# Appendix 1-8

# Capacity Requirement Calculations

UMA | AECOM

# Distribution System Modeling, Stantec Memo (January 10, 2008)

stantec.com

# Transmittal

**Stantec Consulting Ltd.**
3260 Devon Drive
Windsor ON N8X 4L4
Tel: (519) 966-2250 Fax: (519) 966-5523

Stantec

| | | | |
|---|---|---|---|
| To: | Norbert Poggio, P. Eng. | From: | Tony Berardi, P. Eng. |
| Office: | Windsor Utilities Commission | ☑ | For Your Information |
| Date: | January 10, 2008 | ☑ | For Your Approval |
| File: | 65600573 - 119 | ☑ | For Your Review |
| | | ☑ | As Requested |

**Windsor Water Supply System 2028 & 2048 Servicing Horizons**

Norbert:

Attached are revised drawing Figures 5 - 7 of the Windsor 2028 & 2048 Servicing Horizons for your review and records. The drawings show the required distribution system upgrades needed to adequately service the 2028 and 2028 demand projections respectively. Note that Figure 6 does not include the proposed Banwell reservoir whereas Figure 7 includes it.

The Figures have also been updated to include LaSalle's proposed system improvements taken from LaSalle's Bouffard-Howard Planning Study 2005 with the exception of the proposed LaSalle elevated tower.

Both figures show predicted system pressure residuals during peak hour conditions with only 1 pump on at the existing Cook PS and proposed Banwell PS (where applicable).

Also attached to the drawings are tables and graph predicting the behavior of the High lift pumps, reservoirs and elevated towers for each of the figures..

Please call me if you have any questions or require additional information.

Regards

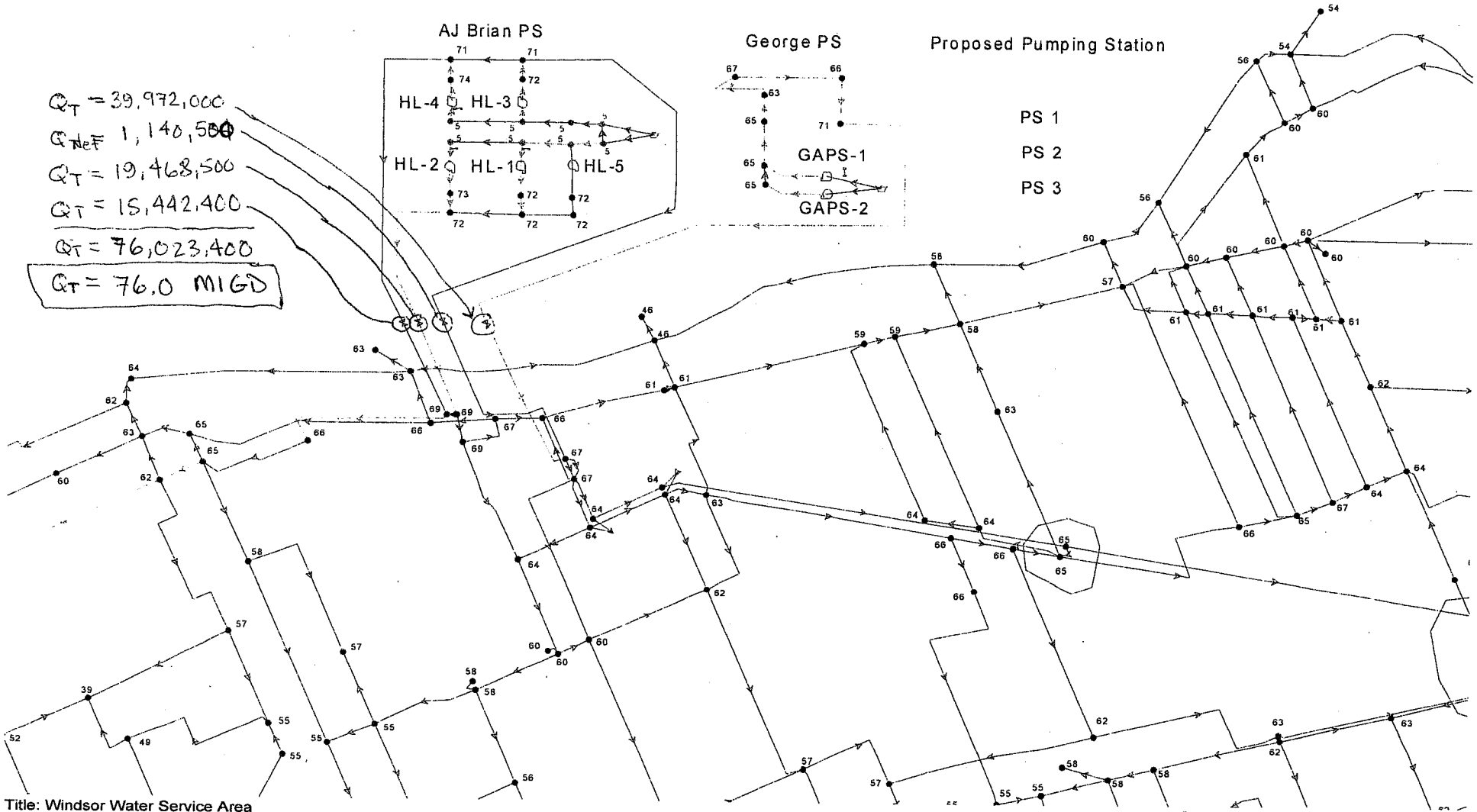
**STANTEC CONSULTING LTD.**

Tony Berardi, P. Eng.
Project Manager
Tel: (519) 966-2250
Fax: (519) 966-5523
tony.berardi@stantec.com

Attachment - 1 copy of Drawings – Figure 5, 6 & 7 including Tables & Graphs

CC – Tom Montgomery, P.Eng. – KMK Consultants – Transmittal only

# Scenario: 2018 Servicing Horizon+control from Tec Tower per KMK config Jan2008




Title: Windsor Water Service Area
r:\...\windsor_ model_(jan6,2008).wcd
01/08/08 05:27:18 PM

Stantec Consulting

37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Tony Berardi, P.Eng.
WaterCAD v5.0 [5.0032]

# Scenario: 2018 Servicing Horizon+cont... from Tec Tower per KMK config Jan2008
## Extended Period Analysis: 43.40 hr / 96.00
## Pump Report

| Label | Elevation (m) | Shutoff Head (ft) | Shutoff Discharge (gal(Imp)/min) | Design Discharge (gal(Imp)/min) | Design Head (ft) | Maximum Operating Head (ft) | Maximum Operating Discharge (gal(Imp)/min) | Control Status | Intake Pump Grade (ft) | Discharge Pump Grade (ft) | Discharge (gal(Imp)/min) | Pump Head (ft) | Calculated Water Power (kW) | Active? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AJ Brian (Pump 1) | 182.545 | 202.4 | 0.0 | 13,367.1 | 133.0 | 0.0 | 26,734.3 | On | 594.0 | 764.1 | 8,153.3 | 170.1 | 313.51 | true |
| AJ Brain (Pump 2) | 182.533 | 218.7 | 0.0 | 11,747.6 | 160.0 | 0.0 | 23,495.3 | On | 593.9 | 768.7 | 10,081.9 | 174.8 | 398.29 | true |
| AJ Brian (Pump 3) | 182.682 | 209.0 | 0.0 | 10,213.8 | 146.5 | 0.0 | 20,427.7 | On | 594.2 | 762.7 | 7,957.9 | 168.5 | 303.15 | true |
| AJ Brian (Pump 4) | 182.219 | 205.7 | 0.0 | 14,521.7 | 142.7 | 0.0 | 29,043.3 | On | 594.2 | 779.4 | 7,520.1 | 185.2 | 314.86 | true |
| AJ Brian Diesel Standby P | 182.682 | 200.0 | 0.0 | 21,973.4 | 165.0 | 74.0 | 40,477.2 | Off | 594.1 | 755.3 | 0.0 | 0.0 | 0.00 | true |
| Cook Pump 1 | 184.214 | 163.0 | 0.0 | 2,081.7 | 150.0 | 86.0 | 4,996.0 | On | 619.2 | 715.5 | 4,655.3 | 96.3 | 101.34 | true |
| Cook Pump 2 | 184.214 | 188.0 | 0.0 | 5,551.2 | 130.0 | 98.0 | 7,077.7 | Off | 619.2 | 715.5 | 0.0 | 0.0 | 0.00 | true |
| Cook Pump 3 | 184.214 | 190.0 | 0.0 | 6,939.0 | 130.0 | 110.0 | 8,326.7 | Off | 619.2 | 715.5 | 0.0 | 0.0 | 0.00 | true |
| GAPS (Pump 1) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 765.0 | 13,388.5 | 170.0 | 514.50 | true |
| GAPS (Pump 2) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 765.0 | 13,387.9 | 170.0 | 514.50 | true |

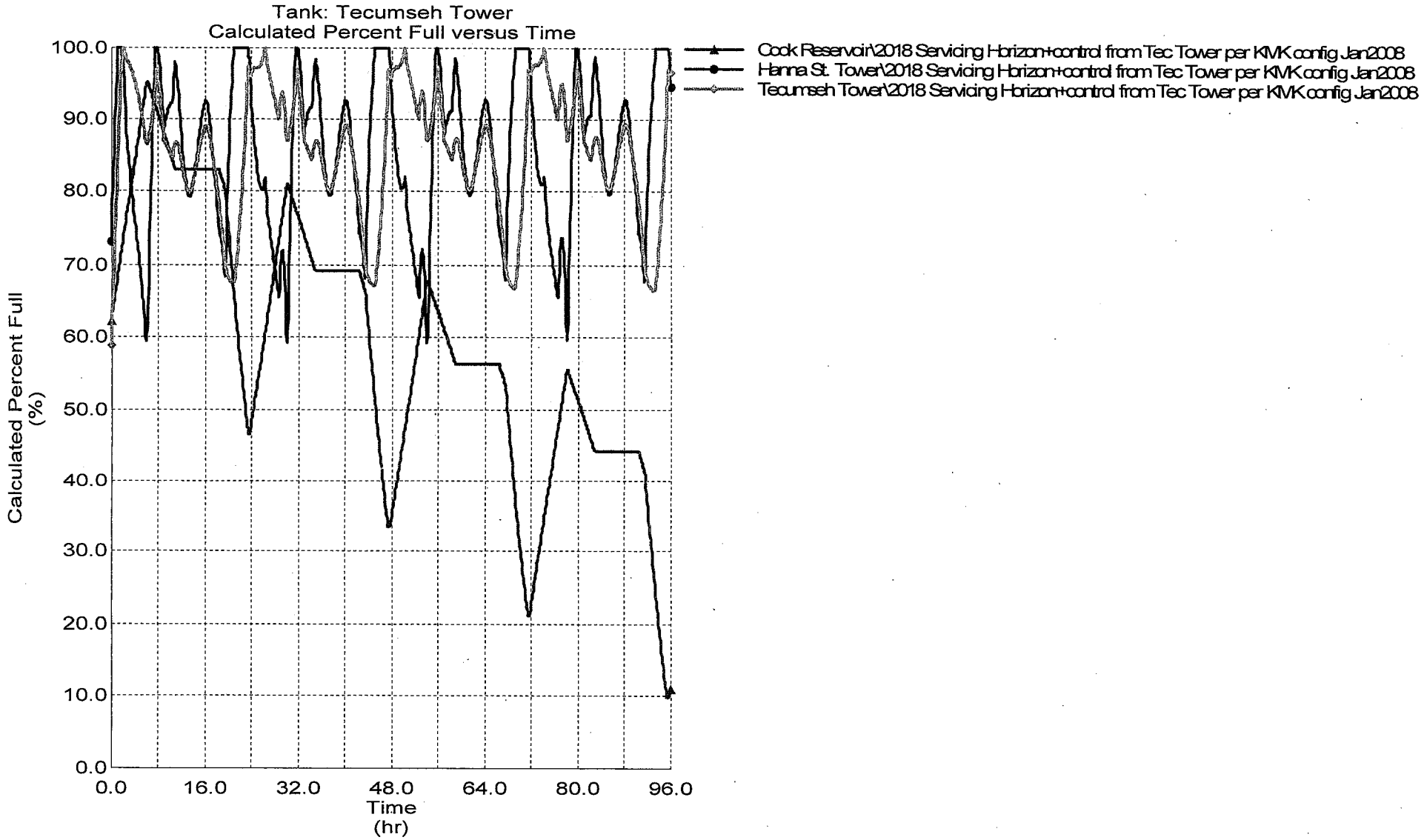
# Scenario: 2018 Servicing Horizon+contr.. from Tec Tower per KMK config Jan2008
## Extended Period Analysis: 43.50 hr / 96.00
## Pump Report

| Label | Elevation (m) | Shutoff Head (ft) | Shutoff Discharge (gal(Imp)/min) | Design Discharge (gal(Imp)/min) | Design Head (ft) | Maximum Operating Head (ft) | Maximum Operating Discharge (gal(Imp)/min) | Control Status | Intake Pump Grade (ft) | Discharge Pump Grade (ft) | Discharge (gal(Imp)/min) | Pump Head (ft) | Calculated Water Power (kW) | Active? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AJ Brian (Pump 1) | 182.545 | 202.4 | 0.0 | 13,367.1 | 133.0 | 0.0 | 26,734.3 | On | 594.0 | 764.8 | 8,045.2 | 170.8 | 310.55 | true |
| AJ Brain (Pump 2) | 182.533 | 218.7 | 0.0 | 11,747.6 | 160.0 | 0.0 | 23,495.3 | On | 593.9 | 769.4 | 10,000.0 | 175.4 | 396.58 | true |
| AJ Brian (Pump 3) | 182.682 | 209.0 | 0.0 | 10,213.8 | 146.5 | 0.0 | 20,427.7 | On | 594.2 | 763.4 | 7,874.9 | 169.2 | 301.29 | true |
| AJ Brian (Pump 4) | 182.219 | 205.7 | 0.0 | 14,521.7 | 142.7 | 0.0 | 29,043.3 | On | 594.2 | 779.8 | 7,439.4 | 185.6 | 312.11 | true |
| AJ Brian Diesel Standby P | 182.682 | 200.0 | 0.0 | 21,973.4 | 165.0 | 74.0 | 40,477.2 | Off | 594.1 | 756.2 | 0.0 | 0.0 | 0.00 | true |
| Cook Pump 1 | 184.214 | 163.0 | 0.0 | 2,081.7 | 150.0 | 86.0 | 4,996.0 | On | 618.7 | 731.7 | 4,040.8 | 113.0 | 103.20 | true |
| Cook Pump 2 | 184.214 | 188.0 | 0.0 | 5,551.2 | 130.0 | 98.0 | 7,077.7 | On | 618.7 | 731.7 | 6,399.2 | 113.0 | 163.46 | true |
| Cook Pump 3 | 184.214 | 190.0 | 0.0 | 6,939.0 | 130.0 | 110.0 | 8,326.7 | Off | 618.8 | 731.7 | 0.0 | 0.0 | 0.00 | true |
| GAPS (Pump 1) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 765.8 | 13,320.0 | 170.8 | 514.28 | true |
| GAPS (Pump 2) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 765.8 | 13,319.4 | 170.8 | 514.28 | true |

# Scenario: 2018 Servicing Horizon+cont... from Tec Tower per KMK config Jan2008
## Extended Period Analysis: 43.58 hr / 96.00
## Pump Report

| Label | Elevation (m) | Shutoff Head (ft) | Shutoff Discharge (gal(Imp)/min) | Design Discharge (gal(Imp)/min) | Design Head (ft) | Maximum Operating Head (ft) | Maximum Operating Discharge (gal(Imp)/min) | Control Status | Intake Pump Grade (ft) | Discharge Pump Grade (ft) | Discharge (gal(Imp)/min) | Pump Head (ft) | Calculated Water Power (kW) | Active? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AJ Brian (Pump 1) | 182.545 | 202.4 | 0.0 | 13,367.1 | 133.0 | 0.0 | 26,734.3 | On | 594.0 | 765.4 | 7,943.4 | 171.4 | 307.73 | true |
| AJ Brain (Pump 2) | 182.533 | 218.7 | 0.0 | 11,747.6 | 160.0 | 0.0 | 23,495.3 | On | 594.0 | 770.0 | 9,923.0 | 176.1 | 394.94 | true |
| AJ Brian (Pump 3) | 182.682 | 209.0 | 0.0 | 10,213.8 | 146.5 | 0.0 | 20,427.7 | On | 594.2 | 764.1 | 7,796.6 | 169.9 | 299.50 | true |
| AJ Brian (Pump 4) | 182.219 | 205.7 | 0.0 | 14,521.7 | 142.7 | 0.0 | 29,043.3 | On | 594.2 | 780.1 | 7,363.3 | 185.9 | 309.50 | true |
| AJ Brian Diesel Standby P | 182.682 | 200.0 | 0.0 | 21,973.4 | 165.0 | 74.0 | 40,477.2 | Off | 594.2 | 757.1 | 0.0 | 0.0 | 0.00 | true |
| Cook Pump 1 | 184.214 | 163.0 | 0.0 | 2,081.7 | 150.0 | 86.0 | 4,996.0 | On | 618.0 | 747.3 | 3,329.8 | 129.2 | 97.28 | true |
| Cook Pump 2 | 184.214 | 188.0 | 0.0 | 5,551.2 | 130.0 | 98.0 | 7,077.7 | On | 618.0 | 747.3 | 5,590.4 | 129.3 | 163.35 | true |
| Cook Pump 3 | 184.214 | 190.0 | 0.0 | 6,939.0 | 130.0 | 110.0 | 8,326.7 | On | 618.0 | 747.3 | 6,992.1 | 129.3 | 204.34 | true |
| GAPS (Pump 1) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 766.5 | 13,255.6 | 171.5 | 514.04 | true |
| GAPS (Pump 2) | 185.890 | 259.0 | 0.0 | 12,272.8 | 182.6 | 0.0 | 24,545.7 | On | 595.0 | 766.5 | 13,254.9 | 171.5 | 514.04 | true |

# Graph


Tank: Tecumseh Tower
Calculated Percent Full versus Time
Cook Reservoir\2018 Servicing Horizon+control from Tec Tower per KMK config Jan2008
Hanna St. Tower\2018 Servicing Horizon+control from Tec Tower per KMK config Jan2008
Tecumseh Tower\2018 Servicing Horizon+control from Tec Tower per KMK config Jan2008
Calculated Percent Full (%)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0.0
16.0
32.0
48.0
64.0
80.0
96.0
Time (hr)

Stantec Consulting Ltd.
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Windsor ON N8X 4L4
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stantec.com



Stantec

November 19, 2007
File: 165600927

Ontario Ministry of Environment
Safe Drinking Water Branch
Approvals and Licensing
2 St. Clair Ave. W. 19th Flr
Toronto, ON M4V1L5

**Attention: Ms. Indra Prashad, Manager**

Dear Ms. Prashad:

**Reference: Windsor Utilities Commission**
**Class EA Banwell Reservoir**

We have been retained by the Windsor Utilities Commission (WUC) for the subject project and have undertaken to determine the treated water storage requirements in accordance with the MOE Design Guidelines for Drinking Water Systems, i.e. *Total Treated Water Storage Requirement = A + B + C, where A = Fire Storage; B = Equalization Storage (25% of maximum day demand): and, C = Emergency Storage (25% of A + B), and where Maximum day Demand = Average Day Demand x Maximum Day Factor.* The Guidelines also state *"The above equation is for the calculation of the storage needs for a system where the water supply system is capable of satisfying only the maximum day demand. For situations where the water supply system can supply more, the storage requirements can be reduced accordingly."*

Attached are Table 1.2, Summary of Projected Water Usage for the WUC Water Service Area, and Table 1.6, Summary of Projected System Storage Requirements for the WUC Water Service Area (based on the MOE formula). Also attached is Figure 1.1, showing graphs for the projected water storage requirements, projected maximum day demand, existing storage and treatment capacity. It can be seen that the existing storage capacity currently exceeds the water storage requirement based on the MOE formula. It can also be seen that the graph for projected storage requirements according to the MOE formula and the graph for existing storage capacity intersect at year 2009. This suggests that additional storage would be required in the year 2009. Also shown is the graph for "effective storage" which represents the existing storage plus the excess treatment capacity (the difference between the projected maximum day demand and the existing treatment capacity). It can be seen that the graph for "effective storage" and the graph for projected storage requirements according to the MOE formula intersect at the year 2018. This suggests that the need for additional storage would not occur until the year 2018. This is obviously very significant and important because it would allow the WUC to defer capital expenditure on additional storage capacity until the year 2018 provided population projections are realized.

**Reference: Windsor Utilities Commission**
**Class EA Banwell Reservoir**

The WUC is in the process of undertaking to update its Water Supply Master Plan, which would include a timetable for capital projects for expanding and upgrading its system, and is seeking confirmation from the MOE that it is properly following the MOE Guidelines in utilizing the excess treatment capacity to supplement existing storage capacity.

Sincerely,

**STANTEC CONSULTING LTD.**

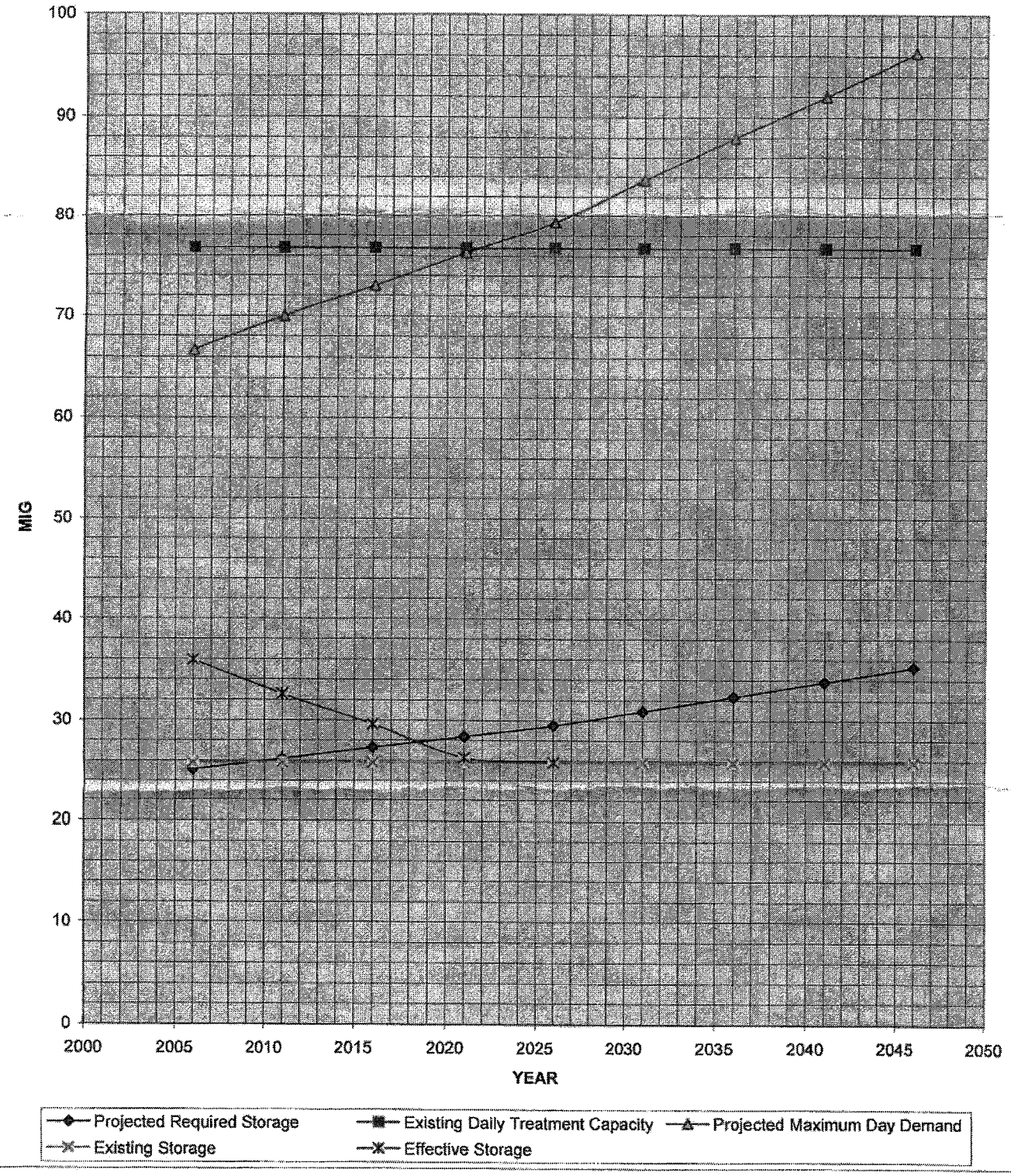
Dino Buratto, P. Eng.
Senior Consultant
Tel: (519) 966-2250
Fax: (519) 966-5523
dino.buratto@stantec.com

Attachment: Figure 1.1, Table 1.2, Table 1.6

c. WUC, Attn: Norbert Poggio, P. Eng.

d w:\active\165600927_class_ea_banwell_water_storage_reservoir\task200-class ea\project_management\letter to moe re storage requirements.doc

**Figure 1.1**
**WUC STORAGE REQUIREMENTS**



## Table 1.2 - Summary of Projected Water Usage for the WUC Water Service Area

| Year | 2001 | 2002 | 2003 | 2004 | 2005 | 5-Yr Avg | 2006 | 2026 | 2046 |
|---|---|---|---|---|---|---|---|---|---|
| **Service Population (persons)** | | | | | | | | | |
| Windsor* | 211,425 | 214,223 | 216,232 | 218,240 | 220,249 | | 222,430 | 252,880 | 286,330 |
| Tecumseh WTP | 20,171 | 20,793 | 21,415 | 22,037 | 22,659 | | 23,281 | 38,725 | 50,763 |
| LaSalle | 25,285 | 26,031 | 26,771 | 27,330 | 27,747 | | 28,491 | 38,746 | 57,300 |
| **Total** | **256,881** | **261,047** | **264,418** | **267,607** | **270,655** | | **274,202** | **330,351** | **394,393** |
| **Annual Water Usage ML (MIG)** | | | | | | | | | |
| Windsor | 57,716 (12,713) | 58,946 (12,984) | 55,663 (12,260) | 55,026 (12,120) | 57,361 (12,635) | 56,942 (12,542) | 58,617 (12,911) | 66,641 (14,679) | 75,457 (16,620) |
| LaSalle | 3,483 (767) | 3,517 (775) | 3,120 (687) | 3,353 (739) | 3,874 (853) | 3,470 (764) | 3,713 (818) | 5,049 (1,112) | 7,466 (1,645 |
| Tecumseh | 3,657 (805) | 3,903 (860) | 4,031 (888) | 3,845 (847) | 4,300 (947) | 3,947 (869) | 4,150 (914) | 7,034 (1,549) | 11,863 (2,613) |
| **Total** | **64,856 (14,285)** | **66,367 (14,285)** | **62,814 (13,836)** | **62,224 (13,706)** | **65,536 (14,435)** | **64,359 (14,176)** | **66,480 14,643)** | **78,724 (17,340)** | **94,786 (20,878)** |
| **Maximum Day ML (MIG)** | | | | | | | | | |
| Windsor + LaSalle | 275.63 (60.71) | 279.62 (61.59) | 237.49 (52.31) | 226.10 (49.80) | 259.80 (57.22) | 255.73 (56.33) | 280.05 (61.68) | 322.11 (70.96) | 372.59 (82.08) |
| Tecumseh** | 21.28 (4.69) | 22.23 (4.90) | 21.38 (4.71) | 20.13 (4.43) | 22.63 (4.98) | 21.53 (4.74) | 22.74 (5.01) | 38.54 (8.49) | 65.00 (14.32) |
| **Total** | **296.91 (65.40)** | **301.85 (66.49)** | **258.87 (57.02)** | **246.23 (54.23)** | **282.43 (62.20)** | **277.26 (61.07)** | **302.79 (66.69)** | **360.65 (79.45)** | **437.59 (96.40)** |
| **Average Day ML (MIG)** | | | | | | | | | |
| Windsor | 158.13 (34.83) | 161.50 (35.57) | 152.50 (33.59) | 150.34 (33.12) | 157.15 (34.62) | 155.92 (34.34) | 160.59 (35.37) | 182.58 (40.22) | 206.73 (45.45) |
| LaSalle | 9.54 (2.10) | 9.64 (2.12) | 8.55 (1.88) | 9.16 (2.02) | 10.61 (2.34) | 9.50 (2.09) | 10.17 (2.24) | 13.83 (3.05) | 20.46 (4.51) |
| Tecumseh | 10.02 (2.21) | 10.69 (2.35) | 11.04 (2.43) | 10.53 (2.32) | 11.78 (2.59) | 10.81 (2.38) | 11.37 (2.50) | 19.27 (4.24) | 32.50 (7.16) |
| **Total** | **177.69 (39.14)** | **181.82 (40.04)** | **172.09 (37.90)** | **170.03 (37.45)** | **179.55 (39.54)** | **176.24 (38.81)** | **182.13 (40.11)** | **215.68 (47.51)** | **259.69 (57.21)** |
| **Max Day / Average Day** | | | | | | | | | |
| Windsor + LaSalle | 1.64 | 1.63 | 1.47 | 1.42 | 1.55 | 1.54 | 1.64 | 1.64 | 1.64 |
| Tecumseh*** | 2.12 | 2.08 | 1.94 | 1.91 | 1.92 | 1.99 | 2.00 | 2.00 | 2.00 |
| **Average Per Capita L/d (Igal/d)** | | | | | | | | | |
| Windsor | 748 (165) | 754 (166) | 705 (155) | 689 (152) | 714 (157) | 722 (159) | 722 (159) | 722 (159) | 722 (159) |
| LaSalle | 377 (83) | 370 (82) | 319 (70) | 335 (74) | 383 (84) | 357 (79) | 357 (79) | 357 (79) | 357 (79) |
| Tecumseh*** | 497 (109) | 514 (113) | 516 (114) | 478 (105) | 520 (115) | 505 (111) | 488 (108) | 498 (110) | 640 (141) |

**Includes serviced population in South Tecumseh Water Service Area*

***Max day demands for 2006, 2026 & 2046 determined from information provided in 2005 Tecumseh Water Master Plan Addendum*

****Ratio for future demands taken from 2002 Tecumseh Water Master Plan*

**Table 1.6 - Summary of Projected System Storage Requirements for the WUC Water Service Area**

| *Year* | *Fire ML(MIG)* | *Equalization ML(MIG)* | *Emergency ML(MIG)* | *In-Plant Use ML(MIG)* | *Total ML(MIG)* |
|---|---|---|---|---|---|
| 2006 | 8.16 (1.80) | 75.70 (16.67) | 20.97 (4.62) | 9.08 (2.00) | 113.91 (25.09) |
| 2011 | 8.16 (1.80) | 79.31 (17.47) | 21.87 (4.82) | 9.52 (2.10) | 118.87 (26.18) |
| 2016 | 8.16 (1.80) | 82.93 (18.27) | 22.77 (5.02) | 9.95 (2.19) | 123.82 (27.28) |
| 2021 | 8.16 (1.80) | 86.55 (19.07) | 23.68 (5.22) | 10.39 (2.29) | 128.77 (28.37) |
| 2026 | 8.16 (1.80) | 90.16 (19.86) | 24.58 (5.42) | 10.82 (2.38) | 133.72 (29.46) |
| 2031 | 8.16 (1.80) | 94.97 (20.92) | 25.78 (5.68) | 11.40 (2.51) | 140.32 (30.91) |
| 2036 | 8.16 (1.80) | 99.78 (21.98) | 26.99 (5.95) | 11.97 (2.64) | 146.90 (32.36) |
| 2041 | 8.16 (1.80) | 104.59 (23.04) | 28.19 (6.21) | 12.55 (2.76) | 153.49 (33.82) |
| 2046 | 8.16 (1.80) | 109.40 (24.10) | 29.39 (6.48) | 13.13 (2.89) | 160.07 (35.27) |

Thursday, December 6, 2007

THE WINDSOR STAR

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1322 Legals 1322 Legals

WINDSOR UTILITIES COMMISSION

## CLASS ENVIRONMENTAL ASSESSMENT BANWELL WATER STORAGE RESERVOIR NOTICE OF DEFERRAL

The Windsor Utilities Commission (WUC) published a Notice of Commencement for this Class Environmental Assessment (Class EA) on June 10, 2006. A review of the storage capacity in the WUC system has shown that the existing storage capacity meets the current requirements of the Guidelines of the Ministry of Environment (MOE). However, there will be a need for additional storage capacity at some time in the future. Although this Class EA was initiated for the purpose of seeking approval for the construction of a reservoir on Banwell Road, there is no immediate need for this reservoir. Accordingly, this Class EA is being deferred until further notice.

In conjunction with plans to update the WUC Water Supply Master Plan, additional studies will be carried out to determine the capacity, sites and construction schedule for future reservoirs. It is the intention of the WUC to reactivate this Class EA when the foregoing studies have been completed and the construction of additional reservoir capacity is required.

For additional information, please contact:
Director, Water Engineering
Windsor Utilities Commission
4545 Rhodes Dr. P.O. Box 1625, Stn. "A"
Windsor, ON N9A 5T7 519-255-2727

## Executive Summary

The Windsor Utilities Commission (WUC) manages and controls the treatment and distribution of water to the City of Windsor, Town of LaSalle and the Town of Tecumseh. The total serviced population is approximately 274,000 persons. The WUC water system draws raw water from the Detroit River through two intake pipes that are connected to the A. J. Brian Pump Station where low lift pumps deliver raw water to two nearby treatment facilities located on Wyandotte Street East between Tribune Avenue and George Avenue. The total capacity of the treatment facilities is 349 Mealtimes per Day (MLD) or 76.8 Million Imperial Gallons per Day (MIGD). Treated water is pumped from storage and distributed through a network of 1,100 Km of pipes by high lift pumping facilities located at the A. J. Bran Pump Station, the neighboring George Avenue Pump Station and the J. F. Cook Reservoir and Pump Station located on Howard Avenue in the southwest sector of the City of Windsor. Treated water is stored in an underground reinforced concrete structure at the J. F. Cook Reservoir & Pump Station, and also at an underground reinforced concrete reservoir at the water treatment facilities. In addition, treated water is stored in an elevated steel water tower on Hanna Street in Windsor and in a second elevated steel water tower in Tecumseh. The Hanna Tower serves to protect the system from pressure transients while maintaining proper pressures in the water system while the Tecumseh Tower is also used for system control purposes. The total treated water storage capacity is 117.1 Mealtimes (ML) or 25.8 Million Imperial Gallons (MIG).

In October 2004, the City of Windsor and the Town of Tecumseh entered into an agreement whereby the WUC would supply water to meet the current and future needs of the Town for the next 50 years. In the agreement, the WUC acknowledges that the Barnwell Road Reservoir and Pump Station is required to meet the future servicing needs of Tecumseh and agrees to proceed in 2004 with the Class Environmental Assessment (Class EA), following which it will employ its best efforts to commence construction of this project for completion in 2006. This timetable has not been met but this Class EA is indicative of the WUC plans to comply with the intent of the agreement.

To ensure that a degree of standardization is followed throughout the Province, a Class Environmental Assessment (Class EA) procedure is followed for projects which require approval under the Environmental Assessment Act (EA Act) but which are not considered to be major environmental works. There are three approval mechanisms, identified as Schedule A, B and C, available to a proponent under the Class EA. The construction of a reservoir and pump station is categorized as a Schedule B project and the proponent is required to undertake a screening process, involving mandatory contact with directly affected public and relevant review agencies to ensure they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, the project is approved and the proponent may proceed to implementation. As a Schedule B project, Phases 1 and 2 of the Class EA process must be completed. Phase 1 involves the identification of the problem and Phase 2 involves the identification of alternative solutions to the problem, consultation with review agencies and the public, selection of the preferred solution and confirmation of the Schedule for the project.

In order to identify and clarify the problem, it was necessary to determine the required storage capacity on the basis of Ontario Ministry of the Environment Guidelines for sizing water storage facilities. The Guidelines are based on a formula that considers storage for fire protection; equalization storage to provide water during those periods when peak demands exceed treatment capacity; and emergency storage which provides water during an emergency situation that would seriously affect the production and distribution of treated water to the service area. The formula applies where the treatment plant is capable of satisfying only the maximum day demand. For situations were the treatment plant can supply more, the storage requirements can be reduced accordingly.

Projections of population growth and corresponding future water demands based on historic data over the past five years indicate that additional storage capacity in the order of 45.4 ML (10.0 MIG) would be required in the future. Since the capacity of the existing treatment facilities exceeds the current maximum day demand, it was determined that additional storage will not be required until the year 2018. The timing for the construction of the reservoir could change if area growth and water demands should vary significantly from the projections. Accordingly, the problem statement for this Class EA is as follows:

The existing treated water storage facilities together with the excess capacity at the water treatment facilities satisfy the storage requirements of the MOE Guidelines at the present time and should continue to do so until the year 2018. However, there is insufficient storage capacity to meet the projected future needs of the water service area beyond 2018.

The following alternative solutions to the problem of inadequate storage capacity to meet the future needs of the water service area were identified and evaluated.

1. Do nothing
2. Restrict community growth
3. Expand and upgrade existing high lift pumping facilities
4. Construct additional transmission mains in the distribution system
5. Construct additional elevated storage facilities
6. Construct additional local ground storage reservoir at water treatment plant
7. Construct additional remote ground storage reservoir and booster pump station in distribution system
8. Construct additional local and remote ground storage reservoirs
9. Construct two additional remote ground storage reservoirs
10. Expand existing J.F. Cook Reservoir & Booster Pump Station

11. Construct new raw water storage reservoir

12. Reactivate the Tecumseh WTP reservoir and high lift pumps

Following a detailed examination and evaluation of the alternative solutions, the recommended alternative solution is the construction of a 45.4 ML (10.0 MIG) in-ground reservoir and booster pump station in the Banwell Road corridor south of County Road No. 22. Current projections of growth in the service area indicate the reservoir will be required by the year 2018. However, regular reviews of the storage requirements should be carried out to confirm the timing for implementing additional storage. With respect to the reservoir site, consideration of other sites could be warranted by changing circumstances in the service area. The issue of the reservoir timing and site location may be addressed further, if and when the WUC undertakes to update its Water Master Plan.

With respect to the environment, it is anticipated that the recommended alternative solution presented above will not have any significant effect on wildlife, vegetation or the habitat characteristics of any particular specifies. The main impact on the socio-economic environment is related to the disruption that residents may experience during the course of construction. However, this inconvenience and disruption will only be temporary and should not significantly impact the environment.

With respect to other socio-economic impacts, it is anticipated that the recommended alternative solution will not have any serious impact on existing land uses, cultural activities, heritage resources or any other community program. In fact, it is anticipated that the recommended solution will permit the ongoing implementation of development and other activities as envisaged in planning documents that have positive impacts on the socio-economic development.

The construction of an in-ground storage reservoir and booster pump station in the Banwell Road corridor is considered to be a Schedule "B" undertaking and after due notification to the public and review agencies can proceed without further public participation if no Part II order is requested from the Minister within 30 days of such notification.

The following public consultation program was undertaken in accordance with the requirements of the Class EA document for a Schedule B project:

On June 10, 2006, a Notice of Study Commencement was published in the Windsor Star that informed the public of the project and invited public comment. There were no responses from the public to the Notice. On June 13, 2006 a copy of the Notice of Study Commencement was mailed to a number of Review Agencies and other contacts with a covering letter. Inquiries were received from the Windsor-Essex Catholic District School Board and The Essex Region Conservation Authority and responses to these inquiries were provided by Stantec Consulting Ltd.

At the time of preparation of this Draft Report, the balance of the public consultation program was not completed. It is intended to include the following:

- Publish Notice of Open House in Windsor Star inviting public to attend
- Notify Review Agencies and other contacts re Open House and provide information package summarizing Draft Phase 1 & 2 Report
- Hold Open House with representatives of Stantec and WUC in attendance to
  - explain the Class EA process
  - distribute information package
  - answer questions and receive public input
- Receive comments from Review Agencies and other contacts
- Publish Notice of Completion of Study in Windsor Star

During the 30-day review period following the Notice of Completion, concerns expressed by the public and review agencies will be addressed and upon resolution of these concerns, the Phase 1 & 2 Report will be finalized and presented to the WUC.

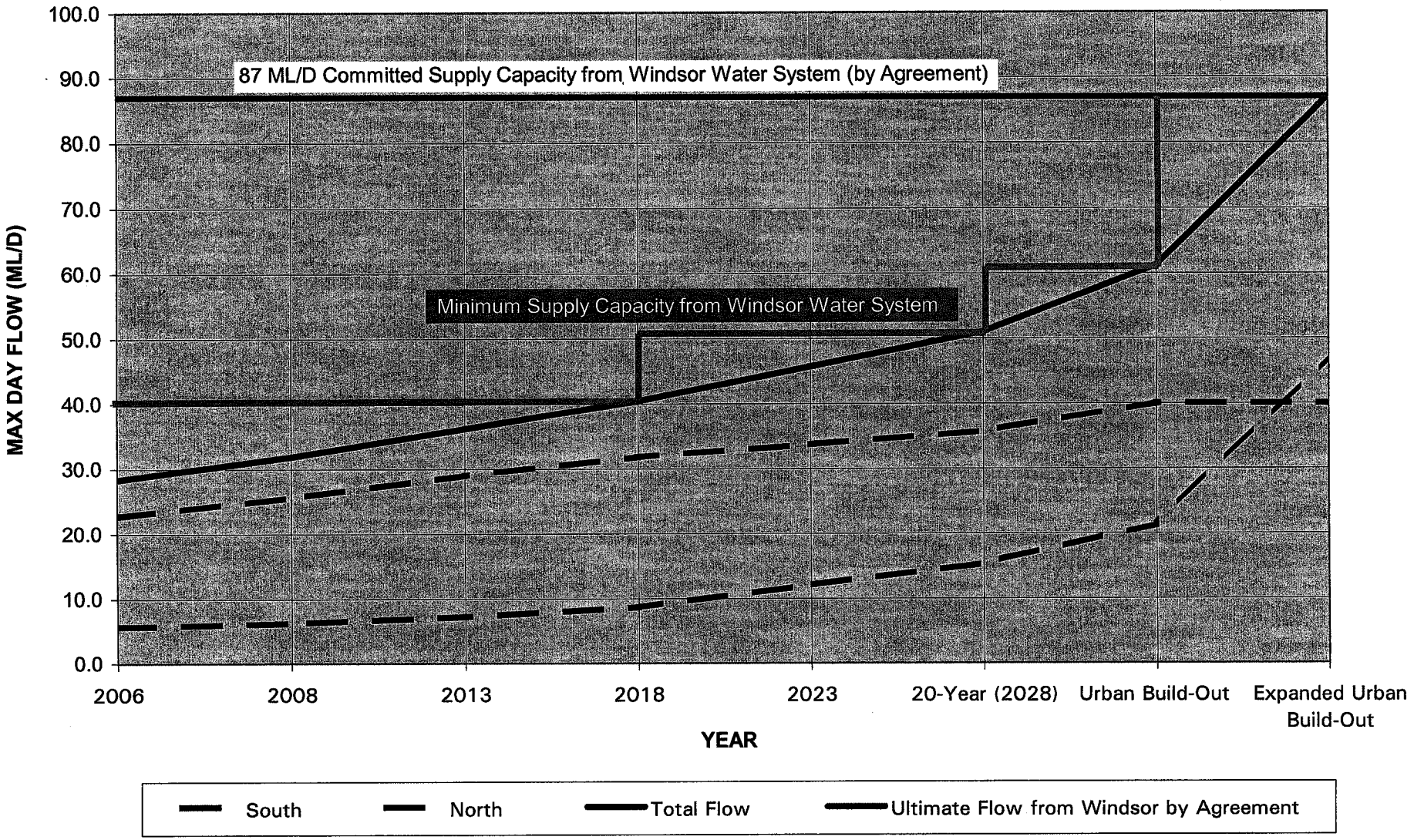
The probable capital cost for the reservoir and pump station is estimated at approximately $25.1 Million. This cost is based on 2007 dollars, and includes 8% PST, a contingency allowance of 15% and an allowance of 15% for engineering. The probable cost does not include the cost of acquiring easements and/or purchasing land and does not include any allowance for interim financing or legal costs. The probable cost is based on a preliminary design and has a level of accuracy of -20% and +35%.

UMA | AECOM

# Water Supply and Storage Capacity Calculations

CLASS EA REPORT

## TOWN OF TECUMSEH
## TOTAL WATER SYSTEM REQUIREMENTS



**Preferred Water Servicing Scheme**

## Water Supply Requirements for Town of Tecumseh

| Year | Max Day Demand (ML/D) | | | | |
|---|---|---|---|---|---|
| | South | North | Total Flow | Minimum Flow from Windsor Water System | Ultimate Flow from Windsor by Agreement |
| 2006 | 5.6 | 22.6 | 28.2 | 40.3 | 87.0 |
| 2008 | 6.2 | 25.5 | 31.7 | 40.3 | 87.0 |
| 2013 | 7.2 | 28.9 | 36.1 | 40.3 | 87.0 |
| 2018 | 8.6 | 31.7 | 40.3 | 40.3 | 87.0 |
| 2023 | 12.1 | 33.6 | 45.7 | 51.0 | 87.0 |
| 20-Year (2028) | 15.3 | 35.7 | 51.0 | 51.0 | 87.0 |
| Urban Build-Out | 21.3 | 40.0 | 61.2 | 61.2 | 87.0 |
| Expanded Urban Build-Out | 47.1 | 40.0 | 87.0 | 87.0 | 87.0 |

**Preferred Water Servicing Scheme**

## Water Supply Requirements for Town of Tecumseh

| Service Area | | Average Day Water Demand (ML/D) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North | Tecumseh | 10.2 | 10.3 | 10.4 | 10.4 | 10.4 | 10.4 | 10.4 |
| | St. Clair Beach | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |
| | Tecumseh Hamlet | 1.8 | 3.3 | 4.6 | 5.5 | 6.5 | 8.7 | 8.7 |
| | Supply to Town of Lakeshore | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| | **Sub-Total** | **14.6** | **16.3** | **17.7** | **18.6** | **19.7** | **21.8** | **21.8** |
| Southeast & Southwest | Highway Service Centre | 0.0 | 0.0 | 0.0 | 0.7 | 1.4 | 1.4 | 1.4 |
| | Maidstone Hamlet (SE) | 0.2 | 0.2 | 0.3 | 0.6 | 0.9 | 1.5 | 1.5 |
| | Rural Area North of 401 (SE ) | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 4.6 |
| | Rural Area South of 401 (SE) | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 4.9 |
| | Oldcastle Hamlet (SW) | 2.2 | 2.6 | 3.3 | 3.9 | 4.5 | 6.6 | 6.6 |
| | Rural Area South of 401 (SW) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 4.6 |
| | **Sub-Total** | **3.1** | **3.6** | **4.3** | **6.0** | **7.7** | **10.6** | **23.5** |
| **Total for Town of Tecumseh** | | **17.7** | **19.9** | **22.0** | **24.7** | **27.3** | **32.4** | **45.3** |

| Planning Area | Service Area | Maximum Day Water Demand (ML/D) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North | Tecumseh | 16.7 | 16.9 | 17.2 | 17.2 | 17.2 | 17.2 | 17.2 |
| | St. Clair Beach | 3.5 | 3.6 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| | Tecumseh Hamlet | 3.6 | 6.6 | 9.1 | 11.0 | 13.1 | 17.4 | 17.4 |
| | Supply to Town of Lakeshore | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| | **Sub-Total** | **25.5** | **28.9** | **31.7** | **33.6** | **35.7** | **40.0** | **40.0** |
| Southeast & Southwest | Highway Service Centre | 0.0 | 0.0 | 0.0 | 1.4 | 2.8 | 2.8 | 2.8 |
| | Maidstone Hamlet (SE) | 0.4 | 0.5 | 0.6 | 1.2 | 1.9 | 3.0 | 3.0 |
| | Rural Area North of 401 (SE ) | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 | 0.6 | 9.2 |
| | Rural Area South of 401 (SE) | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 1.1 | 9.7 |
| | Oldcastle Hamlet (SW) | 4.5 | 5.3 | 6.5 | 7.8 | 8.9 | 13.2 | 13.2 |
| | Rural Area South of 401 (SW) | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 9.2 |
| | **Sub-Total** | **6.2** | **7.2** | **8.6** | **12.1** | **15.3** | **21.3** | **47.1** |
| **Total for Town of Tecumseh** | | **31.7** | **36.1** | **40.3** | **45.7** | **51.0** | **61.2** | **87.0** |

| Planning Area | Service Area | Peak Hour Water Demand (L/s) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North | Tecumseh | 354 | 358 | 361 | 361 | 361 | 361 | 361 |
| | St. Clair Beach | 60 | 62 | 64 | 64 | 64 | 64 | 64 |
| | Tecumseh Hamlet | 63 | 115 | 158 | 191 | 227 | 302 | 302 |
| | Supply to Town of Lakeshore | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | **Sub-Total** | **507** | **565** | **613** | **646** | **682** | **757** | **757** |
| Southeast & Southwest | Highway Service Centre | 0 | 0 | 0 | 25 | 49 | 49 | 49 |
| | Maidstone Hamlet (SE) | 7 | 9 | 10 | 22 | 33 | 51 | 51 |
| | Rural Area North of 401 (SE ) | 3 | 4 | 4 | 5 | 5 | 10 | 159 |
| | Rural Area South of 401 (SE) | 13 | 14 | 15 | 15 | 16 | 19 | 169 |
| | Oldcastle Hamlet (SW) | 77 | 92 | 114 | 135 | 155 | 229 | 229 |
| | Rural Area South of 401 (SW) | 7 | 7 | 7 | 8 | 8 | 10 | 159 |
| | **Sub-Total** | **107** | **126** | **150** | **210** | **266** | **368** | **816** |
| **Total for Town of Tecumseh** | | **614** | **691** | **763** | **856** | **948** | **1,125** | **1,573** |

**Preferred Water Servicing Scheme**

## Water Supply Requirements for Town of Tecumseh

| Planning Area | Service Area | Average Day Water Demand ($m^3$/day) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North Tecumseh | Tecumseh | 10,189 | 10,299 | 10,409 | 10,409 | 10,409 | 10,409 | 10,409 |
| | St. Clair Beach | 1,733 | 1,789 | 1,844 | 1,844 | 1,844 | 1,844 | 1,844 |
| | Tecumseh Hamlet | 1,805 | 3,314 | 4,560 | 5,512 | 6,543 | 8,687 | 8,687 |
| | Supply to Town of Lakeshore | 868 | 868 | 868 | 868 | 868 | 868 | 868 |
| | **Sub-Total (North Tecumseh)** | **14,595** | **16,270** | **17,681** | **18,633** | **19,664** | **21,808** | **21,808** |
| Southeast Tecumseh | Highway Service Centre | 0 | 0 | 0 | 710 | 1,419 | 1,419 | 1,419 |
| | Maidstone Hamlet | 203 | 248 | 294 | 621 | 947 | 1,483 | 1,483 |
| | Rural Area North of 401 | 86 | 102 | 118 | 135 | 151 | 279 | 4,579 |
| | Rural Area South of 401 | 386 | 404 | 422 | 441 | 459 | 556 | 4,856 |
| | **Sub-Total (Southeast Tecumseh)** | **675** | **754** | **834** | **1,907** | **2,976** | **3,737** | **12,337** |
| Southwest Tecumseh | Oldcastle Hamlet | 2,231 | 2,642 | 3,271 | 3,900 | 4,451 | 6,609 | 6,609 |
| | Rural Area | 193 | 202 | 211 | 220 | 229 | 279 | 4,579 |
| | **Sub-Total (Southwest Tecumseh)** | **2,424** | **2,844** | **3,482** | **4,120** | **4,680** | **6,888** | **11,188** |
| **Total for Town of Tecumseh** | | **17,694** | **19,868** | **21,997** | **24,660** | **27,320** | **32,433** | **45,333** |

| Planning Area | Service Area | Maximum Day Water Demand ($m^3$/day) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North Tecumseh | Tecumseh | 16,712 | 16,933 | 17,153 | 17,153 | 17,153 | 17,152 | 17,152 |
| | St. Clair Beach | 3,466 | 3,578 | 3,688 | 3,688 | 3,688 | 3,688 | 3,688 |
| | Tecumseh Hamlet | 3,610 | 6,628 | 9,120 | 11,024 | 13,086 | 17,374 | 17,374 |
| | Supply to Town of Lakeshore | 1,736 | 1,736 | 1,736 | 1,736 | 1,736 | 1,736 | 1,736 |
| | **Sub-Total (North Tecumseh)** | **25,524** | **28,875** | **31,697** | **33,601** | **35,663** | **39,950** | **39,950** |
| Southeast Tecumseh | Highway Service Centre | 0 | 0 | 0 | 1,420 | 2,838 | 2,838 | 2,838 |
| | Maidstone Hamlet | 406 | 496 | 588 | 1,242 | 1,894 | 2,966 | 2,966 |
| | Rural Area North of 401 | 172 | 204 | 236 | 270 | 302 | 558 | 9,158 |
| | Rural Area South of 401 | 772 | 808 | 844 | 882 | 918 | 1,112 | 9,712 |
| | **Sub-Total (Southeast Tecumseh)** | **1,350** | **1,508** | **1,668** | **3,814** | **5,952** | **7,474** | **24,674** |
| Southwest Tecumseh | Oldcastle Hamlet | 4,462 | 5,284 | 6,542 | 7,800 | 8,902 | 13,218 | 13,218 |
| | Rural Area | 386 | 404 | 422 | 440 | 458 | 558 | 9,158 |
| | **Sub-Total (Southwest Tecumseh)** | **4,848** | **5,688** | **6,964** | **8,240** | **9,360** | **13,776** | **22,376** |
| **Total for Town of Tecumseh** | | **31,722** | **36,071** | **40,329** | **45,655** | **50,975** | **61,200** | **87,000** |

| Planning Area | Service Area | Peak Hour Water Demand (L/s) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| North Tecumseh | Tecumseh | 354 | 358 | 361 | 361 | 361 | 361 | 361 |
| | St. Clair Beach | 60 | 62 | 64 | 64 | 64 | 64 | 64 |
| | Tecumseh Hamlet | 63 | 115 | 158 | 191 | 227 | 302 | 302 |
| | Supply to Town of Lakeshore | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | **Sub-Total (North Tecumseh)** | **507** | **565** | **613** | **646** | **682** | **757** | **757** |
| Southeast Tecumseh | Highway Service Centre | - | 0 | 0 | 25 | 49 | 49 | 49 |
| | Maidstone Hamlet | 7 | 9 | 10 | 22 | 33 | 51 | 51 |
| | Rural Area North of 401 | 3 | 4 | 4 | 5 | 5 | 10 | 159 |
| | Rural Area South of 401 | 13 | 14 | 15 | 15 | 16 | 19 | 169 |
| | **Sub-Total (Southeast Tecumseh)** | **23** | **27** | **29** | **67** | **103** | **129** | **428** |
| Southwest Tecumseh | Oldcastle Hamlet | 77 | 92 | 114 | 135 | 155 | 229 | 229 |
| | Rural Areas | 7 | 7 | 7 | 8 | 8 | 10 | 159 |
| | **Sub-Total (Southwest Tecumseh)** | **84** | **99** | **121** | **143** | **163** | **239** | **388** |
| **Total for Town of Tecumseh** | | **614** | **691** | **763** | **856** | **948** | **1,125** | **1,573** |

**Preferred Water Servicing Scheme**

## Water Supply Requirements for Town of Tecumseh

| Planning Area | Service Area | EXISTING - 2006 Water Supply Requirements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | m³/day | MIGD | m³/day | MIGD | m³/day | L/s |
| North Tecumseh | Tecumseh | 13,728 | 2,360 | 11,667 | 1,609 | 29,364 | 8,809 | 1.94 | 14,618 | 3.22 | 26,427 | 306 |
| | St. Clair Beach | 3,957 | 818 | - | 478 | 5,253 | 1,576 | 0.35 | 3,152 | 0.69 | 4,728 | 55 |
| | Tecumseh Hamlet | 3,793 | 1,135 | - | 493 | 5,421 | 1,626 | 0.36 | 3,252 | 0.72 | 4,878 | 56 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 789 | 0.17 | 1,578 | 0.35 | 2,367 | 27 |
| | **Sub-Total (North Tecumseh)** | **21,478** | **6,943** | **11,667** | **2,580** | **42,668** | **12,800** | **2.82** | **22,600** | **4.98** | **38,400** | **444** |
| Southeast Tecumseh | Highway Service Centre | - | - | - | - | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 0 |
| | Maidstone Hamlet | 449 | 110 | - | 56 | 615 | 185 | 0.04 | 370 | 0.08 | 555 | 6 |
| | Rural Area North of 401 | 236 | - | - | 24 | 260 | 78 | 0.02 | 156 | 0.03 | 234 | 3 |
| | Rural Area South of 401 | 1,064 | - | - | 106 | 1,170 | 351 | 0.08 | 702 | 0.15 | 1,053 | 12 |
| | **Sub-Total (Southeast Tecumseh)** | **1,749** | **110** | **0** | **186** | **2,045** | **614** | **0.14** | **1,228** | **0.26** | **1,842** | **21** |
| Southwest Tecumseh | Oldcastle Hamlet | 466 | 5,680 | - | 615 | 6,761 | 2,028 | 0.45 | 4,056 | 0.89 | 6,084 | 70 |
| | Rural Area | 531 | - | - | 53 | 584 | 175 | 0.04 | 350 | 0.08 | 525 | 6 |
| | **Sub-Total (Southwest Tecumseh)** | **997** | **5,680** | **0** | **668** | **7,345** | **2,203** | **0.49** | **4,406** | **0.97** | **6,609** | **76** |
| **Total for Town of Tecumseh** | | **24,224** | **12,733** | **11,667** | **3,434** | **52,058** | **15,617** | **3.45** | **28,234** | **6.21** | **46,851** | **541** |

| Planning Area | Service Area | IMMEDIATE - (2008) Water Supply Requirements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | m³/day | MIGD | m³/day | MIGD | m³/day | L/s |
| North Tecumseh | Tecumseh | 13,773 | 2,360 | 13,130 | 1,613 | 30,876 | 10,189 | 2.24 | 16,712 | 3.68 | 30,567 | 354 |
| | St. Clair Beach | 3,957 | 818 | - | 478 | 5,253 | 1,733 | 0.38 | 3,466 | 0.76 | 5,199 | 60 |
| | Tecumseh Hamlet | 3,838 | 1,135 | - | 497 | 5,470 | 1,805 | 0.40 | 3,610 | 0.79 | 5,415 | 63 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **21,568** | **6,943** | **13,130** | **2,588** | **44,229** | **14,595** | **3.21** | **25,524** | **5.61** | **43,785** | **507** |
| Southeast Tecumseh | Highway Service Centre | - | - | - | - | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 0 |
| | Maidstone Hamlet | 449 | 110 | - | 56 | 615 | 203 | 0.04 | 406 | 0.09 | 609 | 7 |
| | Rural Area North of 401 | 236 | - | - | 24 | 260 | 86 | 0.02 | 172 | 0.04 | 258 | 3 |
| | Rural Area South of 401 | 1,064 | - | - | 106 | 1,170 | 386 | 0.08 | 772 | 0.17 | 1,158 | 13 |
| | **Sub-Total (Southeast Tecumseh)** | **1,749** | **110** | **0** | **186** | **2,045** | **675** | **0.14** | **1,350** | **0.30** | **2,025** | **23** |
| Southwest Tecumseh | Oldcastle Hamlet | 466 | 5,680 | - | 615 | 6,761 | 2,231 | 0.49 | 4,462 | 0.98 | 6,693 | 77 |
| | Rural Area | 531 | - | - | 53 | 584 | 193 | 0.04 | 386 | 0.08 | 579 | 7 |
| | **Sub-Total (Southwest Tecumseh)** | **997** | **5,680** | **0** | **668** | **7,345** | **2,424** | **0.53** | **4,848** | **1.06** | **7,272** | **84** |
| **Total for Town of Tecumseh** | | **24,314** | **12,733** | **13,130** | **3,442** | **53,619** | **17,694** | **3.88** | **31,722** | **6.97** | **53,082** | **614** |

| Planning Area | Service Area | 5-Year (2013) Water Supply Requirements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | m³/day | MIGD | m³/day | MIGD | m³/day | L/s |
| North Tecumseh | Tecumseh | 13,901 | 2,535 | 13,130 | 1,644 | 31,210 | 10,299 | 2.27 | 16,933 | 3.72 | 30,897 | 358 |
| | St. Clair Beach | 4,048 | 881 | - | 493 | 5,422 | 1,789 | 0.39 | 3,578 | 0.79 | 5,367 | 62 |
| | Tecumseh Hamlet | 7,483 | 1,646 | - | 913 | 10,042 | 3,314 | 0.73 | 6,628 | 1.46 | 9,942 | 115 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **25,432** | **7,692** | **13,130** | **3,050** | **49,304** | **16,270** | **3.58** | **28,875** | **6.35** | **48,810** | **565** |
| Southeast Tecumseh | Highway Service Centre | - | - | - | - | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 0 |
| | Maidstone Hamlet | 449 | 235 | - | 68 | 752 | 248 | 0.05 | 496 | 0.11 | 744 | 9 |
| | Rural Area North of 401 | 261 | - | - | 28 | 309 | 102 | 0.02 | 204 | 0.04 | 306 | 4 |
| | Rural Area South of 401 | 1,114 | - | - | 111 | 1,225 | 404 | 0.09 | 808 | 0.18 | 1,212 | 14 |
| | **Sub-Total (Southeast Tecumseh)** | **1,844** | **235** | **0** | **207** | **2,286** | **754** | **0.16** | **1,508** | **0.33** | **2,262** | **27** |
| Southwest Tecumseh | Oldcastle Hamlet | 466 | 6,813 | - | 728 | 8,007 | 2,642 | 0.58 | 5,284 | 1.16 | 7,926 | 92 |
| | Rural Area | 556 | - | - | 56 | 612 | 202 | 0.04 | 404 | 0.09 | 606 | 7 |
| | **Sub-Total (Southwest Tecumseh)** | **1,022** | **6,813** | **0** | **784** | **8,619** | **2,844** | **0.62** | **5,688** | **1.25** | **8,532** | **99** |
| **Total for Town of Tecumseh** | | **28,298** | **14,740** | **13,130** | **4,041** | **60,209** | **19,868** | **4.36** | **36,071** | **7.93** | **59,604** | **691** |

| Planning Area | Service Area | 10-Year (2018) Water Supply Requirements | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | m³/day | MIGD | m³/day | MIGD | m³/day | L/s |
| North Tecumseh | Tecumseh | 14,029 | 2,710 | 13,130 | 1,674 | 31,543 | 10,409 | 2.29 | 17,153 | 3.77 | 31,227 | 361 |
| | St. Clair Beach | 4,138 | 943 | - | 508 | 5,589 | 1,844 | 0.41 | 3,688 | 0.81 | 5,532 | 64 |
| | Tecumseh Hamlet | 10,529 | 2,032 | - | 1,256 | 13,817 | 4,560 | 1.00 | 9,120 | 2.01 | 13,680 | 158 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **28,696** | **8,315** | **13,130** | **3,438** | **53,579** | **17,681** | **3.89** | **31,697** | **6.97** | **53,043** | **613** |
| Southeast Tecumseh | Highway Service Centre | - | - | - | - | 0 | 0 | 0.00 | 0 | 0.00 | 0 | 0 |
| | Maidstone Hamlet | 449 | 360 | - | 81 | 890 | 294 | 0.06 | 588 | 0.13 | 882 | 10 |
| | Rural Area North of 401 | 326 | - | - | 33 | 359 | 118 | 0.03 | 236 | 0.05 | 354 | 4 |
| | Rural Area South of 401 | 1,164 | - | - | 116 | 1,280 | 422 | 0.09 | 844 | 0.19 | 1,266 | 15 |
| | **Sub-Total (Southeast Tecumseh)** | **1,939** | **360** | **0** | **230** | **2,529** | **834** | **0.18** | **1,668** | **0.37** | **2,502** | **29** |
| Southwest Tecumseh | Oldcastle Hamlet | 1,086 | 7,946 | - | 901 | 9,913 | 3,271 | 0.72 | 6,542 | 1.44 | 9,813 | 114 |
| | Rural Area | 561 | - | - | 58 | 639 | 211 | 0.05 | 422 | 0.09 | 633 | 7 |
| | **Sub-Total (Southwest Tecumseh)** | **1,647** | **7,946** | **0** | **959** | **10,552** | **3,482** | **0.77** | **6,964** | **1.53** | **10,446** | **121** |

| Planning Area | Service Area | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | $m^3$/day | MIGD | $m^3$/day | MIGD | $m^3$/day | L/s |
| North Tecumseh | Tecumseh | 14,029 | 2,710 | 13,130 | 1,674 | 31,543 | 10,409 | 2.29 | 17,153 | 3.77 | 31,227 | 361 |
| | St. Clair Beach | 4,138 | 943 | - | 508 | 5,589 | 1,844 | 0.41 | 3,688 | 0.81 | 5,532 | 64 |
| | Tecumseh Hamlet | 13,017 | 2,168 | - | 1,519 | 16,704 | 5,512 | 1.21 | 11,024 | 2.42 | 16,536 | 191 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **31,184** | **8,451** | **13,130** | **3,701** | **56,466** | **18,633** | **4.10** | **33,601** | **7.38** | **55,899** | **646** |
| Southeast Tecumseh | Highway Service Centre | - | 1,955 | - | 196 | 2,151 | 710 | 0.16 | 1,420 | 0.31 | 2,130 | 25 |
| | Maidstone Hamlet | 1,225 | 485 | - | 171 | 1,881 | 621 | 0.14 | 1,242 | 0.27 | 1,863 | 22 |
| | Rural Area North of 401 | 371 | - | - | 37 | 408 | 135 | 0.03 | 270 | 0.06 | 405 | 5 |
| | Rural Area South of 401 | 1,214 | - | - | 121 | 1,335 | 441 | 0.10 | 882 | 0.19 | 1,323 | 15 |
| | **Sub-Total (Southeast Tecumseh)** | **2,810** | **2,440** | **0** | **525** | **5,775** | **1,907** | **0.43** | **3,814** | **0.83** | **5,721** | **67** |
| Southwest Tecumseh | Oldcastle Hamlet | 1,666 | 9,078 | - | 1,074 | 11,818 | 3,900 | 0.86 | 7,800 | 1.72 | 11,700 | 135 |
| | Rural Area | 606 | - | - | 61 | 667 | 220 | 0.05 | 440 | 0.10 | 660 | 8 |
| | **Sub-Total (Southwest Tecumseh)** | **2,272** | **9,078** | **0** | **1,135** | **12,485** | **4,120** | **0.91** | **8,240** | **1.82** | **12,360** | **143** |
| **Total for Town of Tecumseh** | | **36,266** | **19,969** | **13,130** | **5,361** | **74,726** | **24,660** | **5.44** | **45,655** | **10.03** | **73,980** | **856** |

**20-Year (2028) Water Supply Requirements**

| Planning Area | Service Area | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | $m^3$/day | MIGD | $m^3$/day | MIGD | $m^3$/day | L/s |
| North Tecumseh | Tecumseh | 14,029 | 2,710 | 13,130 | 1,674 | 31,543 | 10,409 | 2.29 | 17,153 | 3.77 | 31,227 | 361 |
| | St. Clair Beach | 4,138 | 943 | - | 508 | 5,589 | 1,844 | 0.41 | 3,688 | 0.81 | 5,532 | 64 |
| | Tecumseh Hamlet | 15,720 | 2,304 | - | 1,802 | 19,826 | 6,543 | 1.44 | 13,086 | 2.88 | 19,629 | 227 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **33,887** | **8,587** | **13,130** | **3,984** | **59,588** | **19,664** | **4.33** | **35,663** | **7.84** | **58,992** | **682** |
| Southeast Tecumseh | Highway Service Centre | - | 3,910 | - | 391 | 4,301 | 1,419 | 0.31 | 2,838 | 0.62 | 4,257 | 49 |
| | Maidstone Hamlet | 2,000 | 610 | - | 261 | 2,871 | 947 | 0.21 | 1,894 | 0.42 | 2,841 | 33 |
| | Rural Area North of 401 | 416 | - | - | 42 | 458 | 151 | 0.03 | 302 | 0.07 | 453 | 5 |
| | Rural Area South of 401 | 1,264 | - | - | 126 | 1,390 | 459 | 0.10 | 918 | 0.20 | 1,377 | 16 |
| | **Sub-Total (Southeast Tecumseh)** | **3,680** | **4,520** | **0** | **820** | **9,020** | **2,976** | **0.65** | **5,952** | **1.31** | **8,928** | **103** |
| Southwest Tecumseh | Oldcastle Hamlet | 2,052 | 10,211 | - | 1,226 | 13,489 | 4,451 | 0.98 | 8,902 | 1.96 | 13,353 | 155 |
| | Rural Area | 631 | - | - | 63 | 694 | 229 | 0.05 | 458 | 0.10 | 687 | 8 |
| | **Sub-Total (Southwest Tecumseh)** | **2,683** | **10,211** | **0** | **1,289** | **14,183** | **4,680** | **1.03** | **9,360** | **2.06** | **14,040** | **163** |
| **Total for Town of Tecumseh** | | **40,250** | **23,318** | **13,130** | **6,093** | **82,791** | **27,320** | **6.01** | **50,975** | **11.21** | **81,960** | **948** |

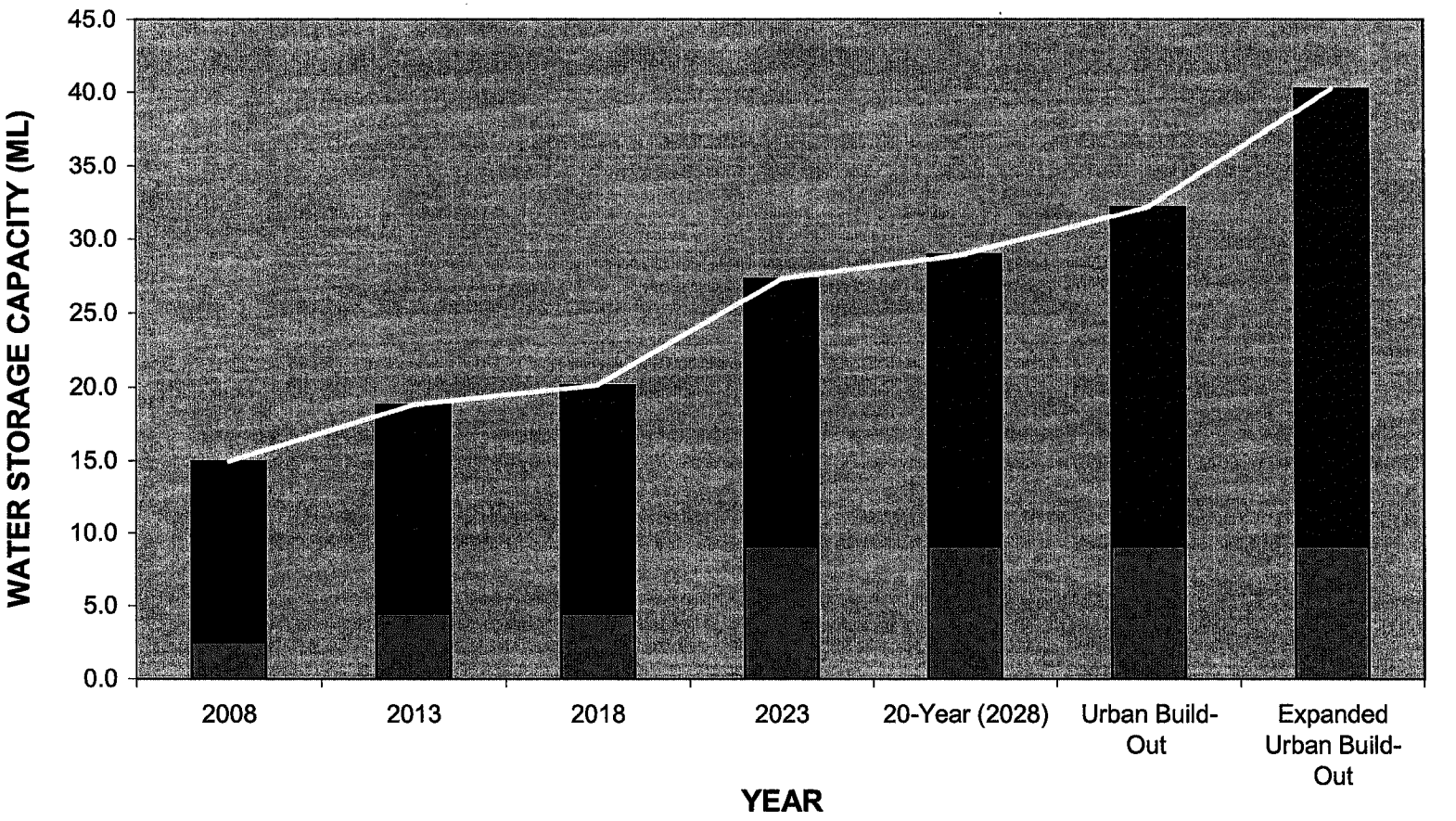
**Urban Build-Out (2028+) Water Supply Requirements**

| Planning Area | Service Area | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | $m^3$/day | MIGD | $m^3$/day | MIGD | $m^3$/day | L/s |
| North Tecumseh | Tecumseh | 14,029 | 2,710 | 13,130 | 1,674 | 31,543 | 10,409 | 2.29 | 17,152 | 3.77 | 31,227 | 361 |
| | St. Clair Beach | 4,138 | 943 | - | 508 | 5,589 | 1,844 | 0.41 | 3,688 | 0.81 | 5,532 | 64 |
| | Tecumseh Hamlet | 21,085 | 2,846 | - | 2,393 | 26,324 | 8,687 | 1.91 | 17,374 | 3.82 | 26,061 | 302 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **39,252** | **9,129** | **13,130** | **4,575** | **66,086** | **21,808** | **4.80** | **39,950** | **8.78** | **65,424** | **757** |
| Southeast Tecumseh | Highway Service Centre | - | 3,910 | - | 391 | 4,301 | 1,419 | 0.31 | 2,838 | 0.62 | 4,257 | 49 |
| | Maidstone Hamlet | 3,000 | 1,085 | - | 409 | 4,494 | 1,483 | 0.33 | 2,966 | 0.65 | 4,449 | 51 |
| | Rural Area North of 401 | 767 | - | - | 77 | 844 | 279 | 0.06 | 558 | 0.12 | 837 | 10 |
| | Rural Area South of 401 | 1,533 | - | - | 153 | 1,686 | 556 | 0.12 | 1,112 | 0.24 | 1,668 | 19 |
| | **Sub-Total (Southeast Tecumseh)** | **5,300** | **4,995** | **0** | **1,030** | **11,326** | **3,737** | **0.82** | **7,474** | **1.63** | **11,211** | **129** |
| Southwest Tecumseh | Oldcastle Hamlet | 2,437 | 15,770 | - | 1,821 | 20,028 | 6,609 | 1.45 | 13,218 | 2.91 | 19,827 | 229 |
| | Rural Area | 767 | - | - | 77 | 844 | 279 | 0.06 | 558 | 0.12 | 837 | 10 |
| | **Sub-Total (Southwest Tecumseh)** | **3,204** | **15,770** | **0** | **1,898** | **20,872** | **6,888** | **1.51** | **13,776** | **3.03** | **20,664** | **239** |
| **Total for Town of Tecumseh** | | **47,756** | **29,894** | **13,130** | **7,503** | **98,283** | **32,433** | **7.13** | **61,200** | **13.44** | **97,299** | **1,125** |

**Expanded Urban Build-Out (2028+) Water Supply Requirements**

| Planning Area | Service Area | Equivalent Population by Category | | | | | Average Day Demand | | Maximum Day Demand | | Peak Hour Demand | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential | ICI | Heavy Ind. | Unaccounted | Total | $m^3$/day | MIGD | $m^3$/day | MIGD | $m^3$/day | L/s |
| North Tecumseh | Tecumseh | 14,029 | 2,710 | 13,130 | 1,674 | 31,543 | 10,409 | 2.29 | 17,152 | 3.77 | 31,227 | 361 |
| | St. Clair Beach | 4,138 | 943 | - | 508 | 5,589 | 1,844 | 0.41 | 3,688 | 0.81 | 5,532 | 64 |
| | Tecumseh Hamlet | 21,085 | 2,846 | - | 2,393 | 26,324 | 8,687 | 1.91 | 17,374 | 3.82 | 26,061 | 302 |
| | Supply to Town of Lakeshore | - | 2,630 | - | - | 2,630 | 868 | 0.19 | 1,736 | 0.38 | 2,604 | 30 |
| | **Sub-Total (North Tecumseh)** | **39,252** | **9,129** | **13,130** | **4,575** | **66,086** | **21,808** | **4.80** | **39,950** | **8.78** | **65,424** | **757** |
| Southeast Tecumseh | Highway Service Centre | - | 3,910 | - | 391 | 4,301 | 1,419 | 0.31 | 2,838 | 0.62 | 4,257 | 49 |
| | Maidstone Hamlet | 3,000 | 1,085 | - | 409 | 4,494 | 1,483 | 0.33 | 2,966 | 0.65 | 4,449 | 51 |
| | Rural Area North of 401 | 12,614 | - | - | 1,261 | 13,875 | 4,579 | 1.01 | 9,158 | 2.01 | 13,737 | 159 |
| | Rural Area South of 401 | 13,380 | - | - | 1,338 | 14,718 | 4,856 | 1.07 | 9,712 | 2.14 | 14,568 | 169 |
| | **Sub-Total (Southeast Tecumseh)** | **28,994** | **4,995** | **0** | **3,399** | **37,388** | **12,337** | **2.72** | **24,674** | **5.42** | **37,011** | **428** |
| Southwest Tecumseh | Oldcastle Hamlet | 2,437 | 15,770 | - | 1,821 | 20,028 | 6,609 | 1.45 | 13,218 | 2.91 | 19,827 | 229 |
| | Rural Area | 12,614 | - | - | 1,261 | 13,875 | 4,579 | 1.01 | 9,158 | 2.01 | 13,737 | 159 |
| | **Sub-Total (Southwest Tecumseh)** | **15,051** | **15,770** | **0** | **3,082** | **33,903** | **11,188** | **2.46** | **22,376** | **4.92** | **33,564** | **388** |
| **Total for Town of Tecumseh** | | **83,297** | **29,894** | **13,130** | **11,056** | **137,377** | **45,333** | **9.98** | **87,000** | **19.12** | **135,999** | **1,573** |

**TOWN OF TECUMSEH**
**WATER STORAGE REQUIREMENTS**



**Preferred Water Servicing Scheme**

| Year | Max Day Demand (ML/D) | Town of Tecumseh Water Storage Requirements (ML) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Fire Flow | Pump Control | | Equalization & Emergency | Total | Fire Flow and Zone 2 Pump Control (Tecumseh System) | Equalization, Emergency and Zone 1 Pump Control (Windsor System) |
| | | | North Service Area (Windsor System) | SE Service Area (Tecumseh System) | | | | |
| 2008 | 31.7 | 2.5 | 1.9 | | 10.5 | 14.9 | 2.5 | 12.4 |
| 2013 | 36.1 | 4.5 | 1.9 | | 12.4 | 18.8 | 4.5 | 14.3 |
| 2018 | 40.3 | 4.5 | 1.9 | | 13.7 | 20.1 | 4.5 | 15.6 |
| 2023 | 45.7 | 8.2 | 1.9 | 0.9 | 16.3 | 27.3 | 9.1 | 18.2 |
| 20-Year (2028) | 51.0 | 8.2 | 1.9 | 0.9 | 18.0 | 29.0 | 9.1 | 19.9 |
| Urban Build-Out | 61.2 | 8.2 | 1.9 | 0.9 | 21.2 | 32.2 | 9.1 | 23.1 |
| Expanded Urban Build-Out | 87.0 | 8.2 | 1.9 | 0.9 | 29.2 | 40.2 | 9.1 | 31.1 |

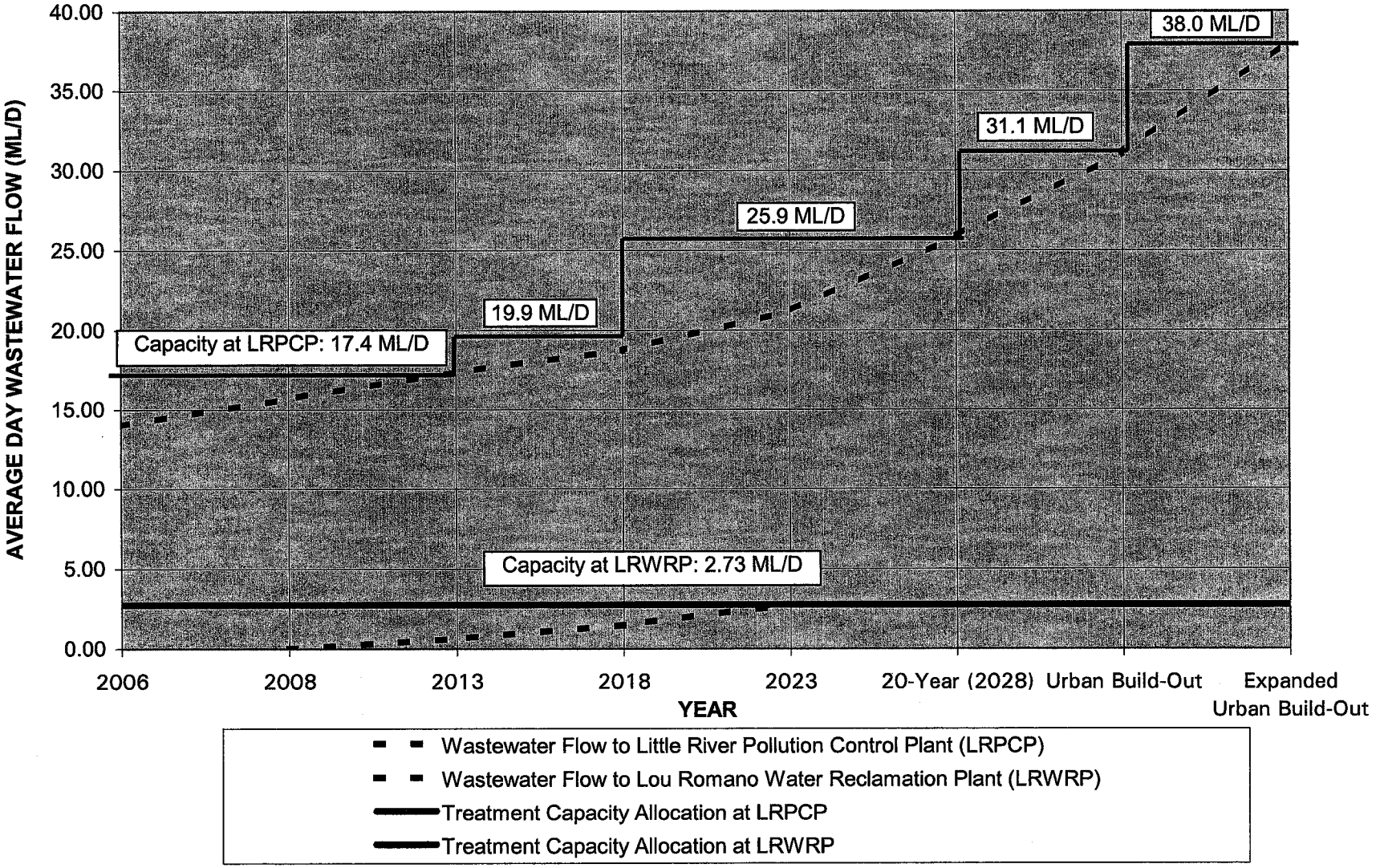
NOTES:
(1) Fire storage for 2008 based on IAO recommended fire flow of 227 L/s for 3.0 hours based on a single fire in the largest urban centre (Tecumseh)
(2) Fire storage for 2013 and 2018 based on MOE Guidelines recommended fire flow of 280 L/s for 4.5 hours based on a single fire in the largest urban centre (2002 Master Plan)
(3) Fire storage for 2023 and beyond based on MOE Guidelines recommended fire flow of 378 L/s for 6.0 hours based on the serviced population in integrated north and south service areas (2007 Master Plan Update)

UMA | AECOM

# Average Day and Peak Wastewater Flow Calculations

CLASS EA REPORT

## TOWN OF TECUMSEH
## TOTAL WASTEWATER TREATMENT CAPACITY REQUIREMENTS



**Preferred Wastewater Servicing Scheme**

## Average Day Wastewater Flow Projections for Town of Tecumseh

| Year | Average Day Flow (ML/D) | |
|---|---|---|
| | Wastewater Flow to Little River Pollution Control Plant (LRPCP) | Wastewater Flow to Lou Romano Water Reclamation Plant (LRWRP) |
| 2006 | 14.00 | |
| 2008 | 15.71 | 0.00 |
| 2013 | 17.37 | 0.64 |
| 2018 | 18.75 | 1.49 |
| 2023 | 21.19 | 2.73 |
| 20-Year (2028) | 25.87 | 2.73 |
| Urban Build-Out | 31.06 | 2.73 |
| Expanded Urban Build-Out | 38.00 | 2.73 |

Preferred Wastewater Servicing Scheme

## Summary of Average Day Wastewater Flow Projections for Treatment at LRPCP

| Service Area | Estimated Average Day Flow ($m^3/d$) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| Tecumseh | 9,528 | 9,598 | 9,667 | 9,667 | 9,667 | 9,667 | 9,667 |
| St. Clair Beach | 2,833 | 2,869 | 2,904 | 2,904 | 2,904 | 2,904 | 2,904 |
| Central Tecumseh Hamlet north of CP Rail | 1,862 | 1,890 | 1,918 | 1,918 | 1,918 | 1,918 | 1,918 |
| Central Tecumseh Hamlet south of CP Rail | 1,278 | 1,347 | 1,417 | 1,417 | 1,417 | 1,417 | 1,417 |
| Manning Business Park (Sylvestre Drive PS) | 212 | 265 | 318 | 371 | 424 | 635 | 635 |
| East Tecumseh Hamlet north of CPR (north part to Westlake Drive Trunk Sewer) | - | 230 | 277 | 324 | 370 | 524 | 524 |
| East Tecumseh Hamlet north of CPR (south part to CP Rail Diversion Sewer) | - | 310 | 384 | 457 | 530 | 772 | 772 |
| West Tecumseh Hamlet north of CP Rail | - | 861 | 1,072 | 1,282 | 1,492 | 2,186 | 2,186 |
| East Tecumseh Hamlet south of CP Rail | - | - | 140 | 243 | 381 | 559 | 559 |
| West Tecumseh Hamlet south of CP Rail | - | - | 649 | 1,176 | 1,772 | 2,596 | 2,596 |
| Highway Service Centre | - | - | - | 762 | 1,525 | 1,525 | 1,525 |
| Maidstone Hamlet | - | - | - | 667 | 1,018 | 1,593 | 1,593 |
| Oldcastle Hamlet | - | - | - | - | 2,448 | 4,766 | 7,101 |
| Future Urban Expansion Area (Southeast and Southwest) | - | - | - | - | - | - | 4,603 |
| **Total from Tecumseh to LRPCP** | **15,713** | **17,370** | **18,746** | **21,188** | **25,866** | **31,062** | **38,000** |
| Tecumseh's Allocation at Existing LRPCP (4.37 MIGD out of 16.0 MIGD) | *19,866* | *19,866* | *19,866* | *19,866* | *19,866* | *19,866* | *19,866* |
| **LRPCP Capacity Allocation Surplus/ (Deficit)** | ***4,153*** | ***2,496*** | ***1,120*** | ***(1,322)*** | ***(6,000)*** | ***(11,196)*** | ***(18,134)*** |
| **MIGD** | 0.9 | 0.5 | 0.2 | (0.3) | (1.3) | (2.5) | (4.0) |

Preferred Wastewater Servicing Scheme

## Summary of Peak Flow Projections for Conveyance Capacity to LRPCP

| Service Area | Estimated Peak Flow (L/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Immediate (2008) | 5-Year (2013) | 10-Year (2018) | 15-Year (2023) | 20-Year (2028) | Urban Build-Out (2028+) | Expanded Urban Build-Out (2028+) |
| Tecumseh | 551 | 555 | 560 | 560 | 560 | 560 | 560 |
| St. Clair Beach | 205 | 208 | 211 | 211 | 211 | 211 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 149 | 152 | 156 | 156 | 156 | 156 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 99 | 107 | 115 | 115 | 115 | 115 | 115 |
| Manning Business Park (Sylvestre Drive PS) | 11 | 14 | 17 | 19 | 22 | 32 | 32 |
| East Tecumseh Hamlet north of CPR (north part to Westlake Drive Trunk Sewer) | - | 11 | 13 | 15 | 17 | 24 | 24 |
| East Tecumseh Hamlet north of CPR (south part to CP Rail Diversion Sewer) | - | 15 | 18 | 21 | 25 | 35 | 35 |
| West Tecumseh Hamlet north of CP Rail | - | 34 | 42 | 49 | 56 | 79 | 79 |
| East Tecumseh Hamlet south of CP Rail | - | - | 6 | 11 | 16 | 23 | 23 |
| West Tecumseh Hamlet south of CP Rail | - | - | 26 | 45 | 65 | 92 | 92 |
| Highway Service Centre | - | - | - | 29 | 54 | 54 | 54 |
| Maidstone Hamlet | - | - | - | 39 | 60 | 90 | 90 |
| Oldcastle Hamlet | - | - | - | - | 132 | 246 | 325 |
| Future Urban Expansion Area (Southeast and Southwest) | - | - | - | - | - | - | 447 |
| **Total for Town of Tecumseh** | **1,015** | **1,096** | **1,164** | **1,270** | **1,489** | **1,717** | **2,243** |
| ***Less Peak Flow to Cedarwood Outlet (Maximum)*** | **935** | **935** | **935** | **935** | **935** | **935** | **935** |
| **Banwell Road Outlet** | ***80*** | ***161*** | ***229*** | ***335*** | ***554*** | ***782*** | ***1,308*** |

**Wastewater Flow Projections for Existing Serviced Areas per I & I Control Study (CH2M Hill) dated January 2005**

| Service Area | Population | | | | Average Day and Peak Domestic Flows Excluding Infiltration/Inflow | | | Drainage Area | Monitored Dry Weather Average Infiltration/ Inflow Rate | Monitored Wet Weather Peak Infiltration/ Inflow Rate | Average Day Wastewater Flow (for Treatment Capacity) | Peak Flow (for Sewer Capacity) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential Population | ICI Equivalent Population | Heavy Industrial Equivalent Population | Total Equivalent Population | Average Day Domestic Flow (@ 229 Lpcd) | Peak Factor | Peak Domestic Flow | | | | | |
| | Persons | Persons | Persons | Persons | $m^3$/day | | L/s | Hectares | L/ha/day | L/ha/day | $m^3$/day | L/s |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | Monitored Wastewater Flow for 2003 | | | | | | | | | | | |
| Tecumseh | 13,638 | 2,173 | 9,100 | 24,911 | 5,705 | 5.09 | 335.8 | 625 | 6,000 | 29,200 | 9,455 | 547 |
| St. Clair Beach | 3,907 | 818 | | 4,725 | 1,082 | 7.41 | 92.8 | 290 | 6,000 | 33,120 | 2,822 | 204 |
| Central Tecumseh Hamlet north of CP Rail | 2,626 | 108 | | 2,734 | 626 | 10.03 | 72.7 | 188 | 6,500 | 34,400 | 1,848 | 148 |
| Central Tecumseh Hamlet south of CP Rail | 1,126 | 422 | | 1,547 | 354 | 10.03 | 41.1 | 139 | 6,500 | 34,400 | 1,258 | 96 |
| Combined Catchment Area | 21,297 | 3,520 | 9,100 | 33,917 | 7,767 | 5.57 | 500.5 | 1,242 | - | 34,400 | 15,382 | 995 |
| | Wastewater Flow Projections for 2008 | | | | | | | | | | | |
| Tecumseh | 13,773 | 2,360 | 9,100 | 25,233 | 5,778 | 5.09 | 340.1 | 625 | 6,000 | 29,200 | 9,528 | 551 |
| St. Clair Beach | 3,957 | 818 | | 4,775 | 1,093 | 7.41 | 93.8 | 290 | 6,000 | 33,120 | 2,833 | 205 |
| Central Tecumseh Hamlet north of CP Rail | 2,687 | 108 | | 2,795 | 640 | 10.03 | 74.3 | 188 | 6,500 | 34,400 | 1,862 | 149 |
| Central Tecumseh Hamlet south of CP Rail | 1,151 | 484 | | 1,635 | 375 | 10.03 | 43.5 | 139 | 6,500 | 34,400 | 1,278 | 99 |
| Combined Catchment Area | 21,568 | 3,770 | 9,100 | 34,438 | 7,886 | 5.57 | 508.2 | 1,242 | - | 34,400 | 15,502 | 1,003 |
| | Wastewater Flow Projections for 5 Year Plan (2013) | | | | | | | | | | | |
| Tecumseh | 13,901 | 2,535 | 9,100 | 25,536 | 5,848 | 5.09 | 344.2 | 625 | 6,000 | 29,200 | 9,598 | 555 |
| St. Clair Beach | 4,048 | 881 | | 4,929 | 1,129 | 7.41 | 96.8 | 290 | 6,000 | 33,120 | 2,869 | 208 |
| Central Tecumseh Hamlet north of CP Rail | 2,810 | 108 | | 2,918 | 668 | 10.03 | 77.6 | 188 | 6,500 | 34,400 | 1,890 | 152 |
| Central Tecumseh Hamlet south of CP Rail | 1,204 | 734 | | 1,938 | 444 | 10.03 | 51.5 | 139 | 6,500 | 34,400 | 1,347 | 107 |
| Combined Catchment Area | 21,963 | 4,258 | 9,100 | 35,321 | 8,088 | 5.57 | 521.2 | 1,242 | - | 34,400 | 15,704 | 1,016 |
| | Wastewater Flow Projections for 10 Year Plan (2018) | | | | | | | | | | | |
| Tecumseh | 14,029 | 2,710 | 9,100 | 25,839 | 5,917 | 5.09 | 348.3 | 625 | 6,000 | 29,200 | 9,667 | 560 |
| St. Clair Beach | 4,138 | 943 | | 5,081 | 1,164 | 7.41 | 99.8 | 290 | 6,000 | 33,120 | 2,904 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 2,933 | 108 | | 3,041 | 696 | 10.03 | 80.8 | 188 | 6,500 | 34,400 | 1,918 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 1,257 | 984 | | 2,241 | 513 | 10.03 | 59.6 | 139 | 6,500 | 34,400 | 1,417 | 115 |
| Combined Catchment Area | 22,357 | 4,745 | 9,100 | 36,202 | 8,290 | 5.57 | 534.2 | 1,242 | - | 34,400 | 15,906 | 1,029 |
| | Wastewater Flow Projections for 15 Year Plan (2023) | | | | | | | | | | | |
| Tecumseh | 14,029 | 2,710 | 9,100 | 25,839 | 5,917 | 5.09 | 348.3 | 625 | 6,000 | 29,200 | 9,667 | 560 |
| St. Clair Beach | 4,138 | 943 | | 5,081 | 1,164 | 7.41 | 99.8 | 290 | 6,000 | 33,120 | 2,904 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 2,933 | 108 | | 3,041 | 696 | 10.03 | 80.8 | 188 | 6,500 | 34,400 | 1,918 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 1,257 | 984 | | 2,241 | 513 | 10.03 | 59.6 | 139 | 6,500 | 34,400 | 1,417 | 115 |
| Combined Catchment Area | 22,357 | 4,745 | 9,100 | 36,202 | 8,290 | 5.57 | 534.2 | 1,242 | - | 34,400 | 15,906 | 1,029 |
| | 20-Year Wastewater Flow Projections (2028) | | | | | | | | | | | |
| Tecumseh | 14,029 | 2,710 | 9,100 | 25,839 | 5,917 | 5.09 | 348.3 | 625 | 6,000 | 29,200 | 9,667 | 560 |
| St. Clair Beach | 4,138 | 943 | | 5,081 | 1,164 | 7.41 | 99.8 | 290 | 6,000 | 33,120 | 2,904 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 2,933 | 108 | | 3,041 | 696 | 10.03 | 80.8 | 188 | 6,500 | 34,400 | 1,918 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 1,257 | 984 | | 2,241 | 513 | 10.03 | 59.6 | 139 | 6,500 | 34,400 | 1,417 | 115 |
| Combined Catchment Area | 22,357 | 4,745 | 9,100 | 36,202 | 8,290 | 5.57 | 534.2 | 1,242 | - | 34,400 | 15,906 | 1,029 |
| | Urban Build-Out Wastewater Flow Projections (2028+) | | | | | | | | | | | |
| Tecumseh | 14,029 | 2,710 | 9,100 | 25,839 | 5,917 | 5.09 | 348.3 | 625 | 6,000 | 29,200 | 9,667 | 560 |
| St. Clair Beach | 4,138 | 943 | | 5,081 | 1,164 | 7.41 | 99.8 | 290 | 6,000 | 33,120 | 2,904 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 2,933 | 108 | | 3,041 | 696 | 10.03 | 80.8 | 188 | 6,500 | 34,400 | 1,918 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 1,257 | 984 | | 2,241 | 513 | 10.03 | 59.6 | 139 | 6,500 | 34,400 | 1,417 | 115 |
| Combined Catchment Area | 22,357 | 4,745 | 9,100 | 36,202 | 8,290 | 5.57 | 534.2 | 1,242 | - | 34,400 | 15,906 | 1,029 |
| | Expanded Urban Build-Out Wastewater Flow Projections (2028+) | | | | | | | | | | | |
| Tecumseh | 14,029 | 2,710 | 9,100 | 25,839 | 5,917 | 5.09 | 348.3 | 625 | 6,000 | 29,200 | 9,667 | 560 |
| St. Clair Beach | 4,138 | 943 | | 5,081 | 1,164 | 7.41 | 99.8 | 290 | 6,000 | 33,120 | 2,904 | 211 |
| Central Tecumseh Hamlet north of CP Rail | 2,933 | 108 | | 3,041 | 696 | 10.03 | 80.8 | 188 | 6,500 | 34,400 | 1,918 | 156 |
| Central Tecumseh Hamlet south of CP Rail | 1,257 | 984 | | 2,241 | 513 | 10.03 | 59.6 | 139 | 6,500 | 34,400 | 1,417 | 115 |
| Combined Catchment Area | 22,357 | 4,745 | 9,100 | 36,202 | 8,290 | 5.57 | 534.2 | 1,242 | - | 34,400 | 15,906 | 1,029 |

**Wastewater Flow Projections for Growth Areas**

| Service Area | Service Population | | | Average Day and Peak Domestic Flows Excluding Infiltration/Inflow | | | Drainage Area | Average Day Infiltration/ Inflow Rate (MOE Guidelines) | Peak Infiltration/ Inflow Rate | Average Day Wastewater Flow (for Treatment Capacity) | Peak Flow (for Sewer Capacity) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residential Population | ICI Equivalent Population | Total Equivalent Population | Average Day Domestic Flow (@ 300 Lpcd) | Peak Factor for Total Equivalent Population (Harmon's Formula) | Peak Domestic Flow | | | | | |
| | Persons | Persons | Persons | $m^3$/day | | L/s | Hectares | Lpcd | L/ha/day | $m^3$/day | L/s |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | Wastewater Flow Projections for 2008 | | | | | | | | | | |
| Manning Business Park (Sylvestre Drive PS) | | 543 | 543 | 163 | 3.96 | 7.5 | 20 | 90 | 16,415 | 212 | 11 |
| | Wastewater Flow Projections for 5 Year Plan (2013) | | | | | | | | | | |
| Manning Business Park (Sylvestre Drive PS) | | 679 | 679 | 204 | 3.90 | 9.2 | 25 | 90 | 16,415 | 265 | 14 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 490 | 100 | 590 | 177 | 3.94 | 8.1 | 14 | 90 | 16,415 | 230 | 11 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 770 | 25 | 795 | 239 | 3.86 | 10.7 | 22 | 90 | 16,415 | 310 | 15 |
| West Tecumseh Hamlet north of CP Rail | 2,208 | 0 | 2,208 | 663 | 3.55 | 27.2 | 35 | 90 | 16,415 | 861 | 34 |
| East Tecumseh Hamlet south of CP Rail | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| West Tecumseh Hamlet south of CP Rail | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Highway Service Centre | | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Maidstone Hamlet | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Oldcastle Hamlet to LRPCP | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Combined Catchment Area to LRPCP | 3,469 | 804 | 4,273 | 1,282 | 3.34 | 49.1 | 96 | 90 | 16,415 | 1,666 | 67 |
| Oldcastle Hamlet to LRWRP | 0 | 1,640 | 1,640 | 492 | 3.65 | 20.8 | 82 | 90 | 10,110 | 640 | 30 |
| | Wastewater Flow Projections for 10 Year Plan (2018) | | | | | | | | | | |
| Manning Business Park (Sylvestre Drive PS) | | 815 | 815 | 245 | 3.86 | 10.9 | 30 | 90 | 16,415 | 318 | 17 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 610 | 100 | 710 | 213 | 3.89 | 9.6 | 17 | 90 | 16,415 | 277 | 13 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 958 | 25 | 983 | 295 | 3.80 | 13.0 | 27 | 90 | 16,415 | 384 | 18 |
| West Tecumseh Hamlet north of CP Rail | 2,748 | 0 | 2,748 | 824 | 3.47 | 33.1 | 44 | 90 | 16,415 | 1,072 | 42 |
| East Tecumseh Hamlet south of CP Rail | 358 | 0 | 358 | 108 | 4.04 | 5.0 | 6 | 90 | 16,415 | 140 | 6 |
| West Tecumseh Hamlet south of CP Rail | 1,665 | 0 | 1,665 | 499 | 3.65 | 21.1 | 26 | 90 | 16,415 | 649 | 26 |
| Highway Service Centre | | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Maidstone Hamlet | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Oldcastle Hamlet to LRPCP | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Combined Catchment Area to LRPCP | 6,389 | 940 | 7,279 | 2,184 | 3.09 | 78.1 | 150 | 90 | 16,415 | 2,839 | 107 |
| Oldcastle Hamlet to LRWRP | 600 | 3,213 | 3,813 | 1,144 | 3.35 | 44.4 | 123 | 90 | 10,110 | 1,487 | 59 |
| | Wastewater Flow Projections for 15 Year Plan (2023) | | | | | | | | | | |
| Manning Business Park (Sylvestre Drive PS) | | 951 | 951 | 285 | 3.81 | 12.6 | 35 | 90 | 16,415 | 371 | 19 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 730 | 100 | 830 | 249 | 3.85 | 11.1 | 21 | 90 | 16,415 | 324 | 15 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 1,147 | 25 | 1,172 | 351 | 3.75 | 15.3 | 32 | 90 | 16,415 | 457 | 21 |
| West Tecumseh Hamlet north of CP Rail | 3,287 | 0 | 3,287 | 986 | 3.41 | 38.9 | 53 | 90 | 16,415 | 1,282 | 49 |
| East Tecumseh Hamlet south of CP Rail | 649 | 0 | 649 | 195 | 3.91 | 8.8 | 10 | 90 | 16,415 | 253 | 11 |
| West Tecumseh Hamlet south of CP Rail | 3,015 | 0 | 3,015 | 905 | 3.44 | 36.0 | 48 | 90 | 16,415 | 1,176 | 45 |
| Highway Service Centre | | 1,955 | 1,955 | 587 | 3.59 | 24.4 | 23 | 90 | 16,415 | 762 | 29 |
| Maidstone Hamlet | 1,225 | 485 | 1,710 | 513 | 3.64 | 21.6 | 92 | 90 | 16,415 | 667 | 39 |
| Oldcastle Hamlet to LRPCP | 0 | 0 | 0 | 0 | 4.50 | 0.0 | 0 | 90 | 16,415 | 0 | 0 |
| Combined Catchment Area to LRPCP | 10,052 | 3,516 | 13,568 | 4,070 | 2.82 | 133.0 | 314 | 90 | 16,415 | 5,292 | 193 |

| | 20-Year Wastewater Flow Projections (2028) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manning Business Park (Sylvestre Drive PS) | | 1,087 | 1,087 | 326 | 3.78 | 14.3 | 40 | 90 | 16,415 | 424 | 22 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 849 | 100 | 949 | 285 | 3.81 | 12.6 | 24 | 90 | 16,415 | 370 | 17 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 1,335 | 25 | 1,360 | 408 | 3.71 | 17.5 | 38 | 90 | 16,415 | 530 | 25 |
| West Tecumseh Hamlet north of CP Rail | 3,826 | 0 | 3,826 | 1,148 | 3.35 | 44.5 | 61 | 90 | 16,415 | 1,492 | 56 |
| East Tecumseh Hamlet south of CP Rail | 978 | 0 | 978 | 293 | 3.81 | 12.9 | 16 | 90 | 16,415 | 381 | 16 |
| West Tecumseh Hamlet south of CP Rail | 4,542 | 0 | 4,542 | 1,363 | 3.28 | 51.8 | 72 | 90 | 16,415 | 1,772 | 65 |
| Highway Service Centre | | 3,910 | 3,910 | 1,173 | 3.34 | 45.4 | 46 | 90 | 16,415 | 1,525 | 54 |
| Maidstone Hamlet | 2,000 | 610 | 2,610 | 783 | 3.49 | 31.7 | 150 | 90 | 16,415 | 1,018 | 60 |
| Oldcastle Hamlet to LRPCP | 852 | 5,424 | 6,276 | 1,883 | 3.15 | 68.7 | 335 | 90 | 16,415 | 2,448 | 132 |
| Combined Catchment Area to LRPCP | 14,382 | 11,156 | 25,538 | 7,661 | 2.55 | 225.8 | 782 | 90 | 16,415 | 9,960 | 374 |
| Oldcastle Hamlet to LRWRP | 1,200 | 4,787 | 5,987 | 1,796 | 3.17 | 65.9 | 163 | 90 | 10,110 | 2,335 | 85 |

| | Urban Build-Out Wastewater Flow Projections (2028+) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manning Business Park (Sylvestre Drive PS) | | 1,629 | 1,629 | 489 | 3.65 | 20.7 | 60 | 90 | 16,415 | 635 | 32 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 1,244 | 100 | 1,344 | 403 | 3.71 | 17.3 | 35 | 90 | 16,415 | 524 | 24 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 1,956 | 25 | 1,981 | 594 | 3.59 | 24.7 | 55 | 90 | 16,415 | 772 | 35 |
| West Tecumseh Hamlet north of CP Rail | 5,606 | 0 | 5,606 | 1,682 | 3.20 | 62.3 | 90 | 90 | 16,415 | 2,186 | 79 |
| East Tecumseh Hamlet south of CP Rail | 1,433 | 0 | 1,433 | 430 | 3.69 | 18.4 | 23 | 90 | 16,415 | 559 | 23 |
| West Tecumseh Hamlet south of CP Rail | 6,656 | 0 | 6,656 | 1,997 | 3.13 | 72.3 | 105 | 90 | 16,415 | 2,596 | 92 |
| Highway Service Centre | | 3,910 | 3,910 | 1,173 | 3.34 | 45.4 | 46 | 90 | 16,415 | 1,525 | 54 |
| Maidstone Hamlet | 3,000 | 1,085 | 4,085 | 1,226 | 3.33 | 47.2 | 225 | 90 | 16,415 | 1,593 | 90 |
| Oldcastle Hamlet to LRPCP | 1,237 | 10,983 | 12,220 | 3,666 | 2.87 | 121.7 | 652 | 90 | 16,415 | 4,766 | 246 |
| Combined Catchment Area to LRPCP | 21,132 | 17,732 | 38,864 | 11,659 | 2.97 | 319.5 | 1,291 | 90 | 16,415 | 15,157 | 565 |
| Oldcastle Hamlet to LRWRP | 1,200 | 4,787 | 5,987 | 1,796 | 3.17 | 65.9 | 163 | 90 | 10,110 | 2,335 | 85 |

| | Expanded Urban Build-Out Wastewater Flow Projections (2028+) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manning Business Park (Sylvestre Drive PS) | | 1,629 | 1,629 | 489 | 3.65 | 20.7 | 60 | 90 | 16,415 | 635 | 32 |
| East Tecumseh Hamlet north of CP Rail (north part to Westlake Drive Trunk Sewer) | 1,244 | 100 | 1,344 | 403 | 3.71 | 17.3 | 35 | 90 | 16,415 | 524 | 24 |
| East Tecumseh Hamlet north of CP Rail (south part to CP Rail Diversion Sewer) | 1,956 | 25 | 1,981 | 594 | 3.59 | 24.7 | 55 | 90 | 16,415 | 772 | 35 |
| West Tecumseh Hamlet north of CP Rail | 5,606 | 0 | 5,606 | 1,682 | 3.20 | 62.3 | 90 | 90 | 16,415 | 2,186 | 79 |
| East Tecumseh Hamlet south of CP Rail | 1,433 | 0 | 1,433 | 430 | 3.69 | 18.4 | 23 | 90 | 16,415 | 559 | 23 |
| West Tecumseh Hamlet south of CP Rail | 6,656 | 0 | 6,656 | 1,997 | 3.13 | 72.3 | 105 | 90 | 16,415 | 2,596 | 92 |
| Highway Service Centre | | 3,910 | 3,910 | 1,173 | 3.34 | 45.4 | 46 | 90 | 16,415 | 1,525 | 54 |
| Maidstone Hamlet | 3,000 | 1,085 | 4,085 | 1,226 | 3.33 | 47.2 | 225 | 90 | 16,415 | 1,593 | 90 |
| Oldcastle Hamlet to LRPCP | 2,437 | 15,770 | 18,207 | 5,462 | 2.69 | 170.3 | 815 | 90 | 16,415 | 7,101 | 325 |
| Future Urban Expansion Area @ 50 ppha (to match 38.0 ML/D Treatment Capacity at LRPCP) | 11,803 | | 11,803 | 3,541 | 2.88 | 118.1 | 236 | 90 | 16,415 | 4,603 | 163 |
| Combined Catchment Area to LRPCP | 34,135 | 22,519 | 56,654 | 16,996 | 2.21 | 436.6 | 1,690 | 90 | 16,415 | 22,095 | 757 |
| Oldcastle Hamlet to LRWRP | 1,200 | 4,787 | 5,987 | 1,796 | 3.17 | 65.9 | 163 | 90 | 10,110 | 2,335 | 85 |

***Alternative flow projection for future urban expansion area***

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Future Urban Expansion Area @ 50 ppha (to match 1,308 L/s Banwell Road Outlet Capacity) | 36,939 | | 36,939 | 11,082 | 2.39 | 306.4 | 739 | 90 | 16,415 | 14,406 | 447 |

UMA | AECOM

# County Road (CR) 22 Relief Sewer Modeling

CLASS EA REPORT

# Town of Tecumseh - County Road (CR) 22 - Relief Sewer Modeling

**PREPARED FOR:** Town of Tecumseh

**PREPARED BY:** CH2M HILL Canada Limited

**DATE:** May 15th, 2008

**PROJECT NUMBER:** 122053

## Background

In November 2004, a new Wastewater Agreement was executed between the City of Windsor and the Town of Tecumseh, to increase the conveyance capacity to the Little River Wastewater Pollution Control Plant (WWPCP) via a new 2100 mm diameter trunk sewer along Banwell Road. The following conveyance stipulations were placed on the agreement:

- 935 L/s through the existing outlet at Cedarwood pumping station (same as previous agreement)
- 1,308 L/s through a new outlet at Banwell Road and E.C. Rowe Expressway.

Based on this new agreement, the Tecumseh wastewater servicing scheme was revised to immediately address capacity limitations along Lesperance trunk sewer north of CR22, and to plan for the accommodation of new growth in the approved development areas. Table 1 provides the projected peak flow for existing, 20-year, and future growth for various service areas contributing to the Little River WWPCP and Figure 1 illustrates their location. The 20-year and ultimate peak flows include the Tecumseh Hamlet development in the Northeast and Southeast areas.

**TABLE 1**
**PROJECTED PEAK FLOW RATES TO LESPERANCE ROAD TRUNK SEWER**

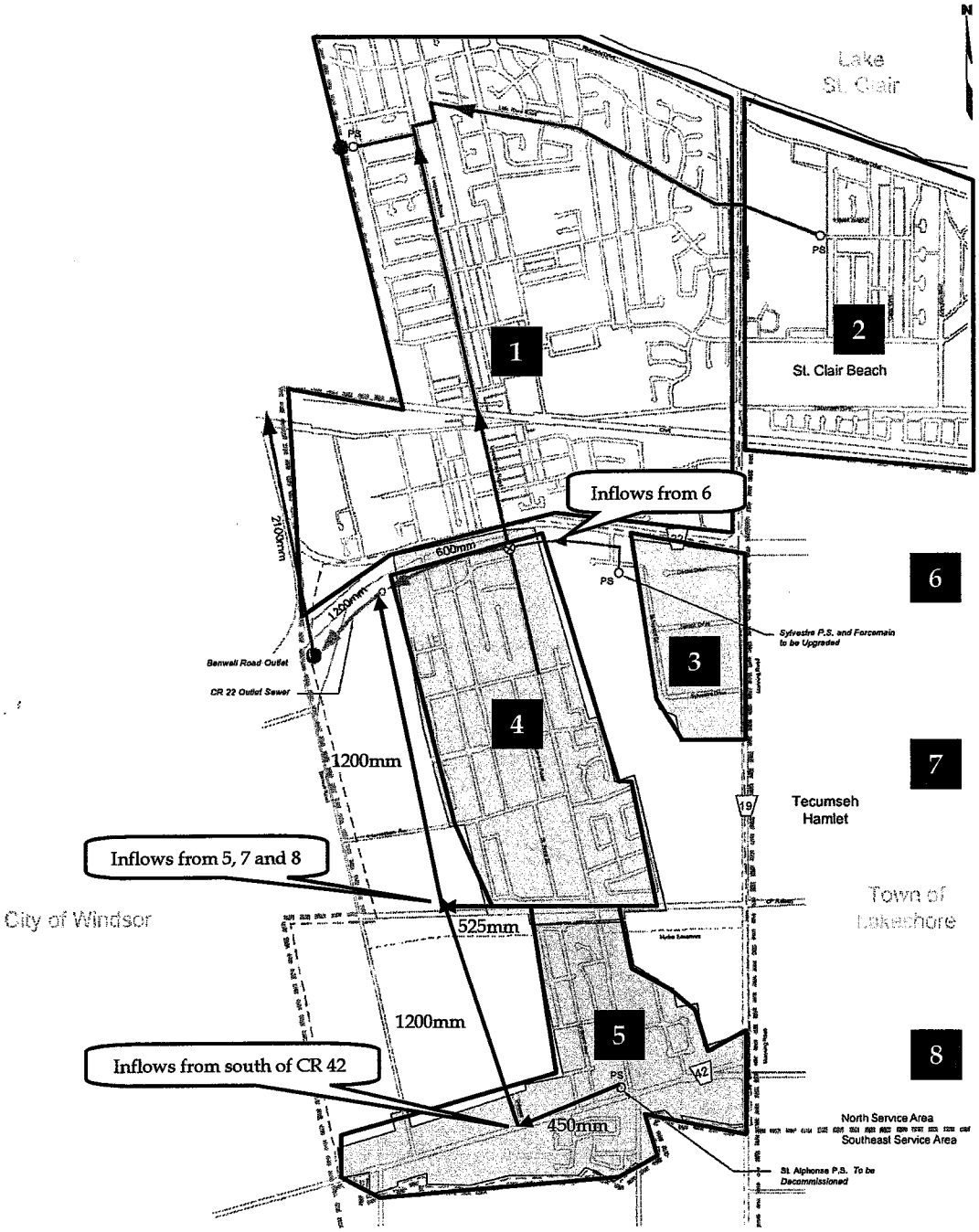
| Service Areas | Peak Flow (L/s) | | |
|---|---|---|---|
| | Existing | 20-year | Ultimate |
| 1. Tecumseh | 547 | 560 | 560 |
| 2. St. Clair Beach | 204 | 211 | 211 |
| 3. Manning Business Park (Sylvestre PS) | 11 | 22 | 32 |
| 4. Central Tecumseh Hamlet north of CPR Tracks | 148 | 156 | 156 |
| 5. Central Tecumseh Hamlet south of CPR Tracks | 96 | 96 | 115 |
| 6. Tecumseh Hamlet Development Area – north portion of the NE Area | | 17 | 24 |
| 7. Tecumseh Hamlet Development Area – south portion of the NE Area | | 25 | 35 |
| 8. Tecumseh Hamlet Development Area – SE area | | 16 | 23 |
| **Sub-Total** | **1,006** | **1,103** | **1,156** |
| *Minimum flow through CR22 Relief Sewer* | 71 | 31 | 48 |
| *Total flow through Diversion Sewer in Tecumseh Hamlet* | | 137 | 173 |
| **Total Peak Flow at the Cedarwood Pumping Station** | **935** | **935** | **935** |

Within Service Area #5, the flow is split between the area north of CR42 and the area south of CR42 as follows:

- Existing: No diversion at CR42 or at CP Rail
- 20-Year Condition: 75 L/s to CR42 Diversion Sewer AND 21 L/s diversion at CP to new West Tecumseh Trunk Sewer (Total 96 L/s).
- Ultimate Condition: 90 L/s to CR42 Diversion Sewer AND 25 L/s diversion at CP to new West Tecumseh Trunk Sewer (Total 115 L/s).

The town is constructing the CR 22 relief and outlet in 2008, and the West Tecumseh Trunk Sewer and diversion sewers at CP rail will be constructed in 5-10 years.

**FIGURE 1:**
Study Service Areas




## Study Purpose

The study purpose is to confirm that the proposed diversion flows from the Lesperance Road trunk sewer are adequate and appropriate to address capacity limitations within the

Tecumseh wastewater servicing system. In order to assess capacity limitations, the sewer model developed as part of the Sanitary Sewer Infiltration Study (2005) was updated to incorporate the proposed CR22 relief sewer and the Tecumseh Hamlet diversion sewer.

## Model Scenarios

The following scenarios were simulated in the model to evaluate capacity limitations in the system:

*Scenario 1 – Short-term Plan with CR22 Relief Sewer*

- Under this scenario, the impact of diverting peak flow ranging from 71 L/s under existing conditions to 194 L/s (maximum pipe capacity) will be evaluated. The desired output is to quantify the impact to capacity limitations previously identified in the Lesperance Road trunk sewer north of CR22 and confirm that the maximum allowable discharge rate of 935L/s at the Cedarwood pumping station is not exceeded.
    - **Scenario 1a** – 71 L/s
    - **Scenario 1b** – 194 L/s

*Scenario 2 – Long-term Plan with CR22 Relief Sewer and Tecumseh Hamlet Diversion Sewer*

- Under this scenario, the impact of diverting peak flows from Tecumseh Hamlet to the new CR22 outlet at Banwell Road will be evaluated. The desired output is to quantify the impact to capacity limitations in the Lesperance Road trunk sewer (maximum 935 L/s at Cedarwood PS) and Banwell Road trunk sewer (maximum 1,308 L/s) based on flows from the future Tecumseh Hamlet development areas.
    - **Scenario 2a** – 20-year
    - **Scenario 2b** – Ultimate

## Model Parameters & Assumptions

As part of the Town of Tecumseh Inflow and Infiltration Control Study (2005), a calibrated sanitary sewer model was developed. XPSWMM was used to simulate the hydraulics and the dry and wet weather time series flow pattern were developed using SWMHYMO. The wet weather hydrographs were created based on a diurnal dry weather flow pattern and a 24-hour 1:5 year storm event.

The calibrated hydrographs from the 2005 study were used to run the existing wet weather and dry weather flow conditions. To account for increases to the peak flow for the 20-year and ultimate scenarios, constant dry weather inflows were added to the calibrated hydrographs to reflect the change in peaks flows identified in Table 1. The increase in peak flow was distributed evenly throughout the respective service area.

For example, there are 70 nodes (manholes) in the Central Tecumseh Hamlet service area model south of the CPR tracks, two of which contain time series inflow data. The 20-year and ultimate peak flows for this service area are 22 L/s higher than existing peak flows. As such, 11 L/s were added as constant inflows to these two nodes. Adding a constant peak inflow as opposed to a diurnal curve is a more conservative approach and will produce conservative results.

Details on the County Relief Sewer were extracted from the April 2007 'County Road 22 Relief Sewer and Outlet Contract No. 1 (KMK Project no. 2841.02)' and added to the model. Data extracted included: ground elevation, pipe invert elevation, distance between manholes, pipe slope, and pipe diameter.

It was concluded in the November 15th 2007 CH2M HILL memo that the Reichmann Seniors Housing Development in the St. Clair Beach area will not increase the peak flow of the service area. As such, the model data at the respective manhole was not changed.

**Additional Assumptions:**

- The sewer pipe outlet at CR22 and Banwell Road is assumed to be a free outfall. There may be slight surcharge conditions at Banwell Road in the Ultimate Condition Scenario, since the connection is at the same invert as the new 2100mm pipe. However, this surcharge will have minimal hydraulic impact and is considered negligible for purposes of this study.
- The control structure connecting the CR22 relief sewer to the Lesperance trunk sewer is a 10 meter long flume (a pipe section with a reduced diameter). Other control structures could be considered such as sluice gate, orifice, bending weir, and rectangular weir which essentially serve the same purpose of controlling flow through the relief sewer.

## Modeling Results

The abovementioned scenarios were run on the XPSWMM sanitary sewer model, and analyses were performed to determine the resulting hydraulic bottlenecks in the system. To illustrate hydraulic restrictions within the system for the depth of the hydraulic gradeline below ground (freeboard) and the ratio of maximum flow to pipe capacity, color encoding was applied to the model.

The node (manhole) colour for the freeboard represents the depth in meters from the ground elevation to the hydraulic gradeline. It is assumed that most basements are located 1.5 metres below the ground surface therefore a freeboard level less then 1.5m indicates the potential for basement flooding to occur. Table 2 shows the colour encoding that were used in this analysis.

**TABLE 2**
Legend For Freeboard

| Colour | Max Flow/Design Flow |
|---|---|
| Red | < 1.5 |
| Yellow | 1.51 – 3.00 |
| Green | > 3.01 |

The graphical encoding or pipe colour for the hydraulic capacity represents the ratio of the flow in the pipes for the particular scenario to the design capacity for that pipe segment. Table 3 shows the hydraulic capacity ranges that were used in the analysis.

If the maximum flow to design flow ratio is less than 1.0 then the system in that section has available capacity. A ratio greater than 1.0 means the pipe is operating under surcharge conditions.

**TABLE 3**
Legend For Hydraulic Capacity Evaluation

| Colour | Max Flow/Design Flow |
|---|---|
| Green | < 0.49 |
| Blue | 0.5 – 0.99 |
| Yellow | 1.0 – 1.49 |
| Red | 1.5 – 10 |

The summary of flows at both the Cedarwood PS and Banwell Road trunk sewer are detailed in Table 4. Figures 2 to 9 illustrate the simulated freeboard and hydraulic capacity results for the four (4) scenarios.

In general, there were a greater number of manholes with freeboard less than 1.5 meters below the ground elevation for the 20-year and ultimate scenarios. The areas were concentrated around the south side of the Central Tecumseh Hamlet (south of the CPR tracks) and at the east side of St. Clair Beach.

**TABLE 4**
Peak Flow Results – Scenarios 1a, 1b, 2a, 2b

| Scenario | Cedarwood PS (L/s) | Banwell Road Trunk Sewer (L/s) |
|---|---|---|
| 1a | 922 | 74 |
| 1b | 828 | 195 |
| 2a | 925 | 220 |
| 2b | 927 | 252 |
| **Max Flow** | **935** | **1308** |

**FIGURE 2:**
Graphical Encoding of the Depth of the Hydraulic Gradeline Below Ground (no diversion sewer, Figure 4-6 in Jan 2005 report)

**FIGURE 3:**
Graphical Encoding of the Ratio of Maximum Flow to Pipe Capacity (no diversion sewer, Figure 4-5 in Jan 2005 report)

**FIGURE 4:**
Scenario 1a – Graphical Encoding of the Depth of the Hydraulic Gradeline Below Ground

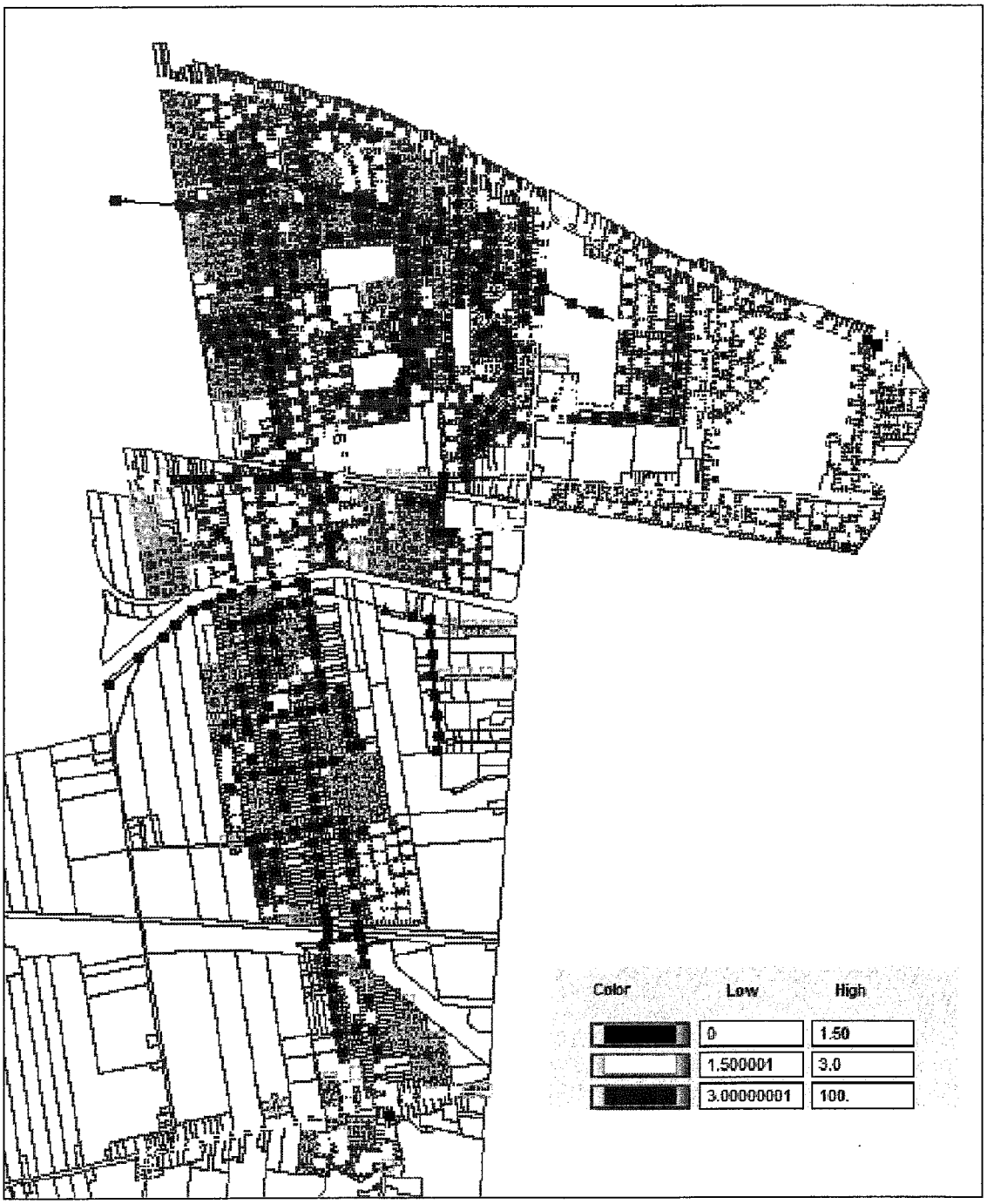


**FIGURE 5:**
Scenario 1a – Graphical Encoding of the Ratio of Maximum Flow to Pipe Capacity

**FIGURE 6:**
Scenario 1b – Graphical Encoding of the Depth of the Hydraulic Gradeline Below Ground

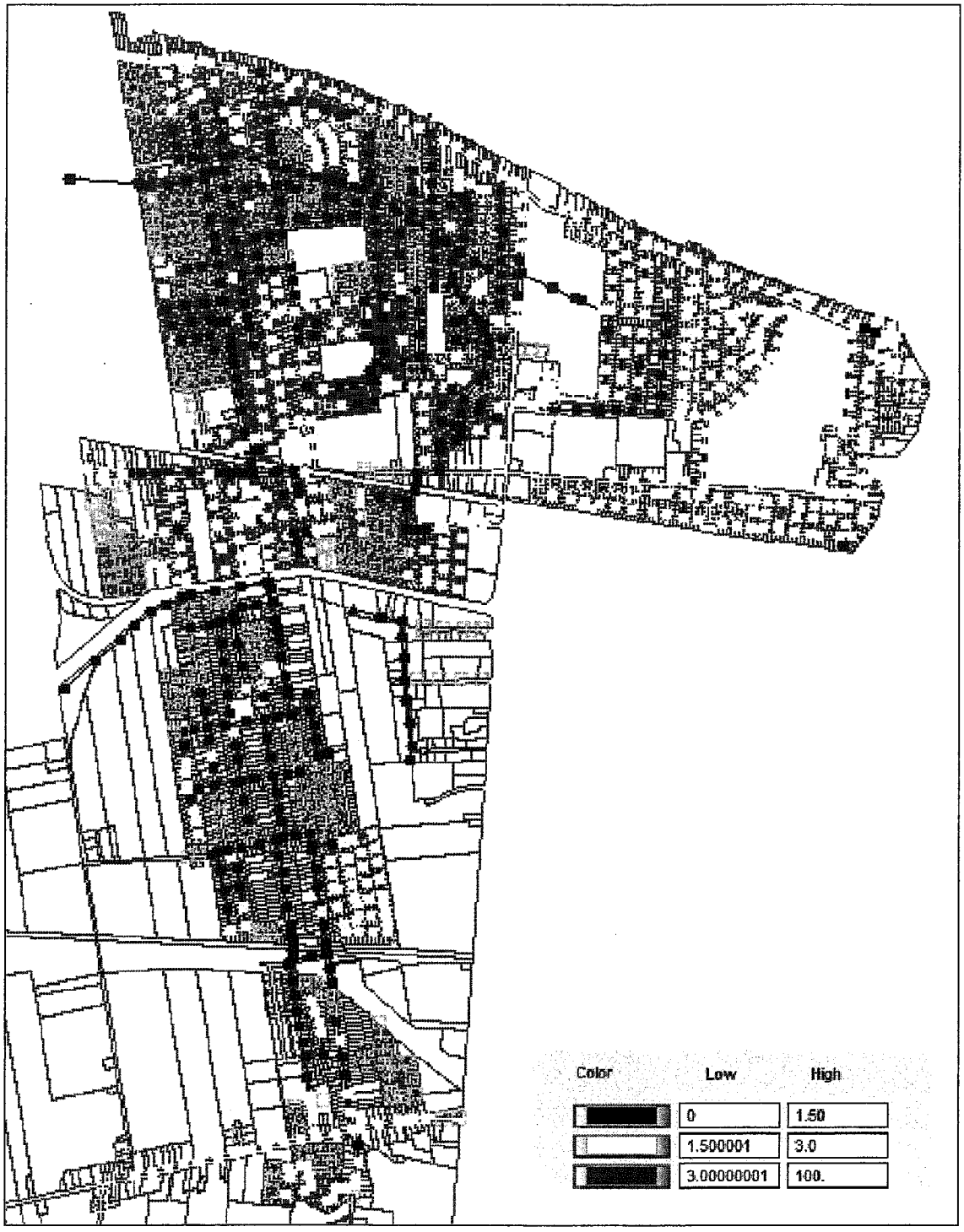


**FIGURE 7:**
Scenario 1b – Graphical Encoding of the Ratio of Maximum Flow to Pipe Capacity

**FIGURE 8:**
Scenario 2a – Graphical Encoding of the Depth of the Hydraulic Gradeline Below Ground

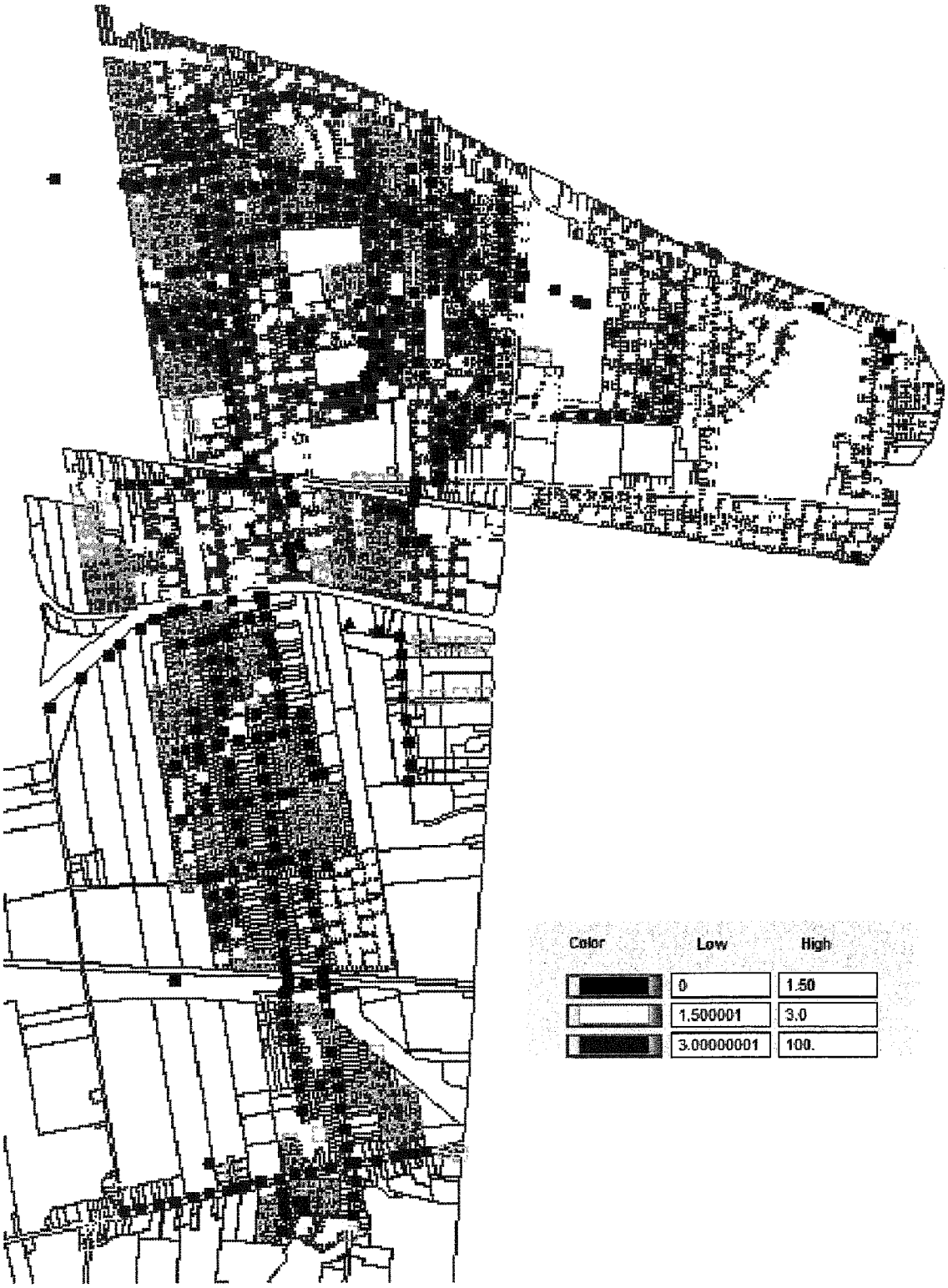


**FIGURE 9:**
Scenario 2a – Graphical Encoding of the Ratio of Maximum Flow to Pipe Capacity

**FIGURE 10:**
Scenario 2b – Graphical Encoding of the Depth of the Hydraulic Gradeline Below Ground

**FIGURE 11:**
Scenario 2b – Graphical Encoding of the Ratio of Maximum Flow to Pipe Capacity

## Diversion Strategies – Conclusions & Recommendations

The three relief sewers at County Road 22, the CP Railway, and County Road 42 effectively divert flow away from Lesperance Street sewer and create ideal hydraulic conditions for pipe capacity and freeboard. The only hydraulic constraint identified in the model analysis is in the St. Clair Beach area. Limited freeboard, less than 1.5m, in the NE section of the service area was observed for existing, 20-yr and ultimate scenarios. This hydraulic constraint is a result of shallow sewers, with limited ground cover. Potential solutions for alleviating this hydraulic constraint are:

- Increase the pump station capacity at the Lakewood PS (existing capacity is 0.195cms and the peak flow in St. Clair Beach is 0.211cms).
- Decrease wet weather flow contribution in the area.
- Provide storage within the system by increasing the existing pipe diameters or add storage at the Lakewood PS.

The critical manhole locations and conveyance pipes which had hydraulic limitations for pipe capacity and freeboard are summarized in Table 5 and Table 6 respectively. Manhole locations with a freeboard less than 1.5 metres are listed in the table since this reflects a hydraulic gradeline that is higher than the average basement invert elevation. Pipe capacity ratios greater than 1.5 are identified since this reflects a maximum pipe flow that is greater than its design capacity.

**TABLE 5**
Freeboard - hydraulic limitations in Scenarios 1a, 1b, 2a, 2b

| Scenario | Manhole # | Freeboard (m) |
|---|---|---|
| 1a | SB125 | 1.300 |
| | SB157 | 1.460 |
| | SB124 | 1.470 |
| 1b | Same results as 1a | |
| 2a | SB125 | 1.210 |
| | SB157 | 1.370 |
| | SB124 | 1.380 |
| | SB126 | 1.460 |
| 2b | Same results as 2a | |

**TABLE 6**
Pipe Capacity – hydraulic limitations in Scenarios 1a, 1b, 2a, 2b

| Scenario | Upstream Manhole # | Downstream Manhole # | Pipe Capacity Ratio |
|---|---|---|---|
| 1a | SB136 | SB306 | 6.138 |
| | SB157 | SB125 | 3.081 |
| | TH176 | TH124 | 1.999 |
| | TH114 | TH176 | 1.616 |
| | TE085 | TE006 | 1.587 |
| 1b | Same results as 1a | | |
| 2a | SB136 | SB306 | 6.176 |
| | SB157 | SB125 | 3.137 |
| | TH176 | TH124 | 1.681 |
| | TE085 | TE006 | 1.618 |
| 2b | SB136 | SB306 | 6.176 |
| | SB157 | SB125 | 3.135 |
| | TH176 | TH124 | 1.749 |
| | TE085 | TE006 | 1.618 |