures during peak demand periods.

Kipling Avenue Area – Attachment No. 3

The Kipling Avenue area is located in Pressure District 4 and in one of the older residential areas in Woodbridge. Under the 2000 Capital Budget, the City is proposing to replace many of the watermains, service connections and appurtenances in the Kipling area, which is expected to improve the supply of water to the homeowners.

Yellow Pine Court & Garview Court Area – Attachment No. 3

Yellow Pine Court and Garview Court are located within the upper limit of Pressure District 4 in Woodbridge. An existing pressure reducing valve at Chancellor Drive and Pine Valley Drive was recently re-built and adjusted to improve pressure to this area.

Lucky Court – Attachment No. 3

Lucky Court was originally located within Pressure District 5 in Woodbridge. Following many water pressure complaints in the area, strategic valving and the installation of several sections of watermain was carried out to switch the area into the higher Pressure District 6 zone. This greatly improved water pressure in the area.

Sylwood Crescent – Attachment No. 4

Sylwood Crescent is bisected by the boundary between Pressure Districts 6 and 7 in Maple. It is anticipated that once full build out in the area occurs, and the water system is complete, water pressures should stabilize in the area. However, if pressure complaints persist, the feasibility of switching the entire area into Pressure District 7 could be investigated.

Thornway Avenue – Attachment No. 4

Thornway Avenue is located along the upper limit of Pressure District 5 East in Thornhill. According to call reports from Public Works, internal plumbing is the main factor contributing to low water pressure in the homes in this area. The residents have been advised to have their internal plumbing checked and upgraded if possible.

Theodore Place – Attachment No. 4

Theodore Place is geographically located within Pressure District 5 East in Thornhill. Hydrant pressure tests have revealed that water pressure in this area is well within City standards. Above average household water demand seems to be a factor behind the low water pressure complaints in this area.

Woodland Acres Subdivision

The Woodland Acres Subdivision is a 210 lot residential subdivision located northeast of Maple. This subdivision was developed in the early 1980's. Recently, the residents at the north end of the Woodland Acres Subdivision raised concerns regarding low water pressure after the water supply to the area was switched from a temporary booster station to the Richmond Hill Pressure District 8 Water System.

To improve the current level of service to these residents, Council on August 28, 2000 approved a Staff recommendation that the City reimburse the affected homeowners for the cost of the supply and installation of an in-house booster pump, to a maximum of \$750 per homeowner upon receipt of satisfactory proof that a booster pump has been installed in the house. This reimbursement offer was estimated to cost about \$15,000.

Since then, residents have expressed concerns that the in-house booster pumps will be noisy, costly to operate and will be a maintenance problem to the homeowners in coming years. An alternate solution to individual in-house booster pumps could be to establish a closed water system for the affected area by means of a small booster pump station in chamber as shown on Attachment 5. Potentially, this booster station could be constructed within the Woodland Acres Court right-of-way and would only increase the pressure within the water system servicing the affected homes. The booster pump would be designed to only provide for the domestic demands of the area. Water for fire fighting purposes would be provided through the PD#8 system by way of a by-pass. The implementation of this type of system would require that a detailed design be completed and approved by the appropriate agencies, followed by a call for tenders and the ultimate construction of the system. The City would own, operate and maintain the hardware involved. A preliminary estimate of the capital costs for the booster pump station is \$125,000 including engineering. In addition, a yearly operating cost of approximately \$12,000 for hydro and maintenance would be incurred. The proposed booster pump station would remain in operation until the Regional Richmond Hill Pressure District #9 water system is extended to the area and

connected to the Woodland Acres subdivision.

In 1998, the Region of York completed its Long Term Water Supply Project Report that included a Regional Capital Works Phasing Plan for the construction of the ultimate Pressure District 9 watermain system. In this report, the establishment of the Pressure District #9 water system for Vaughan and Richmond Hill is identified as a "Strategic" project and planned to be constructed in phases. The first phase involves the extension of a trunk watermain on Bathurst Street from about King-Vaughan Road to Kirby Road by 2007. The second phase would continue this watermain westerly on Kirby Road to a future reservoir at Keele Street and King-Vaughan Road by 2031. Upon the completion of phase one, the Bathurst Street trunk watermain could be extended in a southerly direction and connected to the Woodland Acres Subdivision as shown on Attachment 5. Given the estimated cost for the proposed booster pump station and the projected timing for the extension of the Pressure District #9 water system into the area by 2007, the installation of in-house booster pumps, as previously recommended by Staff, is a more cost effective interim solution. Accordingly, it is recommended that Council reaffirm its resolution of August 28, 2000 to reimburse the affected homeowners for the cost of the supply and installation of in-house booster pumps.

Conclusion

The City of Vaughan's water distribution system provides its residents with potable water at pressures consistent with other municipalities in York Region and the GTA. In keeping with Vaughan's goal to provide a level of service that meets the needs of the residents, it is recommended that the wording of the City's Design Criteria be revised to specifically require the installation of 25 millimetre diameter water service connections in new residential developments, where static water pressures under peak hour demand periods are expected to be 310 kilopascals (45 pounds per square inch) or less, or where water service connections are 30 metres or greater in length (measured from watermain to building envelop), or where lot sizes are 500 square metres or larger.

There are other methods to increasing the water pressure at the north limit of the Woodland Acres Subdivision, however, the installation of in-house booster pumps continues to be the most cost effective interim solution as previously recommended.

Respectfully submitted by,

Approved by,

FRANK MIELE
Commissioner of Development Services

Bill Robinson, P. Eng.
Director of Engineering

Report prepared by: M. Frieri, Sr. Engineering Assistant, Eng. Planning & Studies, ext 8729
A. Pearce, Development Supervisor, Eng. Planning & Studies, ext 8235
B. Holly, Sr. Manager Development/Transportation Engineering, ext 8250

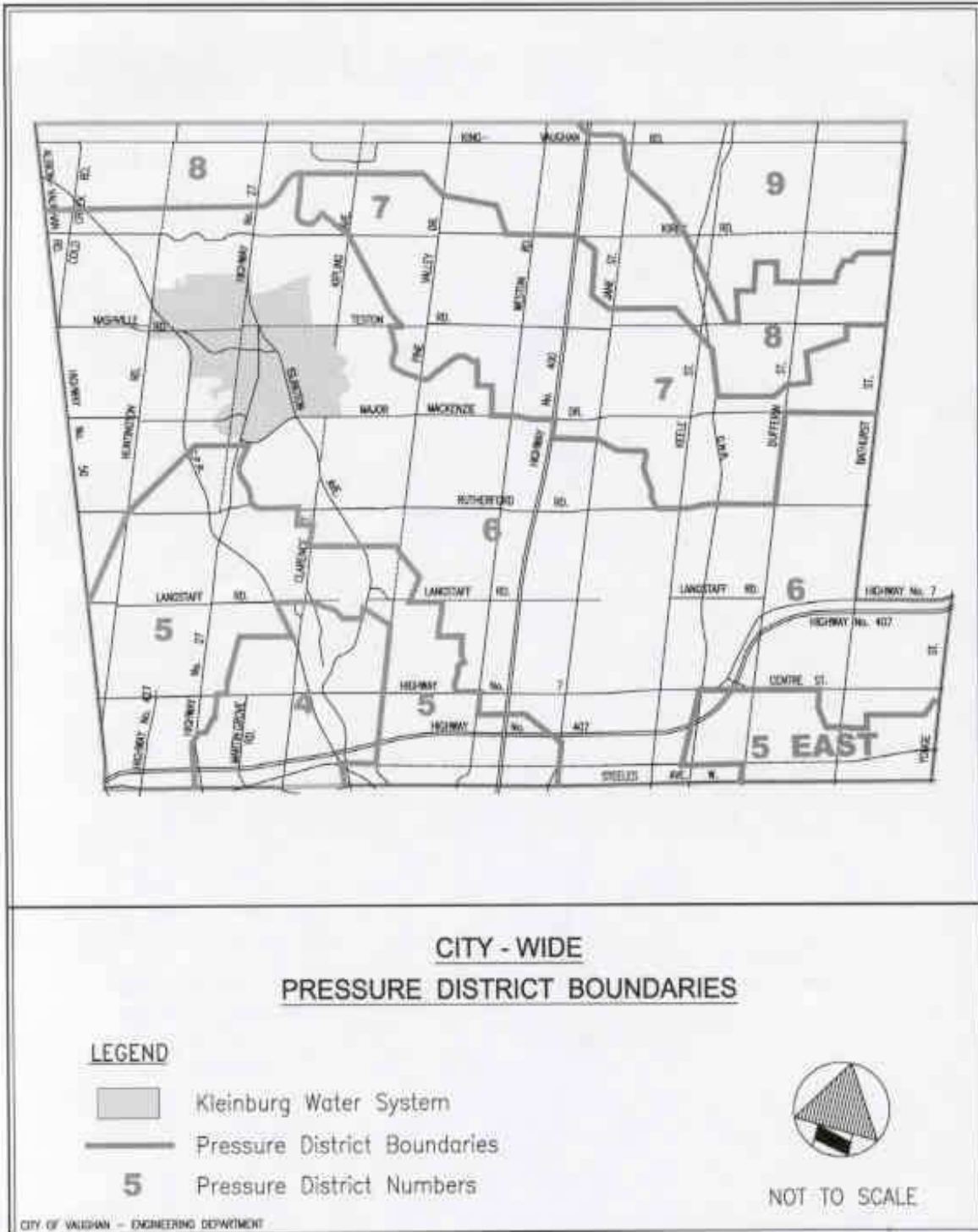
MF:ADP:BH:MR

Attachments

1. City-Wide Pressure District Boundaries
2. Typical Water Distribution System & Pressure District
3. Customer Complaint Areas - West
4. Customer Complaint Areas - East
5. Woodland Acres Booster Pump Station Alternative

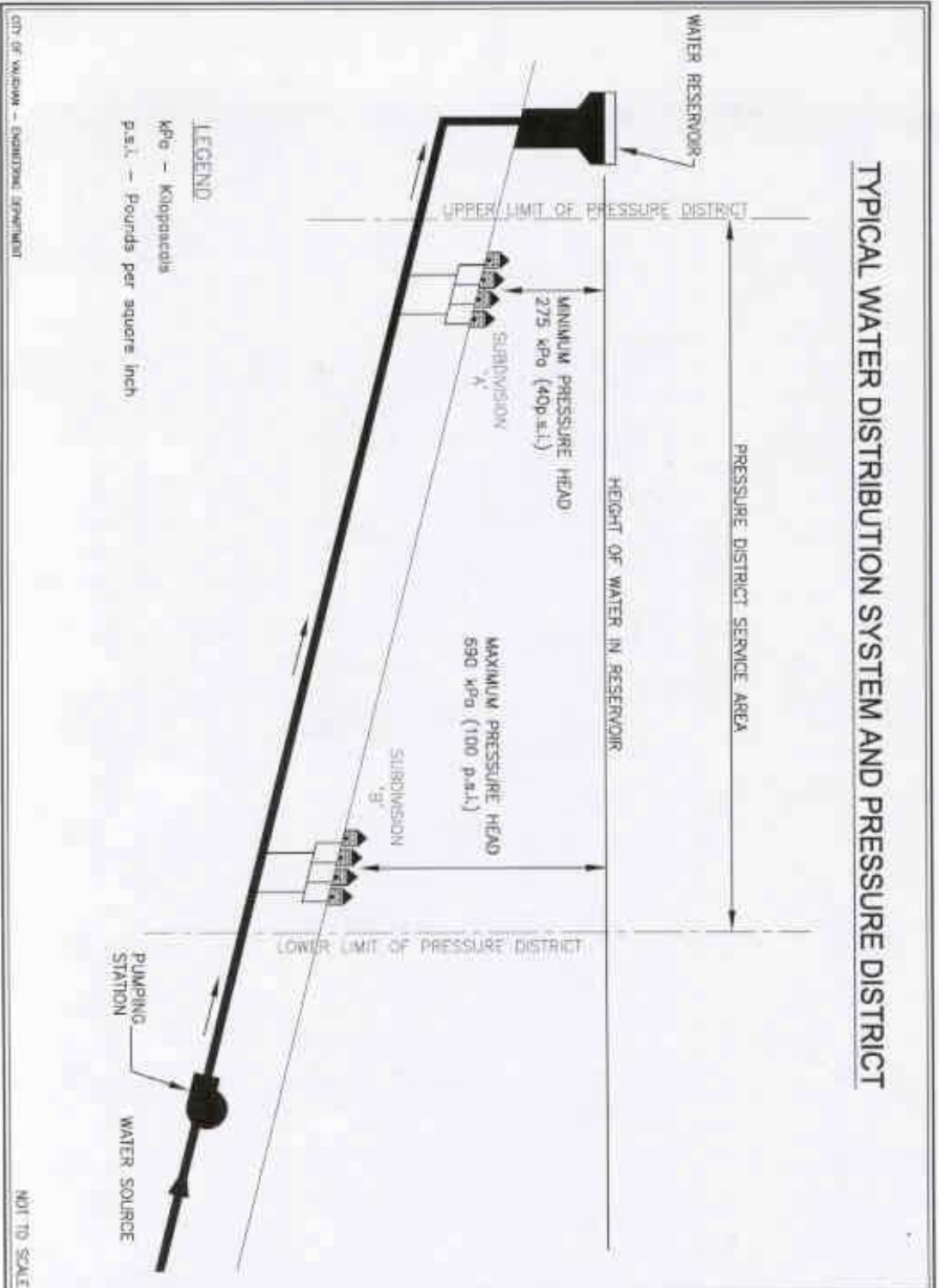
K:\Working\Frieri\city wide water pressure.doc

ATTACHMENT No. 1



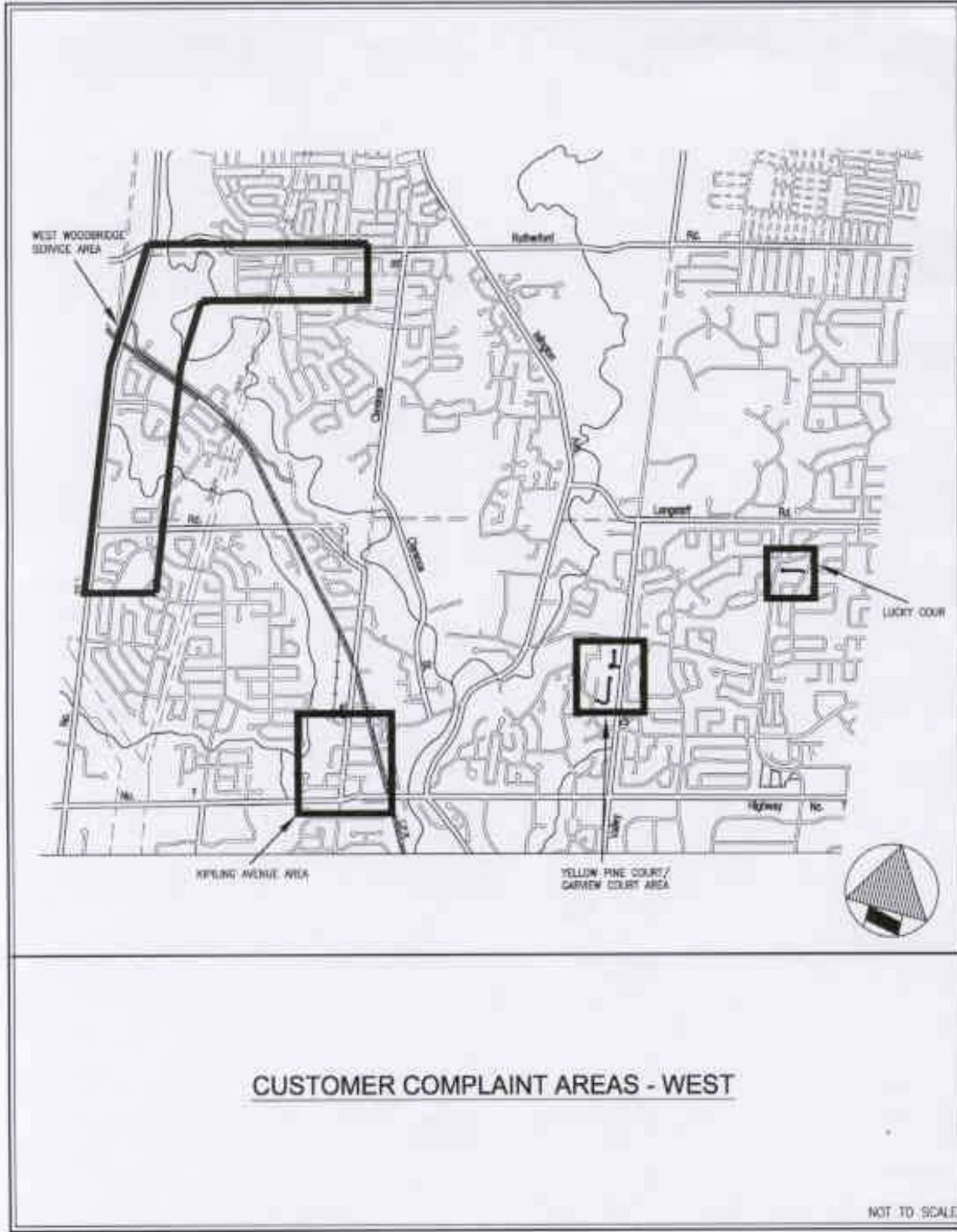
ATTACHMENT No. 2

TYPICAL WATER DISTRIBUTION SYSTEM AND PRESSURE DISTRICT



CITY OF WILSON - OPERATIONS DEPARTMENT

ATTACHMENT No. 3

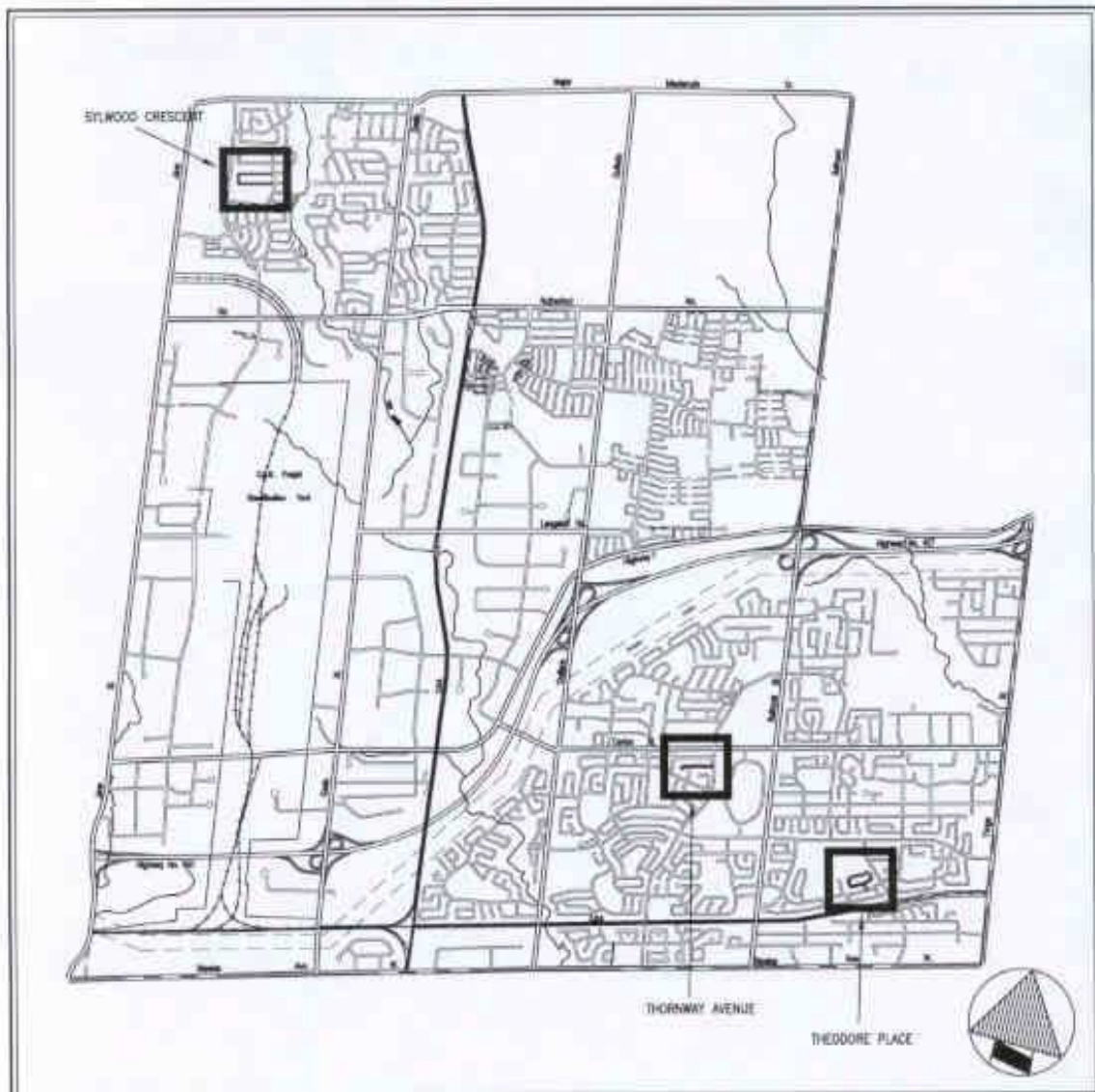


CUSTOMER COMPLAINT AREAS - WEST

NOT TO SCALE

Drawing name: C:\mainsig\020-Report\A\07s Water Pressure Study\CUSTOMP_JAINT-WEST.dwg

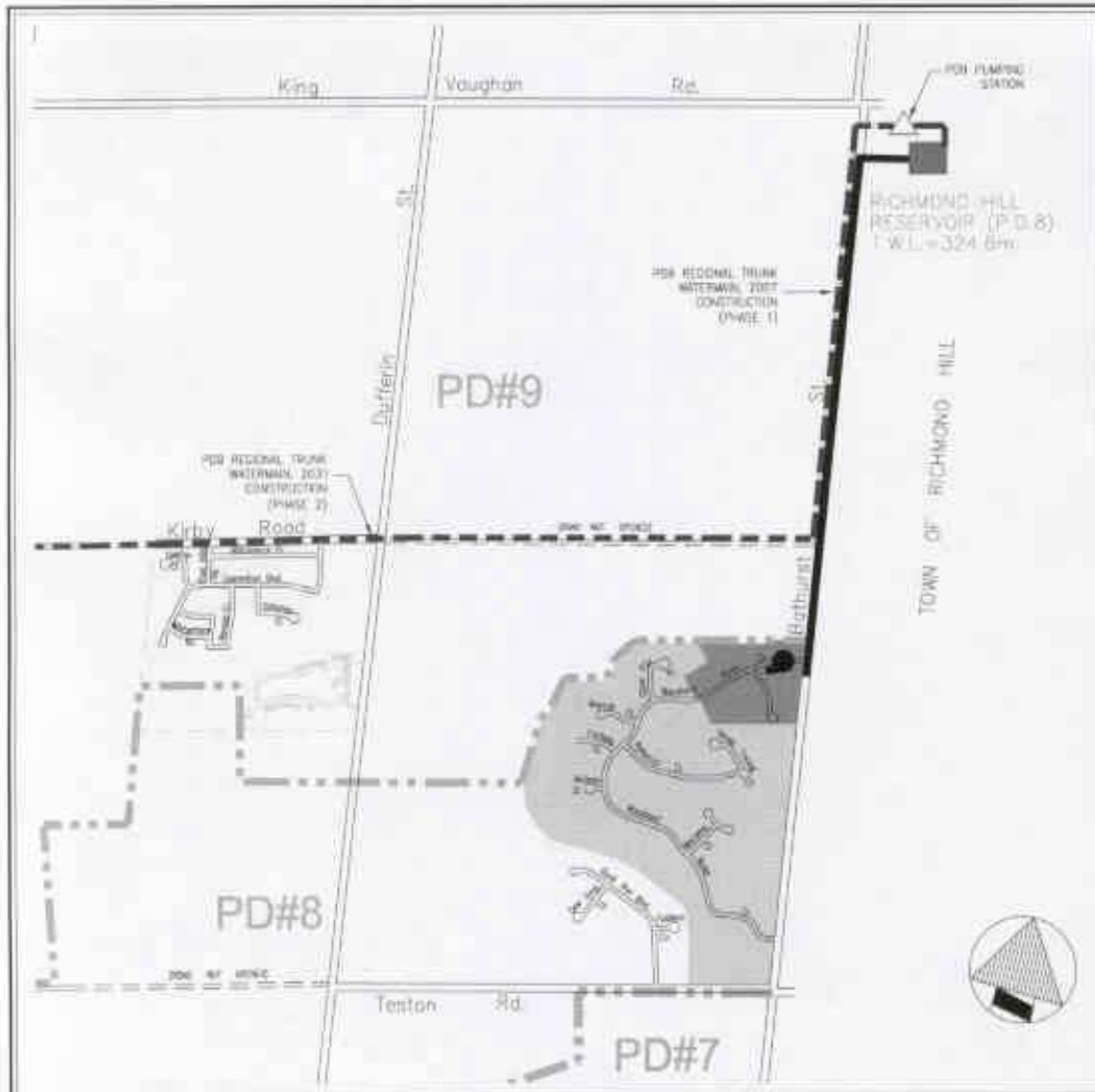
ATTACHMENT No. 4



CUSTOMER COMPLAINT AREAS - EAST

NOT TO SCALE

ATTACHMENT No. 5



WOODLAND ACRES BOOSTER PUMP STATION ALTERNATIVE

LEGEND

-  POTENTIAL BOOSTER PUMP LOCATION
-  PRESSURE DISTRICT BOUNDARY
-  EXISTING WATERMAIN
-  WOODLAND ACRES SUBDIVISION LIMITS
-  POTENTIAL BOOSTER PUMP STATION SERVICE AREA

NOT TO SCALE