



Region of Waterloo

Water and Wastewater Monitoring Report

May

2016

The Water and Wastewater Monitoring Report is produced annually by the Region of Waterloo. It documents actual water use and wastewater flows, water production and wastewater treatment capacities, development planning and remaining capacity.

Approved by Regional Council on May 11, 2016

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1.0 Introduction

1.1 Overview

The Region of Waterloo Transportation & Environmental Services Department produces the Water and Wastewater Monitoring Report annually with input from the Region's Planning, Development and Legislative Services Department (PDLs). The purpose of this report is to:

1. document actual water use and wastewater flows;
2. provide a basis for water use and wastewater flow forecasts required in preparing the capital budgets and user rates;
3. document water production and wastewater treatment capacities;
4. update Regional Council with respect to remaining uncommitted capacities of water supply and wastewater treatment infrastructure;
5. provide a basis for engineering staff to provide comment on the water and wastewater aspects of development applications.

The 2016 Water and Wastewater Monitoring Report (2016WWWMR) will be one of a number of inputs used in assessing the needs for Regional Water and Wastewater Infrastructure, in preparing the annual Capital Budget and Capital Forecast, and in formulating responses to development applications.

Water use and wastewater flows are forecast to the year 2026. Table 1 provides a summary of remaining capacities by service area. A summary of small water supply systems is provided in Table 2. A glossary is included in Appendix A. Wastewater and water data is tabulated in Appendices B and C respectively. Table 3 and Appendix D summarize the status of plans (commitments) for each water and wastewater service area. Sample calculations can be found in Appendix E.

1.2 Changes from the 2015 Water and Wastewater Monitoring Report

The changes from the 2015 WWWMR are as follows:

- Population and development data, including building permits issued, have been updated to December 31, 2015.
- Water consumption patterns and wastewater flows are a function of yearly weather fluctuations. In 2015, the annual precipitation was below the average annual precipitation recorded at the University of Waterloo weather station. Seasonal impacts at some wastewater treatment plants showed generally average or slightly below average flows. The water consumption was slightly below average in 2015,

with an average measured maximum week in 2015. Overall the 5-year average consumption is continuing to decrease.

- The commitment tables in Appendix D have been updated to reflect year end 2015 conditions.

2.0 Methodology

2.1 Ministry of Environment (MOE) Guidelines

The current methodology for calculating uncommitted reserve capacity is outlined in the Ministry of Environment (MOE) publication “Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants, March 1995”. The formula for calculating the Uncommitted Reserve Hydraulic Capacity is defined below:

$$Cu = Cr - \left(\frac{L \times F \times P}{H} \right)$$

Where:

- Cu = uncommitted hydraulic reserve capacity (m³/d)
- Cr = hydraulic reserve capacity (m³/d) from MOE Certificate of Approval
- L = number of unconnected approved lots (units), i.e. “Commitments” that have servicing agreements
- P = existing connected population (people)
- H = number of households or residential connections (units)
- F = average day flows per capita (m³/d/c) - *Sewage Treatment Plants*

OR

F = maximum daily flow per capita (m³/d/c) - *Water Treatment Plants*

It is important to understand that no servicing capacity commitment is held for lands that have zoning in place that would allow development to proceed without additional planning approvals. Except for site plan approvals, all Planning Act approvals, including plans of subdivision, zoning amendments, and consents require acknowledgement by the Region of Waterloo Water Services Division that water and wastewater servicing capacity is available before final approvals are given. The available capacity expressed in this report as ‘Commitments’ is the capacity available to service all future Planning Approvals (subdivisions, condominiums, consents, zoning amendments, part lot control and minor variances) and/or building permits issued for all development outside of residential plans of subdivision. For the purposes of this report, committed capacity is also calculated to include plans of subdivision which have been draft approved.

Appendix E includes two charts that document the calculations used to generate all of

the tabulated water and wastewater results in Appendices B and C, respectively.

2.2 Servicing Commitments

Section 51 (24) (i) of the Planning Act obliges the Region to ensure the “adequacy of utilities and municipal services.” In addition ROP Policy 5.D.1 states that the “servicing requirements for planned development and projected growth will be monitored to ensure that the total system capacities are not exceeded, and to provide sufficient lead time for the planning, design, approval, financing and construction of new facilities.”

Except for site plan approvals, most Planning Act approvals, including plans of subdivision, zoning amendments, and consents require acknowledgement by the Region of Waterloo Water Services Division that water and wastewater servicing capacity is available. Draft approvals are granted based upon the availability of uncommitted capacity in existing water and wastewater systems.

Servicing commitments are made through separate servicing agreements between the Region and the developer, which are executed prior to the registration of a plan of subdivision. The servicing agreement expires within six to 18 months of being signed, at which time the developer would be required to seek a new commitment for servicing if registration of the plan of subdivision has not occurred.

In 1996, Regional Council by Report PC-96-061/ E-96-138 revised the conditions of draft approval for plans of subdivision to include a new condition requiring an Agreement for Servicing and allowing future, unbuilt service capacity to be considered, if three criteria are met:

- 1) The capacity expansion project must be imminent for construction and thereby included within the first five years of the 10 Year Capital Forecast;
- 2) There must be a sound technical basis for the anticipated new capacity associated with the project, as a result of completion of the Environmental Assessment, a suitable master plan or other Regional engineering evaluation; and
- 3) Approval of new draft plans of subdivision will be guided by Area Municipal Staging of Development programs and will not exceed 50 per cent of the estimated capacity of major planned service capacity projects or 75 per cent of minor planned projects.

It is important to note that the actual service capacity of a water or wastewater facility to be delivered from a future project cannot be guaranteed until a Certificate of Approval is issued by the MOE.

Since 1996, the registration of a plan of subdivision has been the point at which the capacity of water and wastewater systems is committed in accordance with MOE policies. However, a significant portion of all residential development is occurring outside of plans of subdivision. For example, in 2015 over 50 per cent of residential building permits issued were outside of plans of subdivision. This includes development on lands within the built up areas and within the designated greenfield areas. This trend is expected to continue. Currently, there is no mechanism to provide for a servicing commitment for lands that have zoning in place that would allow development to proceed without additional planning approvals.

With the adoption of the Places to Grow: Growth Plan for the Greater Golden Horseshoe, municipalities are now required to provide for a minimum of 40% of new residential units (phased in with full implementation by 2015) within the built-up areas. The implementation of the Growth Plan is carried out through the Regional and Area Municipal official plans.

The “Remaining Capacity” expressed in this report is the present capacity available in the water system and/or wastewater treatment plant to service all future Planning Approvals (subdivisions, condominiums, consents, zoning amendments, part lot control and minor variances) as well as/or building permits issued for all development outside of residential plans of subdivision.

For the purposes of this report, a “commitment” is presented in terms of number of people and includes the estimated population within: plans of subdivision which have Draft Approval, building permits issued but not yet occupied, and unbuilt registered plans.

2.3 Population Data

Population estimates for each service area were updated in April 2016. The Regional population estimate reflects year-end 2015, although a mid-summer population estimate is also used in some calculations for alignment with peak water usage period. The base for these estimates is the 2011 Census of Canada, but additionally includes students and the undercoverage (an estimate of those who were missed in the census). Building Permit activity as reported by the Area Municipalities was used to update this base to year-end 2015. Vacancy rates (extrapolated from CMHC data), demolitions, university/college student enrolment, and assumptions about the average number of persons per dwelling unit (PPU) also influence the numbers. Population estimates reported for years previous to 2015 have been preserved for continuity with previous Monitoring Reports.

The population estimates in this document are intended to be used only in the context of water and wastewater servicing requirements in the Region as they only reflect occupant data within the mapped bounds of each water and wastewater service area. It

is important to note that service area boundaries do not necessarily match municipal settlement area boundaries.

Forecast populations are based on the Province of Ontario's Places to Grow: Growth Plan for the Greater Golden Horseshoe (2006) as incorporated into the Region of Waterloo Regional Official Plan (ROP) which anticipates a population for the Region of Waterloo of 729,000 in 2031. In order to maintain a forecast of at least ten years, the forecast horizon for this report is 2026. Interim years have been adjusted downward based on recent growth patterns, and as a result, may not align with previously published figures.

2.4 Development Data

Development data for each service area, shown in Appendix "D," was updated in April 2016 with subdivision plan status current to year-end 2015. Where a range of number of units is proposed in a draft approved plan, the maximum is reported. For registered plans, units are included based on building permit data received from Area Municipalities to indicate whether they are "unbuilt" (no building permit issued).

For all building permit activity, "population in building permit issued but not yet occupied" represents dwelling units assumed to be unoccupied by year-end 2015. Typically a six-month lag is assumed between the time a residential building permit for a single or semi-detached unit is issued and when that unit is occupied. For townhouses and apartment buildings, however, the lag time can be much longer and estimated occupancy dates are delayed accordingly.

Commitments were converted from the number of units to an estimate of population within those units based on a "persons per unit" (PPU) factor which varies with the housing type of the unit. The PPU factors are as published in the Region of Waterloo Land Budget (as revised, June 2012). Multiple units are calculated using 50% townhouses and 50% apartments, while unspecified units are calculated with 75% single and 25% Townhouse.

These PPU's are summarized in the table below.

Structure Type	Persons Per Unit (PPU)
Single and Semi Detached	3.25
Townhouse	2.44
Apartment	1.77
Multiple Unit Types	2.11
Unspecified Unit Types	3.05

As initiated in the 2013 WWWWMR, the building permit commitments continue to be reported separately based on whether they are within the Places to Grow “Built Up Area” (BUA) or the “Designated Greenfield Area” (DGA).

Pending plans do not have a commitment to water and/or wastewater servicing and are not included in any of the development data presented in this report.

A summary of commitments for each service area are provided in Appendix D.

2.5 Water Flows

Actual water use data, where available, was analysed and interpreted in order to forecast future per capita water use. In order to help temper the impact of anomalous years, a five year average of maximum day water use per person is used to calculate the maximum day per capita flow. The five year average of maximum day water use per person is then multiplied by the population to get the maximum day projected flow for the current year, and is also multiplied by the population forecasts to get the future projected flows.

Maximum day demands are used for demand forecasts in most of the systems with the exception of the Integrated Urban System (IUS) where Maximum Week Demand is used. Further details about the use of maximum week are given below.

Where sufficient actual water data is not available or where there is significant data variation during the year as in the case of some of the 12 small communal systems, MOE and Region’s design guidelines were used to generate estimated current and future water use. If future trends change from those projected in the population forecasts, or if person per unit values change, or if the ratio of residential to non-residential development varies, or if additional water demand management programs are implemented and effective, water use will vary from the projections of this report. These projections will be re-evaluated in the yearly WWWWMRs. Water use statistics and forecasts for each service area are included in Appendix C.

2.5.1 Maximum Week Demand

The maximum week approach was introduced in the 94WWWMR report. The Integrated Urban System (IUS) has made it possible to do extended time simulations of the hydraulic model. The simulations verified that through the use of water stored in reservoirs to balance daily peaks the supply system functioned adequately on a maximum week demand basis. This is only possible in the Tri-Cities due to the IUS model and the relatively large amount of water stored in reservoirs. The maximum week demand is approximately 10% lower than the usual maximum day demand. The Region of Waterloo is believed to be the only municipality in Ontario that has MOE approval to use the maximum week demand approach. This report continues to use the Maximum Week Demand for the IUS. The maximum week demand approach is not

used in any of the Region's other water systems due to limitations of the water storage facilities.

2.5.2 Water Use Efficiency Measures

The MOE Guidelines do not allow anticipated water use reductions to be used in calculating future demands, but require future water use projections to be based on historical water use trends. The 2016 WWWMR uses the historic maximum day demand to predict future maximum day demands using the population forecast, with the exception of the Integrated Urban System (IUS) where Maximum Week Demand is used.

As the Region's Water Efficiency Master Plan (WEMP) is implemented and other factors remain the same, future maximum and average day per capita water are expected to decline from current levels, thereby resulting in a decline in future demand projections. Mandatory water efficient fixture installation in new residential development required as of 1996 by the Ontario Building Code also reduced the water needs of future developments.

2.5.3 Water Supply Capacity

An update to the existing Water Supply Master Plan (WSMP) was initiated to address a declining trend in water demands experienced in recent years, to address new constraints on groundwater usage arising from the provincial Clean Water Act and the outcome of recent studies triggered by this new legislation.

The updated WSMP addresses the needs for water supply arising from future development, and supports extending the life of the existing systems and operating them in the most efficient manner, reducing the operational costs and the potential impacts on the environment. Findings and recommendations from the master plan have been incorporated into the 2016 WWWMR.

For the IUS, the updated WSMP has changed the way that the capacity of the system is described. The Sustainable Average System Capacity describes the rate of water that can be constantly taken year-round from the various sources without negatively impacting the long-term supply. The Maximum System Capacity describes the rate of water that can be taken under short-term or peaking conditions, usually limited to number of days per year.

2.6 Wastewater Flows

Annual Average Day Wastewater Flow is normally used to determine requirements for wastewater treatment facilities. Wastewater statistics and forecasts by service area are included in Appendix B.

Historically, the available capacity at each wastewater treatment plant was determined by using the adjusted per capita flows multiplied by the projected population. Adjusted per capita flows are determined for each plant according to the methodology of the MOE described above and are then statistically adjusted to the 85% confidence level (identified as “85% flow” or “Adjusted Flow”). The Adjusted Flow is an adjusted average flow, which corresponds to a flow with an 85% probability of not being exceeded. This methodology accounts for seasonal variations in flow, generally caused by rainfall and snow thawing, and protects against over-committing flows at the treatment plants. Adjusted flows continue to be used to evaluate the impact of seasonal variations at the WWTPs, especially in systems showing elevated seasonal impacts.

Consistent with the 2015 WWWMR, the unadjusted five year average was used for development planning and approvals. Both the average flow and the adjusted average flow are shown on the charts in Appendix B, but remaining capacity at each plant has been determined by using the unadjusted average flow, as outlined in the MOE guidelines.

Intrinsic to the per capita flow is a number of contributing factors above and beyond the simple residential usage. These additional factors include; inflow and infiltration (I&I), Industrial Commercial and Institutional (ICI) flows, and flows from developments that are not currently explicitly tracked (site plans). It is assumed that the ratio of residential population to employment (equivalent population) remains consistent in each service area from year to year.

In addition, if additional water conservation and I&I corrective programs are implemented and effective, wastewater flow projections will vary from the projections of this report. These projections will be evaluated in the yearly WWWMRs.

2.7 Wastewater Treatment Capacity

Wastewater treatment plant capacities are generally based on the MOE Certificates of Approval (CofA). These are usually identical to the rated hydraulic capacity.

3.0 Service Area Assessments

3.1 Water Systems

3.1.1 Integrated Urban System (IUS)

IUS Sustainable Average System Capacity	193,000 (m ³ /d)
IUS Maximum System Capacity	250,000 (m ³ /d)
Max Week Projected Demand	177,392 (m ³ /d)
Commitments	22,177 (m ³ /d)
Remaining Capacity	50,430 (m ³ /d)

The water supply systems servicing the communities of Cambridge (including Brown’s Subdivision in the Township of North

Dumfries), Kitchener, Waterloo (including the village of St. Agatha in Wilmot Township), Elmira and St. Jacobs are treated as a single system as there are permanent interconnections of the water systems servicing these communities. The interconnections improve the capability of distributing water between the five communities.

Measured average day flow for 2015 was 140,101 m³/d, down approximately 2% from 2014. Maximum week water use in 2015 for the IUS is reported as 167,338 m³/d, which is down about 1% over maximum week use in 2014. Consumption in 2015 was below the 5-year average. The peaking factor between average day and maximum week in 2015 was 1.19. The 5-year average for maximum week projected demand is 177,392 m³/d. Maximum week water use is largely dependent on weather conditions. Dry conditions can cause much higher than average maximum week water consumption and wetter than usual conditions can cause a significant drop in water use during the peak usage period (ie. late spring/early summer) and result in much lower than average maximum week consumption.

Using the 5-year average maximum week per capita demand of 0.3516 there is capacity to service approximately 143,000 additional people in the IUS as of December 31, 2015.

The current commitment in draft approved plans, as well as registered plans with unbuilt units, or units with a building permit issued but not yet assumed to be occupied is 63,078 people. A summary of these commitments can be found in Appendix D.

The Region completed an update to the Water Supply Master Plan in 2015 that identifies the demands and anticipated requirements for additional water supply sources. Recommendations in this master plan have been incorporated in this WWWMR.

3.1.2 Baden - New Hamburg Water System

Baden New Hamburg System Capacity	12,614 (m ³ /d)
Max Day Projected Demand	4,455 (m ³ /d)
Commitments	481 (m ³ /d)
Remaining Capacity	7,678 (m ³ /d)

The present water supply capacity for Baden - New Hamburg is 12,614 m³/d as shown in the most recent Master Plan (2011). This

capacity includes 3,542 m³/d from NH3 in New Hamburg, and 9,072 m³/d that can be transferred to Baden and New Hamburg from wells K50 and K51, which also supply the IUS. Maximum Day water demand in 2015 was measured at 4,006 m³/d which is down 2% from 2014. The 5-year average max day projected demand is 4,455 m³/d.

Using the 5-year average max day per capita demand of 0.3353 m³/c/d, there is capacity to service approximately 23,000 additional people in Baden-New Hamburg

water system as of December 31, 2015.

3.1.3 Ayr Water System

Ayr System Capacity	5,530 (m ³ /d)
Max Day Projected Demand	2,813 (m ³ /d)
Commitments	1,285 (m ³ /d)
Remaining Capacity	1,432 (m ³ /d)

The firm capacity rating of the Ayr Water System is 5,530 m³/d. 2015 Maximum Day water use in Ayr was recorded at 2,807 m³/d, which is a 26% decrease from 2014. This large

decrease was attributed to a large watermain leak that occurred in the distribution system in 2014. Higher than normal daily consumption was observed in early 2015, and after exhaustive leak detection efforts which took several weeks the leak was found to be in close proximity to the railway at which time it was repaired and flow returned back to normal for that time of year. The 5-year average max day projected demand is 4,098 m³/d. The 5-year average has not been adjusted to account for the leak.

Using the 5-year average max day per capita demand of 0.5663 m³/c/d, there is capacity to service approximately 2,500 additional people in the Ayr Water System as of December 31, 2015. The present firm capacity could service a population of approximately 10,000 people.

3.1.4 Wellesley Water System

Wellesley System Capacity	3,000 (m ³ /d)
Max Day Projected Demand	1,144 (m ³ /d)
Commitments	57 (m ³ /d)
Remaining Capacity	1,799 (m ³ /d)

The water supply system has a firm capacity of 3,000 m³/d. 2015 Maximum Day demand in Wellesley was measured as 954 m³/d, which is down approximately 27% from 2014. The 5-

year average max day projected demand is 1,144 m³/d.

Using the 5-year average per max day capita demand of 0.3429 m³/c/d, there is capacity to service approximately 5,200 additional people in the Wellesley Water System as of December 31, 2015. The present system capacity could service a population of approximately 8,700 people.

3.1.5 St. Clements Water System

St. Clements System Capacity	1,770 (m ³ /d)
Max Day Projected Demand	458 (m ³ /d)
Commitments	6 (m ³ /d)
Remaining Capacity	1,307 (m ³ /d)

The water treatment plant has a firm capacity of 1,770 m³/d. 2015 Maximum Day Demand in St. Clements was measured as 467 m³/d, which is up approximately 18% from 2014. The 5-

year average max day projected demand is 458 m³/d.

Using the 5-year average per max per capita demand of 0.3651 m³/c/d, there is capacity to service approximately 3,600 additional people in the St. Clements Water System as of December 31, 2015. The present system capacity could service a population of approximately 5,000 people.

3.2 Wastewater

3.2.1 Kitchener Wastewater Treatment Plant (KWWTP)

The KWWTP has a rated capacity of 122,700 m³/d. Flow during 2015 was recorded at 64,136 m³/d which is down about 10% from 2014. The 5-year Average Projected Flow is 70,292 m³/d.

KWWTP Rated Capacity	122,700 (m ³ /d)
Average Projected Flow	70,292 (m ³ /d)
Commitments	11,563 (m ³ /d)
Remaining Capacity	40,845 (m ³ /d)

Using the 5-year average flow per capita flow of 0.2961 m³/c/d, there is capacity to service approximately 138,000 additional people in the Kitchener Wastewater Service Area as of December 31, 2015. The present system capacity could service a population of approximately 415,000 people.

3.2.2 Waterloo Wastewater Treatment Plant (WWWTP)

The WWWTP Certificate of Approval (CofA) has a maximum hydraulic capacity of 72,730 m³/d. However, the installed treatment capacity of the plant is 57,500 m³/d. Flow during 2015 at the WWWTP was recorded at 38,391 m³/d, which is down 20% from 2014. The 5-year Average Projected Flow is 45,870 m³/d.

WWWTP Rated Capacity	57,500 (m ³ /d)
Average Projected Flow	45,870 (m ³ /d)
Commitments	4,325 (m ³ /d)
Remaining Capacity	7,305 (m ³ /d)

Using the 5-year average per capita flow of 0.3340 m³/c/d, there is capacity to service approximately 22,000 additional people in the Waterloo Wastewater Service Area as of December 31, 2015. The expected rated capacity of 57,500 m³/d could service a population of approximately 172,000 people.

The projected flows plus committed flows at the Waterloo WWTP is approximately 90% of the rated capacity of the plant. Background work has been initiated through the Wastewater Master Plan to confirm the timing of a future expansion. Timing of the plant capacity expansion will be planned to accommodate projected flows.

Flows at this plant have also shown unusual variation over the last few years. The City of Waterloo has undertaken a study to identify areas of excessive I & I. The City is progressing with investigations in the high priority areas.

3.2.3 Galt Wastewater Treatment Plant (GWWTP)

The rated capacity of the GWWTP is 56,800 m³/d. Flow at the GWWTP was recorded at 33,516 m³/d in 2015 which is down approximately 5% from 2014. The 5-year Average Projected Flow is 34,868 m³/d.

GWWTP Rated Capacity	56,800 (m ³ /d)
Average Projected Flow	34,868 (m ³ /d)
Commitments	1,296 (m ³ /d)
Remaining Capacity	20,636 (m ³ /d)

Using the 5-year average per capita flow of 0.4051 m³/c/d, there is capacity to service approximately 51,000 additional people in the Galt Wastewater Service Area as of December 31, 2015. The present rated capacity could service a population of approximately 140,000 people.

Flow from Industrial Road Service Area (IRSA) which is high in organic loading had previously been directed to the Preston Wastewater Treatment Plant. Diversion of the IRSA flow from Preston to Galt has been completed and all of the flow from the IRSA has been redirected to Galt. Observations at the Galt WWTP have been undertaken to assess the impact this diversion has at the operations at the plant. It has been confirmed that the plant can accommodate the flows and loading from the IRSA and no reduction in rated capacity will be necessary at Galt.

3.2.4 Preston Wastewater Treatment Plant (PWWTP)

The Preston WWTP has a rated capacity of 16,820 m³/d. Beginning in the summer of 2009, the effluent from the Industrial Road Service Area (IRSA) has been gradually diverted from Preston WWTP to Galt WWTP, as recommended in the

PWWTP Rated Capacity	16,820 (m ³ /d)
Average Projected Flow	8,967 (m ³ /d)
Commitments*	2,701 (m ³ /d)
Remaining Capacity	5,152 (m ³ /d)

*Includes 1,860 m³/d for Boxwood

2007 Wastewater Master Plan. At year end 2011, the diversion was completed and all of the effluent from the IRSA is being diverted to Galt.

Flow in 2015 at the PWWTP was recorded at 8,450 m³/d which is down 8% from 2014 flows. The 5-year Average Projected Flow is 8,967 m³/d.

In the 2011 WWWMR wastewater capacity was reserved for the Boxwood Industrial Subdivision in the Preston Wastewater Service Area in the amount of 1,860 m³/d. Occupancy in the Boxwood subdivision started in late 2014, and continued in 2015. However, the new buildings were generally not occupied until later in the year, so the impact on the wastewater received at the plant would be negligible for 2015, and therefore no adjustments to the reserve capacity have been made in the 2016 WWWMR. In future years, the reserved capacity will be reduced proportionally based

on the development activity.

Using the 5-year average per capita flow of 0.4327 m³/c/d, there is capacity to service approximately 11,900 additional people in the Preston Wastewater Service Area as of December 31, 2015. The present rated capacity could service a population of approximately 39,000 people.

3.2.5 Hespeler Wastewater Treatment Plant (HWWTP)

The HWWTP has a rated capacity of 9,320 m³/d. Flow at the HWWTP was recorded at 6,435 m³/d for 2015, which is down about 5% from 2014. The 5-year Average Projected Flow is 7,088 m³/d.

HWWTP Rated Capacity	9,320 (m ³ /d)
Average Projected Flow	7,088 (m ³ /d)
Commitments	118 (m ³ /d)
Remaining Capacity	2,114 (m ³ /d)

Using the 5-year average per capita flow of 0.2752 m³/c/d, there is capacity to service approximately 7,700 additional people in the Hespeler Wastewater Service Area as of December 31, 2015. The present rated capacity of 9,320 m³/d could service a population of approximately 34,000 people.

3.2.6 Elmira Wastewater Treatment Plant (EWWTP)

The EWWTP has a rated capacity of 7,800 m³/d of which 186 m³/d of capacity is allocated to Crompton (formerly Uniroyal). However, as the flow reports received from OCWA include the Crompton flows, the effective capacity of the plant is reported as 7,800 m³/d.

EWWTP Rated Capacity	7,800 (m ³ /d)
Average Projected Flow	4,283 (m ³ /d)
Commitments	1,822 (m ³ /d)
Remaining Capacity	1,695 (m ³ /d)

Flows in 2015 at the EWWTP were recorded at 3,215 m³/d which is down 21% from 2014. The 5-year Average Projected Flow is 4,283 m³/d.

Using the 5-year average per capita flow of 0.4272 m³/c/d, there is capacity to service approximately 4,000 additional people in the Elmira Wastewater Service Area as of December 31, 2015. The present rated capacity of 7,800 m³/d could service a population of approximately 18,300 people.

Inflow and Infiltration are one of the causes of the unusual flow variations and high wastewater per-capita flows at this plant. Despite an I&I reduction program undertaken between 1998 and 2008, total wastewater flows are still seasonally impacted by rainfall and snow thawing. The high flow variation at the plant indicates that I&I continue to be a problem in several areas in Elmira.

The Region completed the Elmira and St. Jacobs Wastewater Treatment Master Plan in 2012. The master plan indicated that expansion of this plant will be not required until 2031, and that the Township of Woolwich should continue to address the elevated impacts of I&I at the plant flows.

3.2.7 St. Jacobs Wastewater Treatment Plant (SJWWTP)

The hydraulic capacity of the SJWWTP is 1,450 m³/d. Flows in 2015 were recorded at 725 m³/d which is down approximately 25% from 2014. The 5-year Average Projected Flow is 950 m³/d .

SJWWTP Rated Capacity	1,450 (m ³ /d)
Average Projected Flow	950 (m ³ /d)
Commitments	1 (m ³ /d)
Remaining Capacity	498 (m ³ /d)

Similar to Elmira, total wastewater flows in St. Jacobs are still seasonally impacted by rainfall and snow thawing. The high flow variation at the plant indicates that I&I continue to be a problem in several areas in St. Jacobs.

One of the key recommendations of the master plan was to direct the flows from the St Jacobs WWTP to the Waterloo WWTP once the Waterloo WWTP undergoes an expansion. Based on the timing of the planned capacity expansion for Waterloo, the preferred solution will be available before the capacity is reached at the St Jacobs WWTP. Once the flows have been directed to the Waterloo WWTP, the St Jacobs WWTP will be decommissioned.

Using the 5-year average per capita flow of 0.4970 m³/c/d, there is capacity to service approximately 1,000 additional people in the St. Jacobs Wastewater Service Area as of December 31, 2015. The present rated capacity of 1,450 m³/d could service a population of approximately 2,900 people.

3.2.8 Baden/New Hamburg WWTP (BNHWWTP)

The BNHWWTP has a rated operating capacity of 5,200 m³/d. The plant receives flows from Baden and New Hamburg. Flow in 2015 was recorded at 3,320 m³/d which is down about 11% from 2014. The 5-year Average Projected Flow is 3,798 m³/d. I & I are the expected causes of varied flows from year to year.

BNHWWTP Rated Capacity	5,200 (m ³ /d)
Average Projected Flow	3,798 (m ³ /d)
Commitments	420 (m ³ /d)
Remaining Capacity	982 (m ³ /d)

Using the 5-year average per capita flow of 0.2926 m³/c/d, there is capacity to service approximately 3,400 additional people in the Baden/New Hamburg Wastewater Service Area as of December 31, 2015. The present rated capacity of 5,200 m³/d could service a population of approximately 17,500 people.

The Baden – New Hamburg Water and Wastewater Master Plan was completed in 2011. The Master Plan recommended expansion of the WWTP by 2018/19 and that the Township of Wilmot addresses I&I issues in the collection system.

3.2.9 Ayr Wastewater Treatment Plant (AWWTP)

The AWWTP has a rated capacity of 3,000 m³/d. Historically there was an agreement between the Township of North Dumfries and the Schneider's processing plant in Ayr that grants Schneider's the option of connecting to

AWWTP Rated Capacity	3,000 (m ³ /d)
Average Projected Flow	1,358 (m ³ /d)
Commitments	615 (m ³ /d)
Remaining Capacity	1,028 (m ³ /d)

the municipal wastewater system. A flow of 154 m³/d had previously been included in the commitments to AWWTP. However due to the plants closure in 2013, this capacity is no longer required and the commitment of 154 m³/d has been eliminated.

Flow at the AWWTP in 2015 was recorded at 1,269 m³/d which is down about 3% from 2014. The 5-year Average Projected Flow is 1,358 m³/d.

Using the 5-year average per capita flow of 0.2742 m³/c/d, there is capacity to service approximately 3,700 additional people in the Ayr Wastewater Service Area as of December 31, 2015. The present rated capacity of 3,000 m³/d could service a population of approximately 10,900 people.

3.2.10 Wellesley Wastewater Treatment (WEWWTP)

The WEWWTP has a rated capacity of 1,100 m³/d. Flow in 2015 at the WEWWTP was measured at 686 m³/d which is down 17% from the previous year. The 5-year Average Projected Flow is 782 m³/d.

WEWWTP Rated Capacity	1,100 (m ³ /d)
Average Projected Flow	782 (m ³ /d)
Commitments	39 (m ³ /d)
Remaining Capacity	279 (m ³ /d)

The wide fluctuation in flow from year to year is a result of a high level of extraneous flows to the plant. Based on previous I&I assessments of the Wellesley system, the remaining I&I contributions are likely from the private side of the properties.

Using the 5-year average per capita flow of 0.2332 m³/c/d, there is capacity to service approximately 1,200 additional people in the Wellesley Wastewater Service Area as of December 31, 2015. The present rated capacity of 1,100 m³/d could service a population of approximately 4,700 people.

3.3 Small Systems

3.3.1 Water

The 12 small water supply systems owned and operated by the Region are presented in Appendix C. These systems include Branchton Meadows, and Roseville in North Dumfries, Linwood and Heidelberg (reported as one system including that portion of Heidelberg in Woolwich) in Wellesley, New Dundee and Foxboro Green in Wilmot, and Conestoga Golf Course, Conestoga Plains, Maryhill, Maryhill Village Heights, and West Montrose in Woolwich. In 2011 the community of St. Agatha was connected to the IUS and the wells in St. Agatha were decommissioned.

Generally, water supply capacity was adequate to meet the actual maximum demands in all communities supplied by a Regional system in 2015. The only exception was in West Montrose where operation limitations reduced the ability to operate the wells to their rated capacity.

Most of these small systems were designed to only service specific subdivisions in the respective settlement areas and have no additional capacity to service units beyond those subdivisions. Given the complexity of calculating available capacity for the small systems, available system capacity will be evaluated on an individual basis prior to commenting on development applications. Table 2 summarizes the data on small water systems.

3.3.2 Wastewater

Three small wastewater treatment systems are currently operated by the Region of Waterloo. Heidelberg WWTP services the Alt-Heidelberg subdivision, Conestoga Golf Course WWTP which services Phase 2 of the Conestoga Golf Course subdivision, and the Foxboro WWTP servicing the Foxboro Green subdivision. These systems were designed and constructed to service a limited number of units within the specific subdivisions and are not capable of servicing any units beyond that pre-determined number.

There is one other system in Floradale that currently operates privately that the Region has an agreement or option to eventually operate. Should the Region assume ownership and operate this system, it will be reported on in the WWWMR.

4.0 Summary of Service Area Assessments

Tables 1 and 2 below summarize the water and wastewater service area assessments included in Appendices B and C. Table 3 summarizes the committed water and wastewater flows and populations.

TABLE 1: REMAINING WATER AND WASTEWATER CAPACITY AS OF DECEMBER 31, 2015

	A 2015 MAX CAPACITY (1000 m ³ /d)	B MAX DAY / WEEK PROJECTED FLOW (1000 m ³ /d)	C COMMITTED FLOW (1000 m ³ /d)	D = A - (B+C) REMAINING CAPACITY (1000 m ³ /d)	E MAX DAY / WEEK FLOWS PER CAPITA (m ³ /d/c)	F = D/E * 1000 REMAINING CAPACITY (PEOPLE)
WATER						
INTEGRATED URBAN WATER SYSTEM	250.00	177.39	22.18	50.43	0.3516	143,436
BADEN-NEW HAMBURG	12.61	4.45	0.48	7.68	0.3363	22,900
AYR WATER SYSTEM	5.53	2.81	1.29	1.43	0.5663	2,528
WELLESLEY	3.00	1.14	0.06	1.80	0.3429	5,247
ST. CLEMENTS	1.77	0.46	0.01	1.31	0.3651	3,578
WASTEWATER						
KITCHENER WWTP	122.70	70.97	11.56	40.16	0.2961	135,653
WATERLOO WWTP	57.50	45.87	4.33	7.30	0.3340	21,869
GALT WWTP	56.80	34.87	1.30	20.64	0.4051	50,938
PRESTON WWTP	16.82	8.97	2.70	5.15	0.4327	11,906
HESPELER WWTP	9.32	7.09	0.12	2.11	0.2752	7,681
ELMIRA WWTP	7.80	4.28	1.82	1.70	0.4272	3,968
BADEN-NEW HAMBURG WWTP	5.20	3.80	0.61	0.98	0.2926	3,355
AYR WWTP	3.00	1.36	0.61	1.03	0.2742	3,749
ST. JACOBS WWTP	1.45	0.95	0.00	0.50	0.4970	1,002
WELLESLEY WWTP	1.10	0.78	0.04	0.28	0.2332	1,198

TABLE 2: SMALL RURAL WATER SYSTEM SUMMARY AS OF DECEMBER 31, 2015

	A 2015 CAPACITY (m ³ /d)	B MAX DAY PROJECTED FLOW (m ³ /d)	C COMMITTED FLOW (m ³ /d)	D = A - B REMAINING CAPACITY (m ³ /d)	E MAX DAY FLOWS PER CAPITA (m ³ /d/c)	F REMAINING CAPACITY (PEOPLE)
WOOLWICH						
CONESTOGO GOLF COURSE	601	436	N/A	165	0.9076	Case by Case
CONESTOGO PLAINS	786	236	N/A	550	0.6247	Case by Case
MARY HILL	157	106	N/A	51	0.7334	Case by Case
MARY HILL VILLAGE HEIGHTS	820	116	N/A	704	0.8629	Case by Case
WEST MONTROSE	238	188	N/A	50	0.8048	Case by Case
HEIDELBERG	829	308	N/A	521	0.2937	Case by Case
LINWOOD	605	239	N/A	366	0.2970	Case by Case
FOXBORO	527	161	N/A	366	0.3851	Case by Case
NEW DUNDEE	983	434	N/A	549	0.3857	Case by Case
ROSEVILLE	358	169	N/A	189	0.5688	Case by Case
BRANCHTON	130	90	N/A	40	0.8194	Case by Case

- (A) See Water Distribution Master Plan and Wastewater Treatment Master Plan for capacity details of each system
- (B) See section 2.5 and 2.6 and appendix B & C for details of how average flow is calculated for individual systems
- (C) See Table 3 for details about how committed flow is calculated from committed population in the DGA and BUA
- (D) Both Water systems and Wastewater systems average/max day/week flow equals the average of the previous 5 years per capita flow
- (E) See Section 2.5 and 2.6 for an explanation of average/max flows per capita
- (F) Remaining Capacity divided by Average/Max Flow Per Capita multiplied by 1000. Any new service in the small rural systems must be reviewed by the Region of Waterloo Water Services staff and will be evaluated on a case by case basis

TABLE 3: COMMITMENTS AS OF DECEMBER 31, 2015

WATER	A			MAX DAY / WEEK FLOWS PER CAPITA (m ³ /d/c)	C = A x B		
	COMMITMENTS (PEOPLE)				COMMITMENTS (m ³ /d)		
	DGA	BUA	TOTAL		DGA	BUA	TOTAL
INTEGRATED URBAN WATER SYSTEM	52,155	10,923	63,078	0.3516	18,337	22,177	
BADEN-NEW HAMBURG	925	511	1,435	0.3353	310	481	
AYR WATER SYSTEM	2,242	27	2,269	0.5683	1,270	1,285	
WELLESLEY	153	13	165	0.3429	52	57	
ST. CLEMENTS	16	0	16	0.3651	6	6	

WASTEWATER	A			AVERAGE FLOWS PER CAPITA (m ³ /d/c)	C = A x B		
	COMMITMENTS (PEOPLE)				COMMITMENTS (m ³ /d)		
	DGA	BUA	TOTAL		DGA	BUA	TOTAL
KITCHENER WWTP	34,307	4,747	39,054	0.2961	10,157	11,563	
WATERLOO WWTP	7,663	5,285	12,948	0.3340	2,560	4,325	
GALT WWTP	2,773	427	3,200	0.4051	1,123	1,296	
PRESTON WWTP	1,896	49	1,945	0.4327	2,680	2,702	
HESPELER WWTP	71	357	428	0.2752	20	118	
ELMIRA WWTP	4,264	0	4,264	0.4272	1,822	1,822	
BADEN-NEW HAMBURG WWTP	925	511	1,436	0.2926	271	420	
AYR WWTP	2,242	0	2,242	0.2742	615	615	
ST. JACOBS WWTP	0	3	3	0.4970	0	1	
WELLESLEY WWTP	153	13	166	0.2332	36	39	

- (A) See appendix D for a detailed breakdown of committed population from known development
 - (B) Average of the previous five years. See Section 2.5 and 2.6 for an explanation of the Average/Max Flow Per Capita Per Day in Column 'B'
 - (C) Column 'A' multiplied by column 'B'
- * Preston WWTP commitments include 1,860 m³/day for the Boxwood Industrial Subdivision

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APPENDIX A

Glossary

Average Day	The volume of water used in a service area in the year divided by the number of days in the year.
Built-Up Area (BUA)	<p>The limits of the developed portions of the Urban Area and Township Urban Areas designations as defined by the Province in accordance with the provisions of the Growth Plan for the Greater Golden Horseshoe.</p> <p>Referred to as the “Built Boundary” in the Regional Official Plan.</p>
Commitments	<p>The population or flow expected from known development applications and building permit activity.</p> <p>Expressed as Population – the calculated population increase from known development applications which the Region has a legal commitment to servicing including:</p> <ul style="list-style-type: none">Dwelling units for which building permits have been issued but are not yet believed to be occupied, and not included in population estimates;Unbuilt dwelling units in Registered PlansUnits in Draft Approved Plans, except plans having a special clause in the draft agreement that specifically stipulates that draft approval does not constitute a legal commitment to either water or wastewater servicing. <p>Expressed as Flow – the calculated population from known development plans multiplied by the Per Capita Flow.</p>
Designated Greenfield Area (DGA)	The limits of the undeveloped portions of the Urban Area and Township Urban Areas designations as defined by the Province in accordance with the provisions of the Growth Plan for the Greater Golden Horseshoe.
Development Application	An application for approval under the Planning Act. In the context of this report a development applications include Plans of Subdivisions, Plans of Condominium, Official Plan Amendments, Consent Applications and Zone Change Applications that create additional dwelling units. Development applications do not include site plan applications.
Firm Well Capacity	The maximum amount of water that can be safely provided from the wells serving an individual water

system determined from the lesser of the two scenarios listed below:

- 1) 0.85 x the capacity of all available wells producing a useable water supply;
- 2) capacity of all available wells producing a useable water supply less the capacity of the largest well.

A useable water supply must as a minimum meet the MOE Standards for Drinking Water.

Inflow and Infiltration (I&I)

Water (that would not require treatment if it did not enter the sewer system) entering the sanitary sewer system (including sewer service connections) through such means as:

- 1) defective pipes, pipe joints, connections, manhole walls (infiltration);
- 2) cellar and foundation drains, swamp drains, cooling water discharges, etc. (Steady inflow);
- 3) from roof drains, catch basins, sump pumps, manholes in ponded areas, combined sewers, etc. (Direct or Delayed Unsteady inflow).

Maximum Day

The highest daily consumption of water in a service area during the year during the 24 hour period.

Maximum Week

The highest total consumption of water in a service area during any seven consecutive days in a year divided by seven.

Measured Flow

Wastewater (Average Day) - sum of the volume recorded by the flow meter at the treatment plant divided by the number of days in that year.

Water (Average Day) - sum of the volume recorded by the flow meter at the treatment plant divided by the number of days in that year.

Water (Maximum Day) - the highest recorded volume recorded by the flow meter during one day in that year.

Water (Maximum Week) - the sum of the volume recorded by the flow meter during seven consecutive days divided by seven.

Per Capita Flow

A five-year average of the measured flow (average day, maximum day, or maximum week) divided by the

	serviced population.
Persons Per Unit (PPU)	The average number of persons per dwelling unit as projected by the Region of Waterloo's Land Budget.
Projected Flow	Serviced population multiplied by per capita flow.
Remaining Capacity	Water or Wastewater Plant capacity minus Projected Flow and Commitments. Expressed as Flow or People.
Reserved Capacity	A flow that has been set aside for known development to which the Region of Waterloo has a legal obligation to provide servicing. Also see "Commitments".
Serviced Area	The area where municipal water and/or wastewater services are provided. However, water and wastewater service areas are not necessarily the same.

APPENDIX B

Wastewater Charts and Data

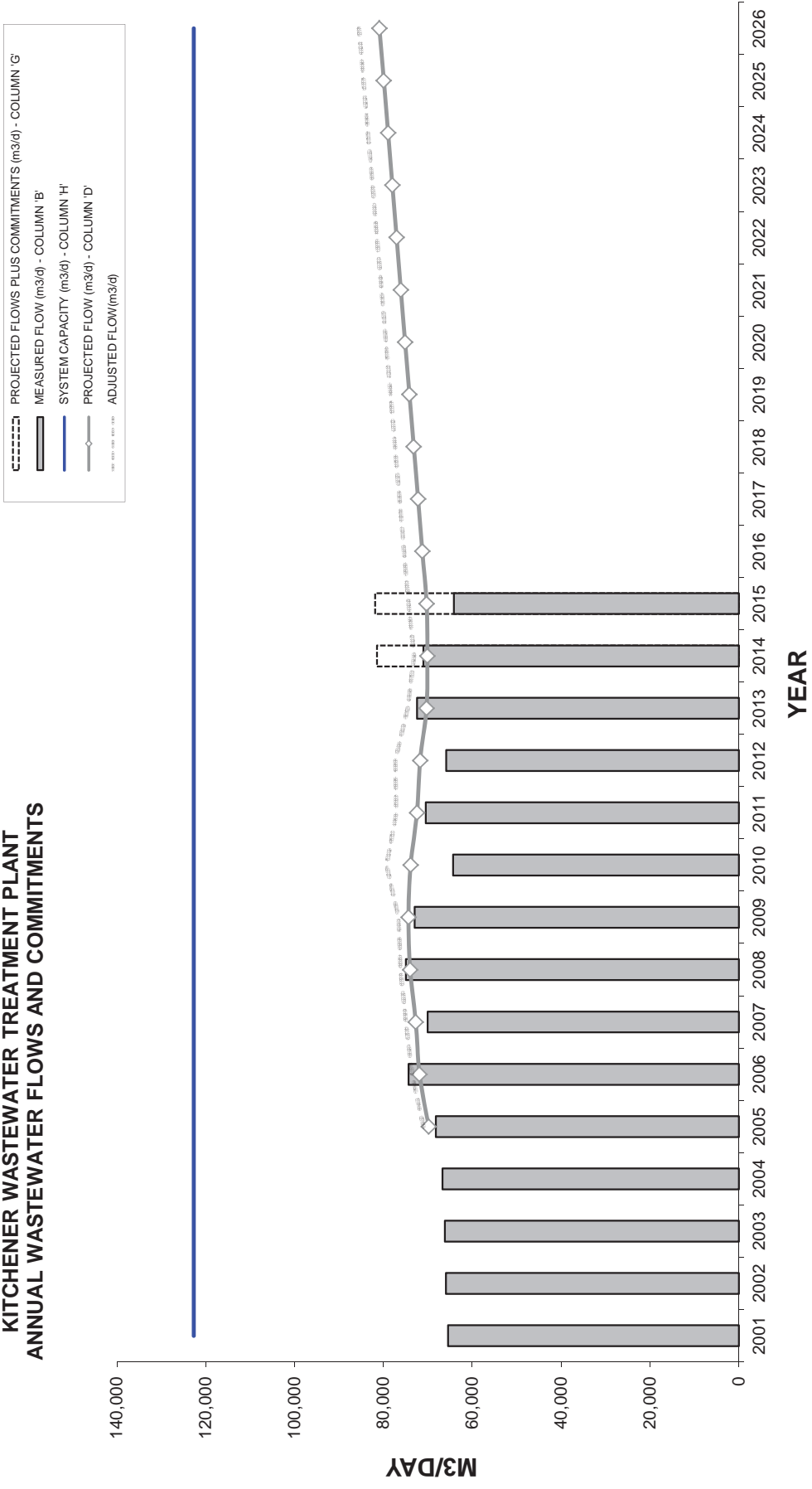
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

KITCHENER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C* AVERAGE DAY		D = A x C		E COMMITMENTS (m ³ /d)		F COMMITMENTS (m ³ /d)		G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	DGA	BUA									
2001	190,200	65,454				69,799	11,300					81,099	122,700	41,601	122,652
2002	193,540	65,960				71,873	10,520					82,393	122,700	40,307	118,249
2003	191,281	66,148				72,709	11,370					84,079	122,700	38,621	114,334
2004	200,030	66,730				73,977	9,280					83,257	122,700	39,443	117,084
2005	205,792	68,224	0.3392			74,365	9,316					83,682	122,700	39,018	116,072
2006	210,854	74,344	0.3409			73,881	10,606					84,487	122,700	38,213	116,948
2007	215,247	70,051	0.3378			72,449	7,858			1,501		81,808	122,700	40,892	128,553
2008	219,596	74,935	0.3369			71,739	8,631			2,332		82,703	122,700	39,997	129,064
2009	221,223	73,002	0.3362			70,290	7,956			1,908		80,154	122,700	42,546	139,775
2010	226,106	64,329	0.3268			70,092	9,449			1,913		81,454	122,700	41,246	137,973
2011	227,761	70,443	0.3181			70,292	10,157			1,405		81,855	122,700	40,845	137,957
2012	231,488	65,858	0.3099			71,255							122,700		
2013	230,922	72,433	0.3044			72,218							122,700		
2014	234,466	70,988	0.2989			73,181							122,700		
2015	237,417	64,136	0.2961			74,144							122,700		
2016	240,669		0.2961			75,107							122,700		
2017	243,922		0.2961			76,070							122,700		
2018	247,174		0.2961			77,033							122,700		
2019	250,427		0.2961			77,996							122,700		
2020	253,679		0.2961			78,959							122,700		
2021	256,932		0.2961			79,922							122,700		
2022	260,184		0.2961			80,885							122,700		
2023	263,437		0.2961										122,700		
2024	266,689		0.2961										122,700		
2025	269,942		0.2961										122,700		
2026	273,194		0.2961										122,700		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'.
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**KITCHENER WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**

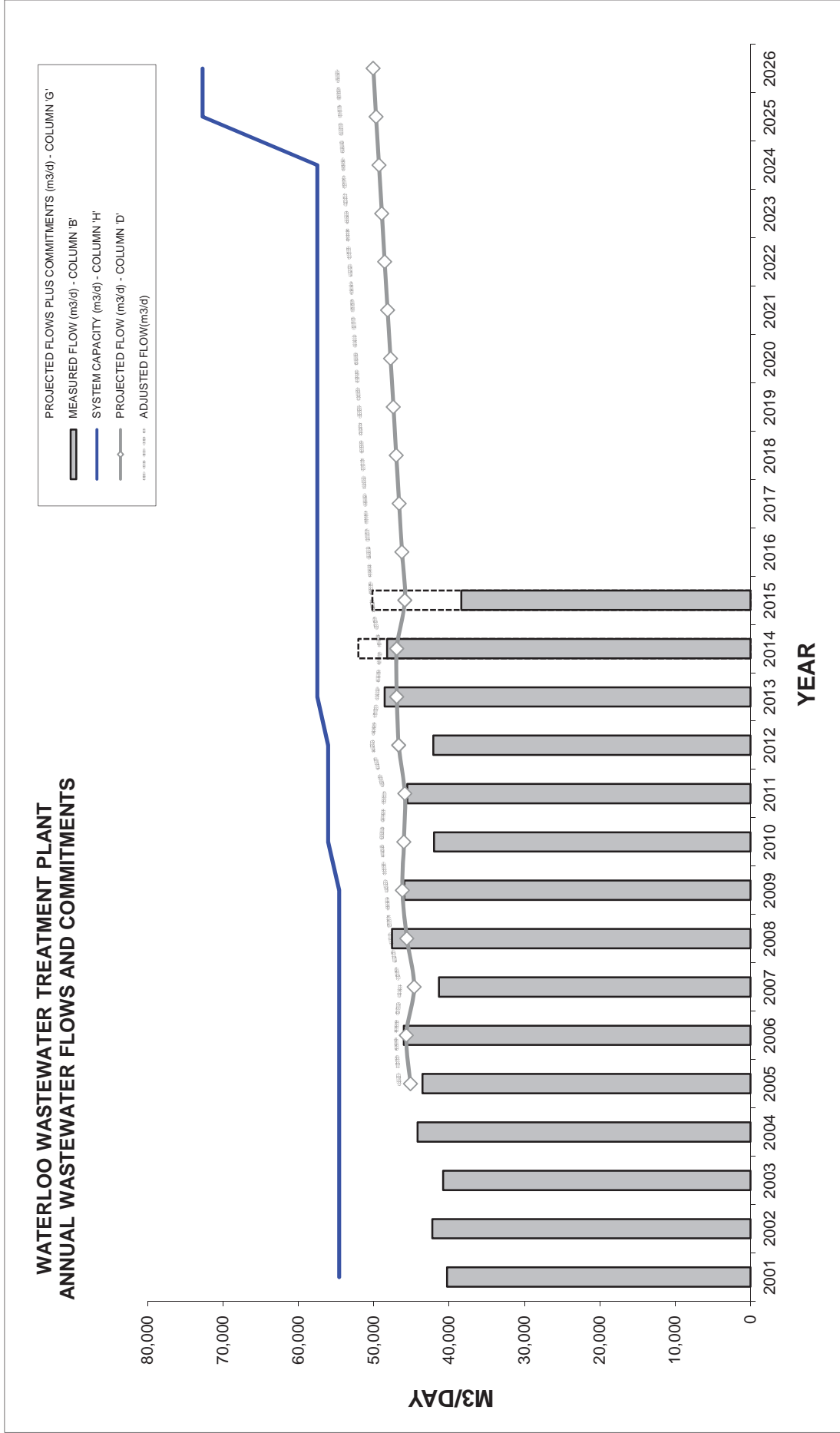


2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

WATERLOO WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F	G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)								
2001	102,070	40,285												
2002	105,390	42,235												
2003	110,197	40,781												
2004	114,568	44,192												
2005	117,364	43,548	0.3845	45,121	5,230						50,351	54,600	4,249	11,051
2006	119,406	46,012	0.3826	45,683	4,120						49,803	54,600	4,797	12,537
2007	120,265	41,358	0.3712	44,644	3,770						48,414	54,600	6,186	16,663
2008	121,413	47,562	0.3755	45,596	5,930						51,526	54,600	3,074	8,184
2009	124,006	45,940	0.3725	46,192	4,595						50,787	54,600	3,813	10,237
2010	126,029	42,007	0.3649	45,994	6,371						52,365	56,050	3,685	10,097
2011	127,688	45,540	0.3592	45,867	3,853	1,657					51,377	56,050	4,673	13,009
2012	131,776	42,104	0.3543	46,693	3,089	2,055					51,838	56,050	4,212	11,888
2013	134,851	48,570	0.3480	46,931	2,815	1,415					51,162	57,500	6,338	18,212
2014	136,179	48,242	0.3448	46,952	2,858	2,250					52,060	57,500	5,440	15,779
2015	137,322	38,391	0.3340	45,870	2,560	1,765					50,195	57,500	7,305	21,869
2016	138,464		0.3340	46,251								57,500		
2017	139,606		0.3340	46,633								57,500		
2018	140,749		0.3340	47,015								57,500		
2019	141,891		0.3340	47,396								57,500		
2020	143,033		0.3340	47,778								57,500		
2021	144,175		0.3340	48,159								57,500		
2022	145,317		0.3340	48,541								57,500		
2023	146,459		0.3340	48,922								57,500		
2024	147,602		0.3340	49,304								57,500		
2025	148,744		0.3340	49,685								72,730		
2026	149,886		0.3340	50,067								72,730		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)



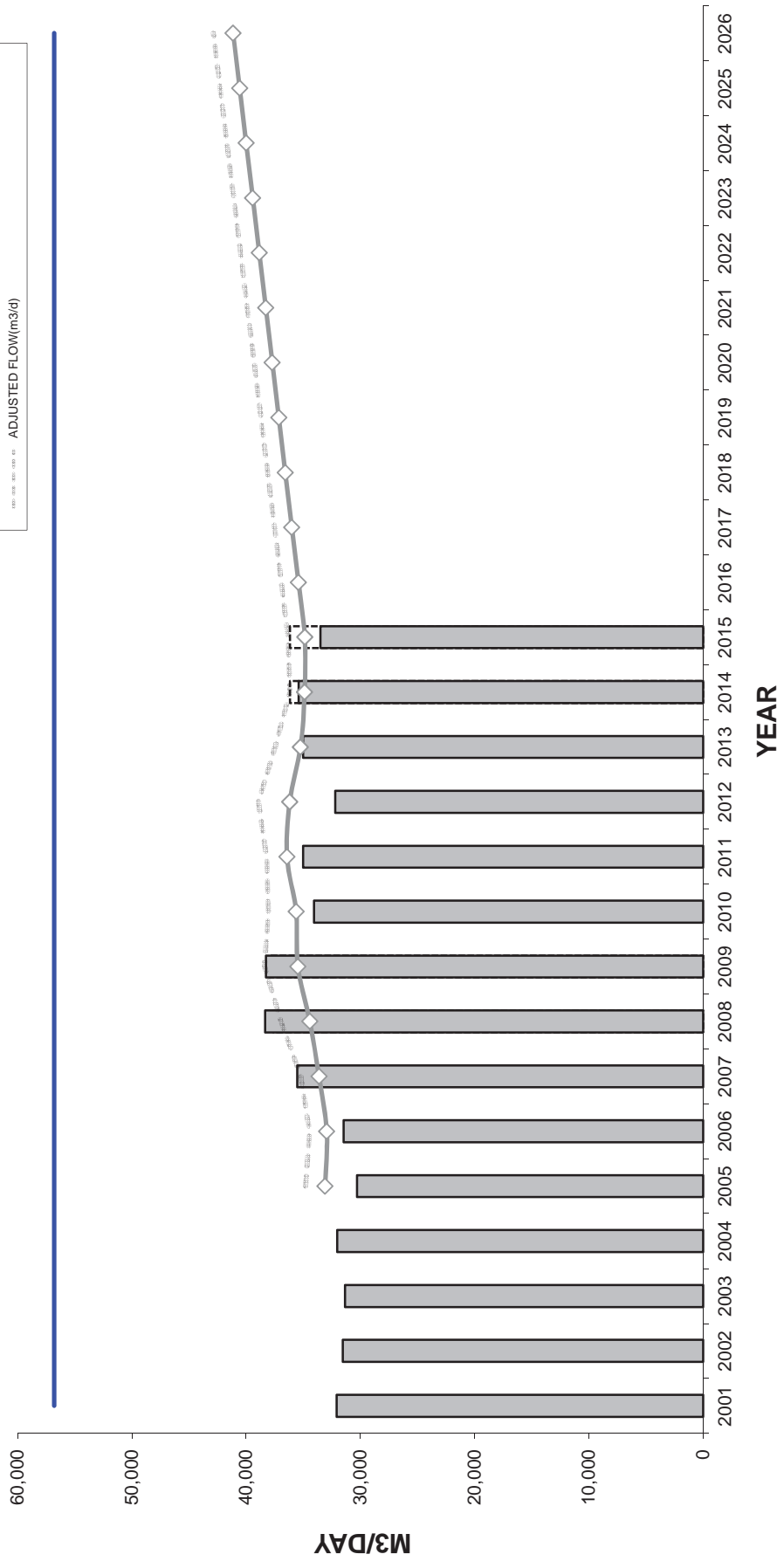
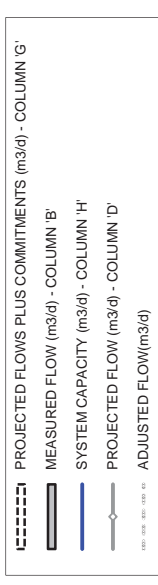
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

GALT WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		G = D + E + F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	COMMITMENTS (m ³ /d)	BUA	DGA	COMMITMENTS (m ³ /d)							
2001	71,580	32,094												56,800		
2002	73,310	31,560												56,800		
2003	73,988	31,344												56,800		
2004	77,029	32,047												56,800		
2005	78,686	30,301	0.4207	33,105	4,000	37,105								56,800	19,695	46,811
2006	80,509	31,488	0.4093	32,950	2,380	35,330								56,800	21,470	52,458
2007	82,083	35,533	0.4098	33,634	3,160	36,794								56,800	20,006	48,825
2008	82,335	38,351	0.4182	34,431	3,220	37,651								56,800	19,149	45,790
2009	83,071	38,271	0.4271	35,481	2,455	37,936								56,800	18,864	44,166
2010	82,321	34,070	0.4329	35,635	2,448	38,083								56,800	18,717	43,240
2011	82,970	35,032	0.4391	36,432	1,445	38,654				777				56,800	18,146	41,327
2012	84,412	32,200	0.4288	36,197	1,138	37,894				560				56,800	18,906	44,088
2013	84,151	35,020	0.4189	35,249	808	36,442				385				56,800	20,358	48,601
2014	85,088	35,423	0.4100	34,886	793	36,169				490				56,800	20,631	50,318
2015	86,070	33,516	0.4051	34,868	1,123	36,164				173				56,800	20,636	50,938
2016	87,479		0.4051	35,439										56,800		
2017	88,888		0.4051	36,010										56,800		
2018	90,297		0.4051	36,580										56,800		
2019	91,706		0.4051	37,151										56,800		
2020	93,115		0.4051	37,722										56,800		
2021	94,524		0.4051	38,293										56,800		
2022	95,934		0.4051	38,864										56,800		
2023	97,343		0.4051	39,435										56,800		
2024	98,752		0.4051	40,006										56,800		
2025	100,161		0.4051	40,576										56,800		
2026	101,570		0.4051	41,147										56,800		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**GALT WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**

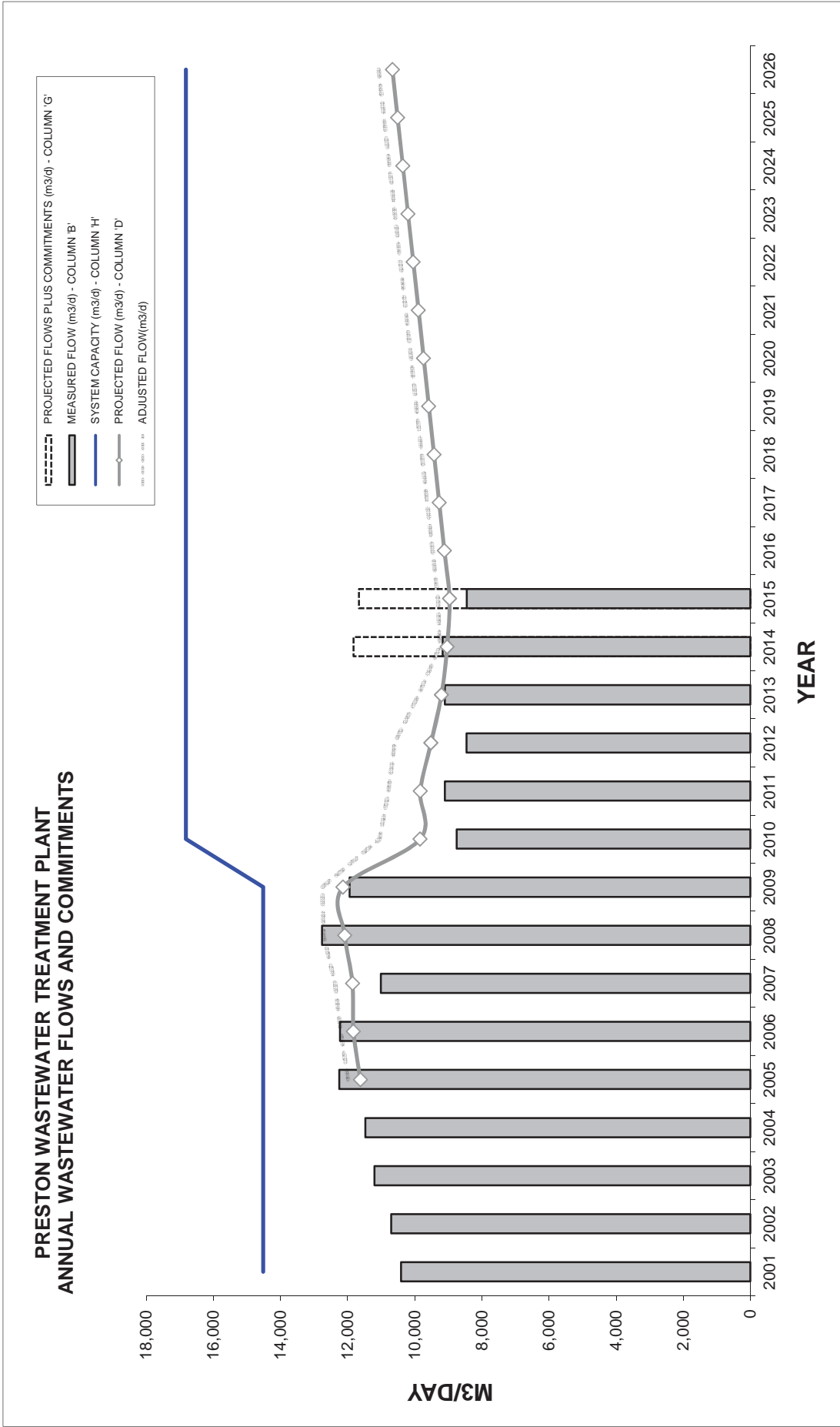


2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

PRESTON WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)						
2001	18,830	10,411										14,520		
2002	19,190	10,703										14,520		
2003	19,503	11,203										14,520		
2004	20,129	11,475										14,520		
2005	20,331	12,251	0.5715	11,620	250							14,520	2,650	4,636
2006	20,357	12,234	0.5812	11,830	100							14,520	2,590	4,456
2007	20,559	11,015	0.5768	11,858	110							14,520	2,552	4,425
2008	20,646	12,767	0.5856	12,090	50							14,520	2,380	4,065
2009	20,682	11,945	0.5871	12,141	48							14,520	2,331	3,971
2010	20,257	8,754	0.5530	9,841	1,990							16,820	4,989	9,022
2011	20,409	9,109	0.5220	9,838	1,895					30		16,820	5,057	9,686
2012	20,174	8,463	0.4988	9,518	2,865					102		16,820	4,335	8,691
2013	20,415	9,107	0.4643	9,207	2,764					104		16,820	4,745	10,219
2014	20,656	9,168	0.4376	9,039	2,712					76		16,820	4,993	11,410
2015	20,722	8,450	0.4327	8,967	2,680					21		16,820	5,152	11,906
2016	21,079		0.4327	9,121								16,820		
2017	21,436		0.4327	9,276								16,820		
2018	21,793		0.4327	9,430								16,820		
2019	22,150		0.4327	9,584								16,820		
2020	22,507		0.4327	9,739								16,820		
2021	22,864		0.4327	9,893								16,820		
2022	23,220		0.4327	10,047								16,820		
2023	23,577		0.4327	10,202								16,820		
2024	23,934		0.4327	10,356								16,820		
2025	24,291		0.4327	10,511								16,820		
2026	24,648		0.4327	10,665								16,820		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)



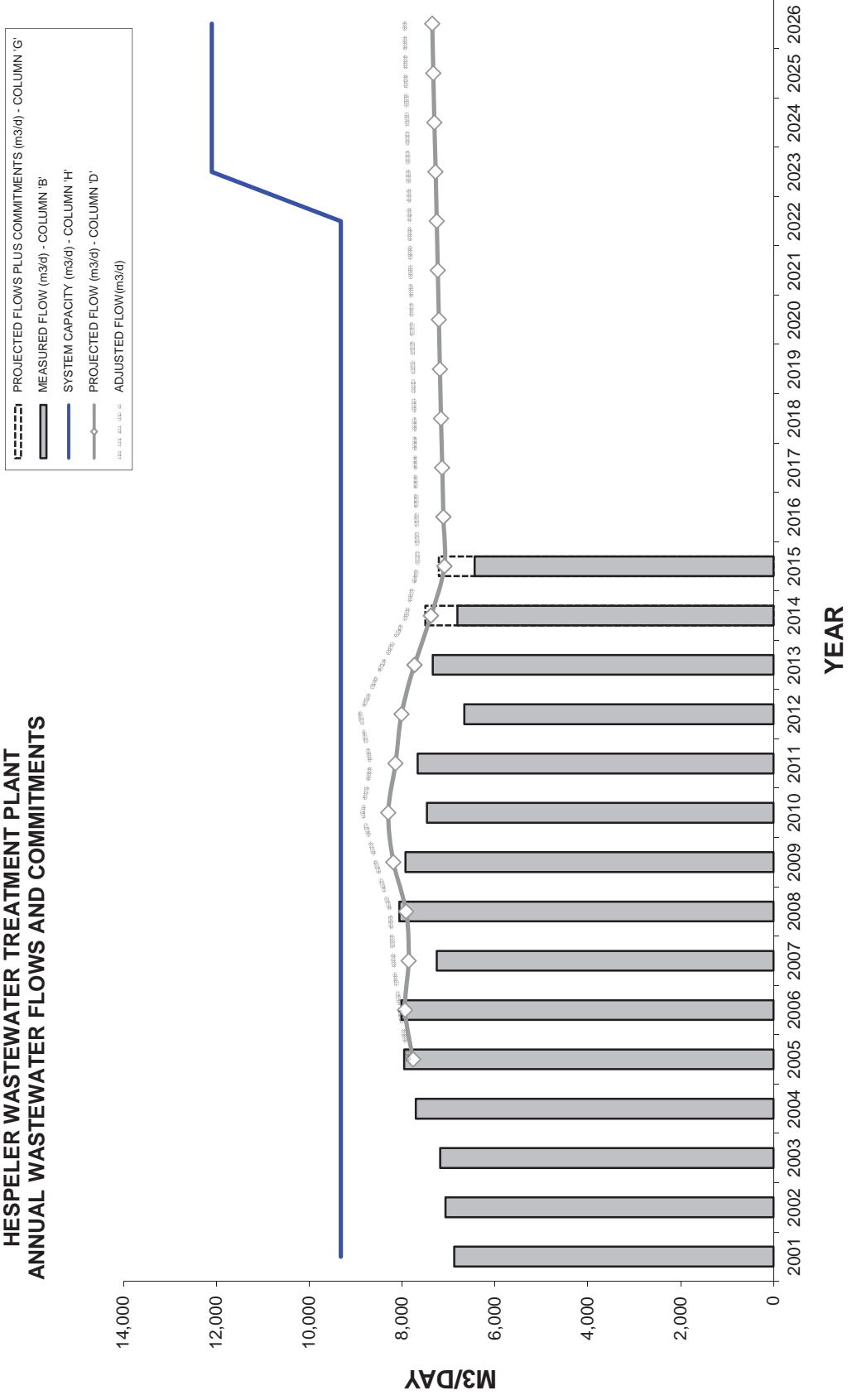
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

HESPELER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)		COMMITMENTS (m ³ /d)						
2001	19,210	6,878										9,320		
2002	19,780	7,064										9,320		
2003	20,201	7,178										9,320		
2004	21,417	7,703										9,320		
2005	21,568	7,956	0.3598	7,761	340		8,101					9,320	1,219	3,389
2006	21,972	8,013	0.3611	7,935	200		8,135					9,320	1,185	3,282
2007	22,117	7,252	0.3553	7,858	1,060		8,918					9,320	402	1,132
2008	22,166	8,056	0.3569	7,911	960		8,871					9,320	449	1,257
2009	23,163	7,929	0.3534	8,186	564		8,751					9,320	569	1,610
2010	24,333	7,462	0.3410	8,297	215		8,512					9,320	808	2,369
2011	24,646	7,666	0.3303	8,140	43		8,310	127				9,320	1,010	3,059
2012	25,239	6,660	0.3175	8,013	12		8,142	118				9,320	1,178	3,711
2013	25,595	7,337	0.3021	7,732	11		7,858	114				9,320	1,462	4,840
2014	25,737	6,808	0.2866	7,375	1		7,498	121				9,320	1,822	6,359
2015	25,759	6,435	0.2752	7,088	20		7,206	98				9,320	2,114	7,681
2016	25,845		0.2752	7,112								9,320		
2017	25,931		0.2752	7,136								9,320		
2018	26,018		0.2752	7,160								9,320		
2019	26,104		0.2752	7,183								9,320		
2020	26,190		0.2752	7,207								9,320		
2021	26,276		0.2752	7,231								9,320		
2022	26,362		0.2752	7,254								9,320		
2023	26,449		0.2752	7,278								12,100		
2024	26,535		0.2752	7,302								12,100		
2025	26,621		0.2752	7,326								12,100		
2026	26,707		0.2752	7,349								12,100		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)
(H) The projected increase in capacity in 2016 is based upon the findings of the Wastewater Treatment Master Plan

**HESPELER WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**



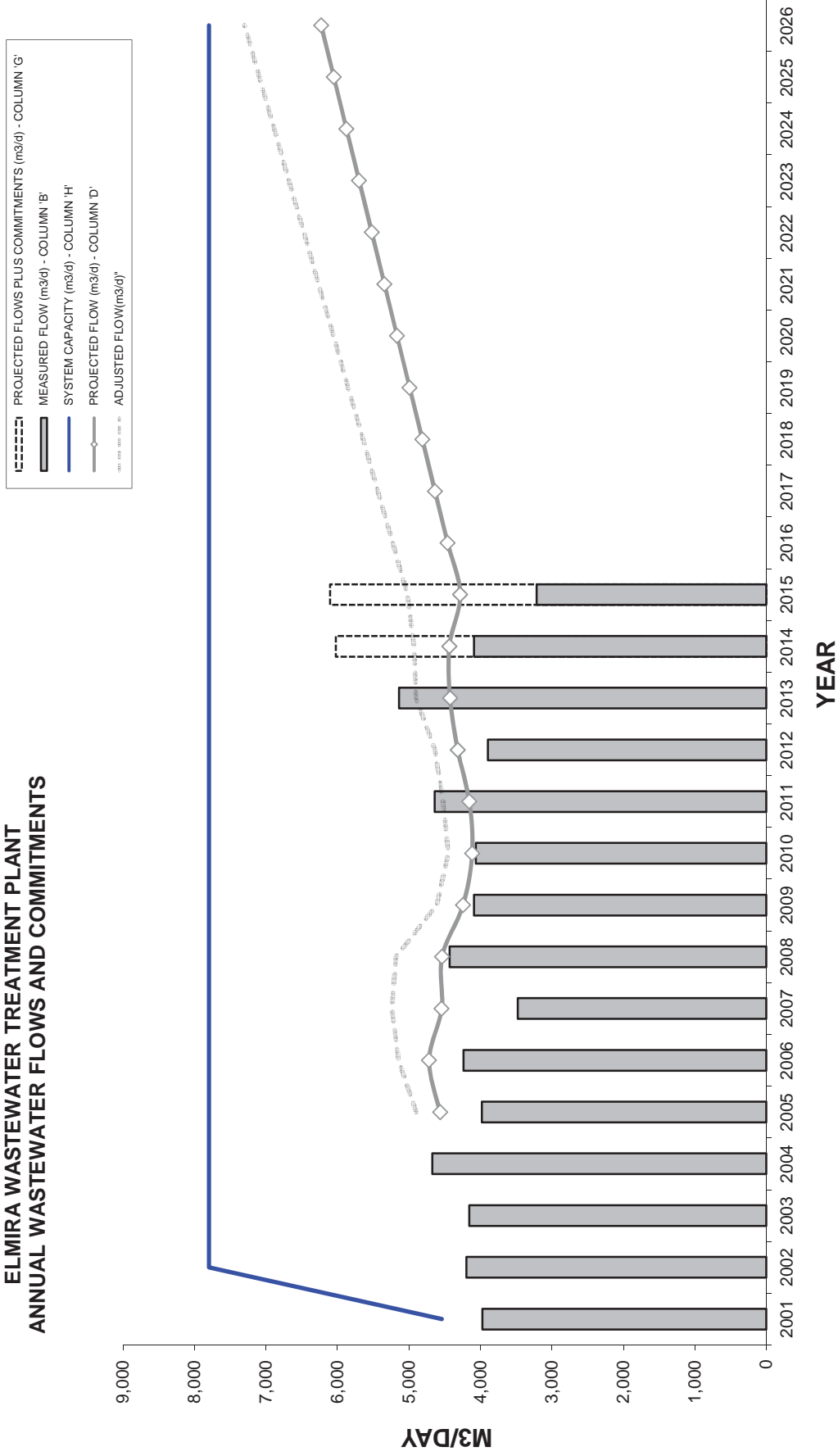
2016 WATER AND WASTEWATER MONITORING REPORT
 APPENDIX - B WASTEWATER TABLES AND CHARTS

ELMIRA WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)		BUA							
2001	7,510	3,975											4,543		
2002	7,560	4,196											7,800		
2003	7,471	4,157											7,800		
2004	8,102	4,675											7,800		
2005	8,495	3,982	0.5373		4,565	700						5,265	7,800	2,535	4,719
2006	8,974	4,237	0.5259		4,719	610						5,329	7,800	2,471	4,698
2007	9,274	3,478	0.4899		4,543	460						5,003	7,800	2,797	5,710
2008	9,647	4,431	0.4705		4,538	240						4,778	7,800	3,022	6,423
2009	9,652	4,089	0.4398		4,245	145						4,389	7,800	3,411	7,755
2010	9,544	4,064	0.4312		4,116	63						4,178	7,800	3,622	8,399
2011	9,586	4,642	0.4336		4,157	1,592				58		5,807	7,800	1,993	4,596
2012	9,869	3,896	0.4376		4,318	1,562				13		5,893	7,800	1,907	4,358
2013	9,824	5,140	0.4503		4,424	1,400				10		5,834	7,800	1,966	4,366
2014	9,896	4,090	0.4483		4,436	1,583				4		6,023	7,800	1,777	3,965
2015	10,025	3,215	0.4272		4,283	1,822				1		6,106	7,800	1,694	3,965
2016	10,439		0.4272		4,460								7,800		
2017	10,853		0.4272		4,637								7,800		
2018	11,267		0.4272		4,814								7,800		
2019	11,681		0.4272		4,990								7,800		
2020	12,095		0.4272		5,167								7,800		
2021	12,509		0.4272		5,344								7,800		
2022	12,923		0.4272		5,521								7,800		
2023	13,337		0.4272		5,698								7,800		
2024	13,751		0.4272		5,875								7,800		
2025	14,165		0.4272		6,052								7,800		
2026	14,579		0.4272		6,228								7,800		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
 (F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**ELMIRA WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**



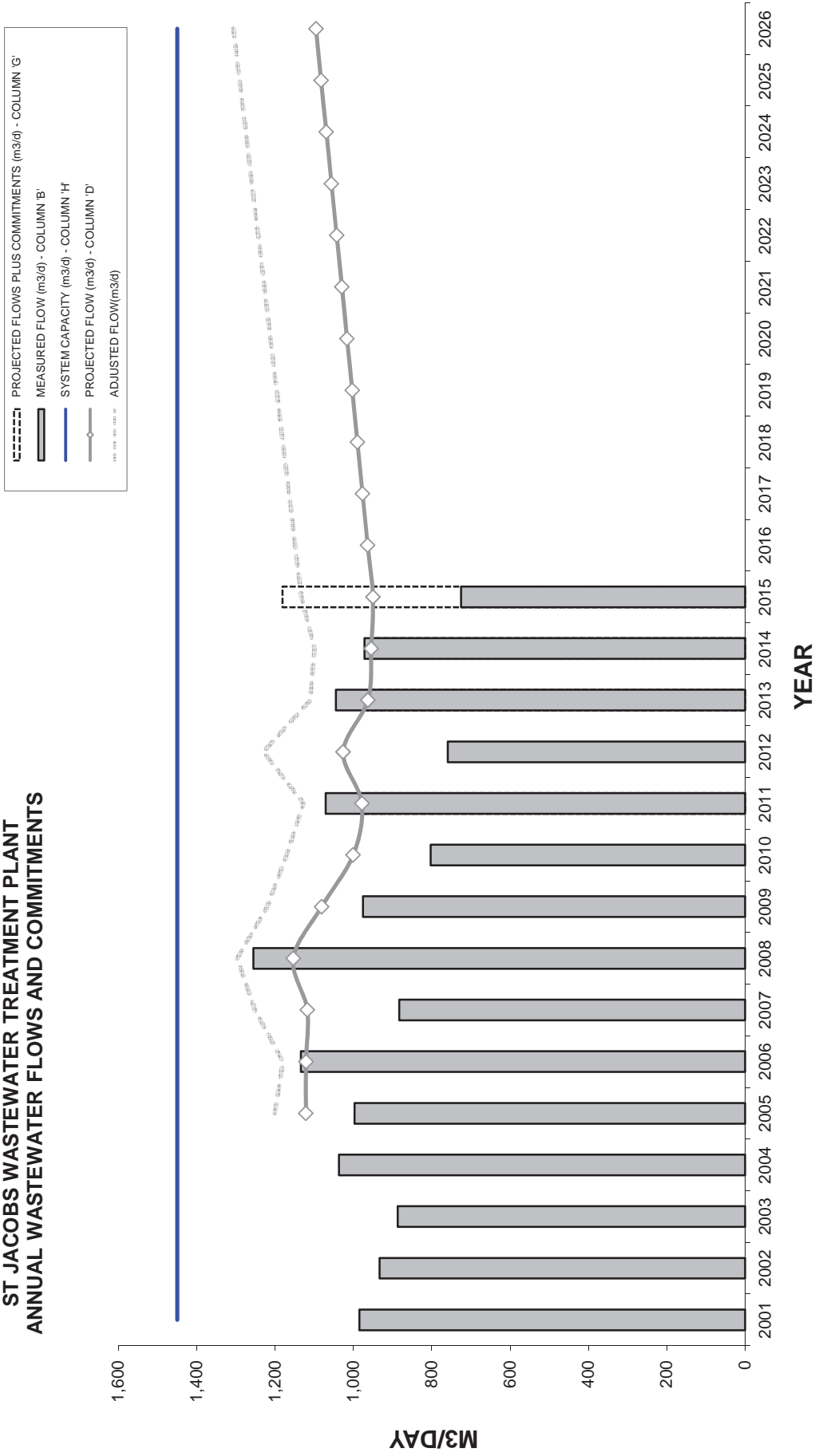
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

ST JACOBS WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C* AVERAGE DAY		D = A x C PROJECTED FLOW (m ³ /d)	E COMMITMENTS (m ³ /d)		F COMMITMENTS (m ³ /d)	G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
			AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	DGA		BUA						
2001	1,310	985								1,450		
2002	1,320	933								1,450		
2003	1,329	887								1,450		
2004	1,482	1,037								1,450		
2005	1,631	997	0.6874	270	1,121	270		1,391		1,450	59	85
2006	1,665	1,134	0.6733	150	1,121	150		1,271		1,450	179	266
2007	1,769	883	0.6318	60	1,118	60		1,178		1,450	272	431
2008	1,811	1,255	0.6370	60	1,154	60		1,214		1,450	236	371
2009	1,783	976	0.6065	29	1,081	29		1,110		1,450	340	561
2010	1,735	803	0.5768	0	1,001	0		1,001		1,450	449	779
2011	1,735	1,071	0.5640	0	978	0	2	980		1,450	470	833
2012	1,884	759	0.5447	0	1,026	0	3	1,029		1,450	421	773
2013	1,857	1,045	0.5186	0	963	0	2	965		1,450	485	936
2014	1,858	972	0.5137	0	955	0	3	958		1,450	492	959
2015	1,912	725	0.4970	231	950	231	0	1,181		1,450	269	541
2016	1,939		0.4970		964					1,450		
2017	1,965		0.4970		977					1,450		
2018	1,992		0.4970		990					1,450		
2019	2,018		0.4970		1,003					1,450		
2020	2,045		0.4970		1,016					1,450		
2021	2,071		0.4970		1,029					1,450		
2022	2,098		0.4970		1,043					1,450		
2023	2,125		0.4970		1,056					1,450		
2024	2,151		0.4970		1,069					1,450		
2025	2,178		0.4970		1,083					1,450		
2026	2,204		0.4970		1,095					1,450		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**ST JACOBS WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**



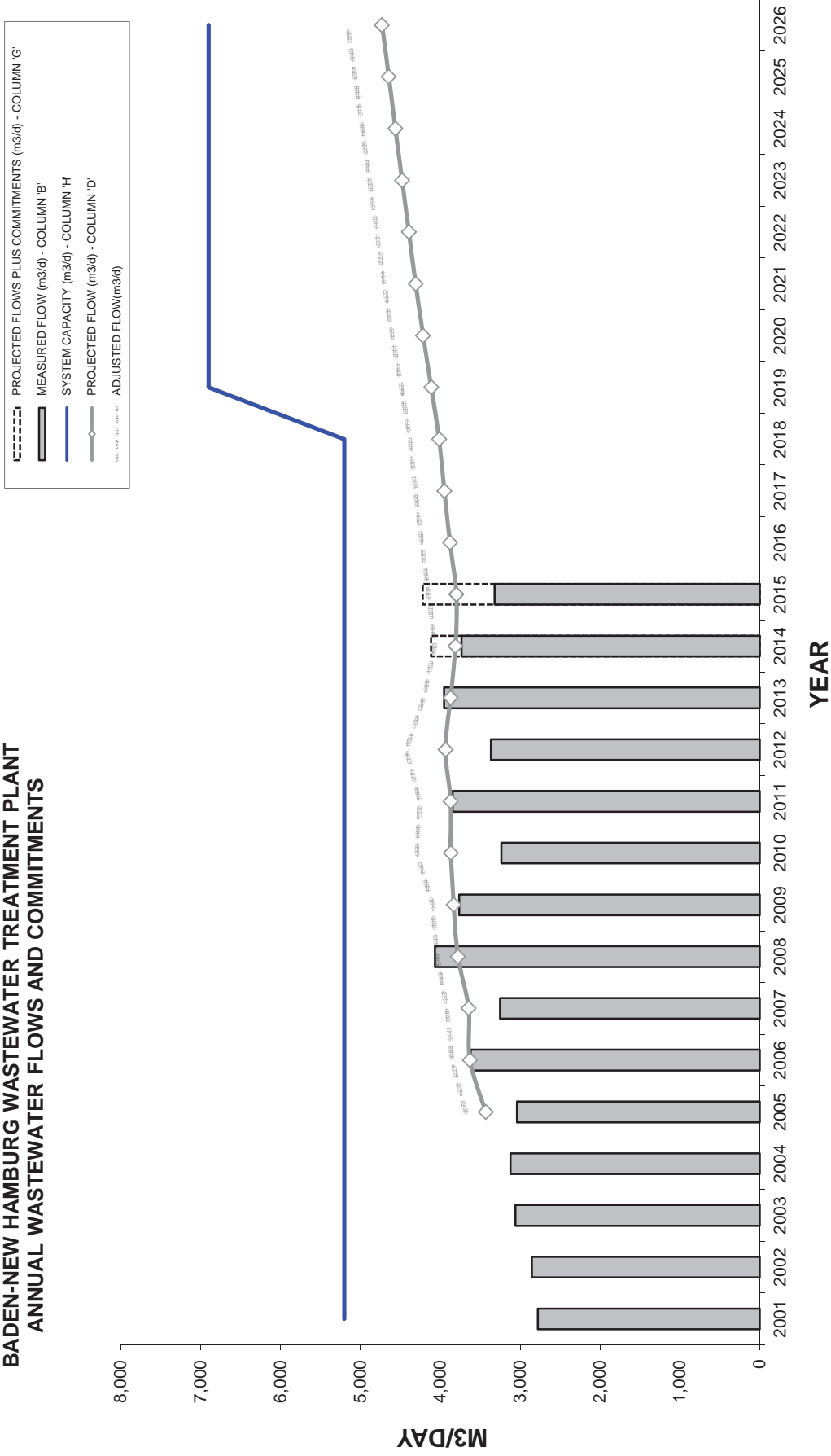
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

BADEN-NEW HAMBURG WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		G = D + E + F		H	I = H - G	J = I / C
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)	DGA	BUA	PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)					
2001	6,830	2,778														
2002	7,150	2,855														
2003	7,912	3,058														
2004	8,648	3,122														
2005	9,083	3,039	0.3776	3,430	1,660		5,090							110	291	
2006	9,804	3,620	0.3701	3,629	1,440		5,069							131	355	
2007	10,319	3,252	0.3533	3,645	1,160		4,805							395	1,117	
2008	10,742	4,066	0.3517	3,778	1,130		4,908							292	831	
2009	11,016	3,763	0.3478	3,831	996		4,828							372	1,071	
2010	11,467	3,235	0.3373	3,868	807		4,675							525	1,556	
2011	11,773	3,844	0.3288	3,871	567		4,440			2				760	2,312	
2012	12,268	3,367	0.3206	3,933	420		4,393			39				807	2,518	
2013	12,575	3,953	0.3078	3,871	344		4,216			2				984	3,195	
2014	12,787	3,736	0.2979	3,809	271		4,114			33				1,086	3,646	
2015	12,978	3,320	0.2926	3,798	271		4,218			150				982	3,355	
2016	13,252		0.2926	3,878												
2017	13,497		0.2926	3,950												
2018	13,715		0.2926	4,014												
2019	14,053		0.2926	4,113												
2020	14,404		0.2926	4,215												
2021	14,722		0.2926	4,308												
2022	15,009		0.2926	4,392												
2023	15,297		0.2926	4,477												
2024	15,585		0.2926	4,561												
2025	15,872		0.2926	4,645												
2026	16,160		0.2926	4,729												

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**BADEN-NEW HAMBURG WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**



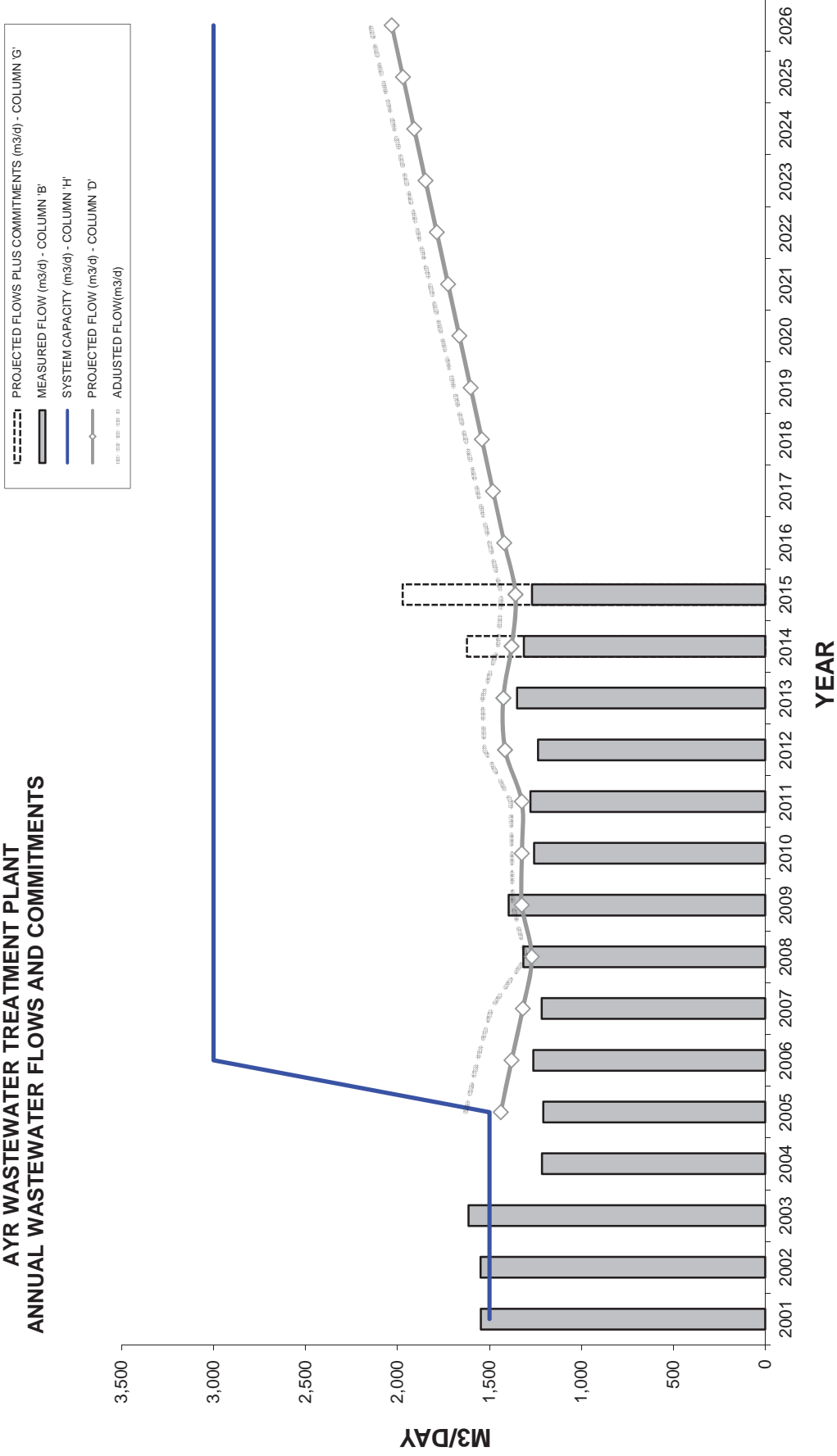
2016 WATER AND WASTEWATER MONITORING REPORT
 APPENDIX - B WASTEWATER TABLES AND CHARTS

AYR WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F	G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)								
2001	3,870	1,547										1,500		
2002	3,960	1,548										1,500		
2003	3,941	1,613										1,500		
2004	3,940	1,214										1,500		
2005	3,967	1,207	0.3624	1,438	90						1,528	1,500	-28	-77
2006	3,989	1,262	0.3458	1,379	490						1,869	3,000	1,131	3,271
2007	4,018	1,216	0.3281	1,318	360						1,678	3,000	1,322	4,028
2008	4,088	1,315	0.3106	1,270	290						1,560	3,000	1,440	4,637
2009	4,195	1,395	0.3155	1,324	693						2,017	3,000	983	3,116
2010	4,209	1,258	0.3144	1,323	642						1,965	3,000	1,035	3,290
2011	4,255	1,277	0.3112	1,324	442			154			1,920	3,000	1,080	3,470
2012	4,658	1,235	0.3037	1,415	329			154			1,897	3,000	1,103	3,632
2013	4,822	1,350	0.2954	1,424	277			1			1,703	3,000	1,297	4,392
2014	4,879	1,313	0.2827	1,379	240			4			1,622	3,000	1,378	4,874
2015	4,952	1,269	0.2742	1,358	615			0			1,972	3,000	1,028	3,749
2016	5,175		0.2742	1,419								3,000		
2017	5,399		0.2742	1,480								3,000		
2018	5,622		0.2742	1,541								3,000		
2019	5,845		0.2742	1,602								3,000		
2020	6,068		0.2742	1,664								3,000		
2021	6,292		0.2742	1,725								3,000		
2022	6,515		0.2742	1,786								3,000		
2023	6,738		0.2742	1,847								3,000		
2024	6,962		0.2742	1,909								3,000		
2025	7,185		0.2742	1,970								3,000		
2026	7,408		0.2742	2,031								3,000		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
 (F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**AYR WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**

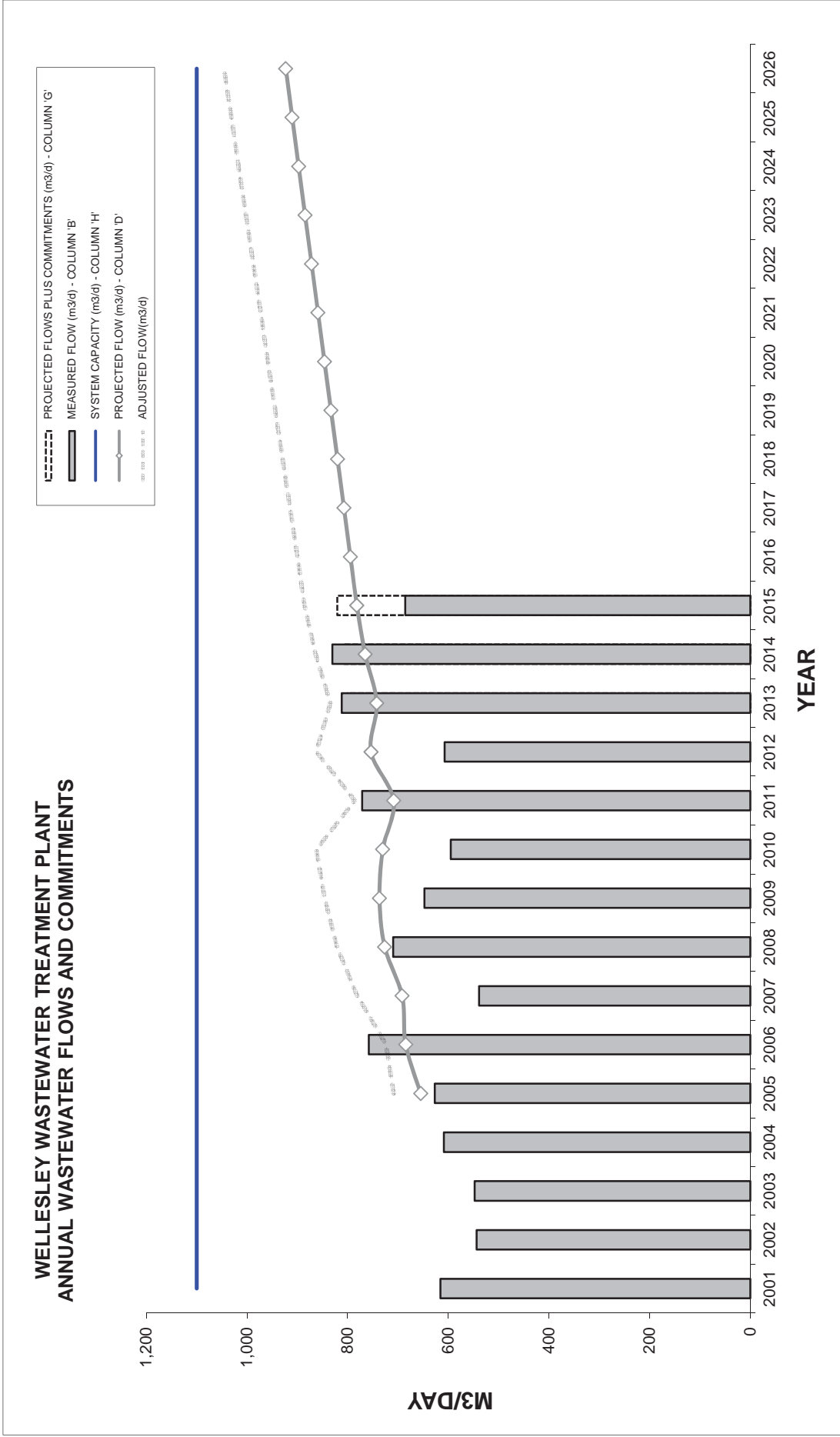


2016 WATER AND WASTEWATER MONITORING REPORT
 APPENDIX - B WASTEWATER TABLES AND CHARTS

WELLESLEY WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E		F		G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	AVERAGE DAY	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)		BUA							
2001	1,750	616											1,100		
2002	1,840	544											1,100		
2003	1,916	548											1,100		
2004	2,051	609											1,100		
2005	2,152	627	0.3044	655	330	985							1,100	115	378
2006	2,279	758	0.3005	685	320	1,005							1,100	95	317
2007	2,420	539	0.2859	692	280	972							1,100	128	448
2008	2,556	710	0.2843	726	270	996							1,100	104	364
2009	2,700	648	0.2729	737	212	949							1,100	151	553
2010	2,849	595	0.2564	730	134	864							1,100	236	921
2011	2,921	771	0.2427	709	89	801				3			1,100	299	1,232
2012	3,191	608	0.2362	754	74	851				23			1,100	249	1,054
2013	3,211	812	0.2312	742	57	801				2			1,100	299	1,293
2014	3,270	831	0.2341	765	40	807				2			1,100	293	1,254
2015	3,353	686	0.2332	782	36	821				3			1,100	279	1,198
2016	3,408		0.2332	795									1,100		
2017	3,463		0.2332	807									1,100		
2018	3,518		0.2332	820									1,100		
2019	3,574		0.2332	833									1,100		
2020	3,629		0.2332	846									1,100		
2021	3,684		0.2332	859									1,100		
2022	3,739		0.2332	872									1,100		
2023	3,794		0.2332	885									1,100		
2024	3,849		0.2332	897									1,100		
2025	3,904		0.2332	910									1,100		
2026	3,959		0.2332	923									1,100		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
 (F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)



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APPENDIX C

Water Charts and Data

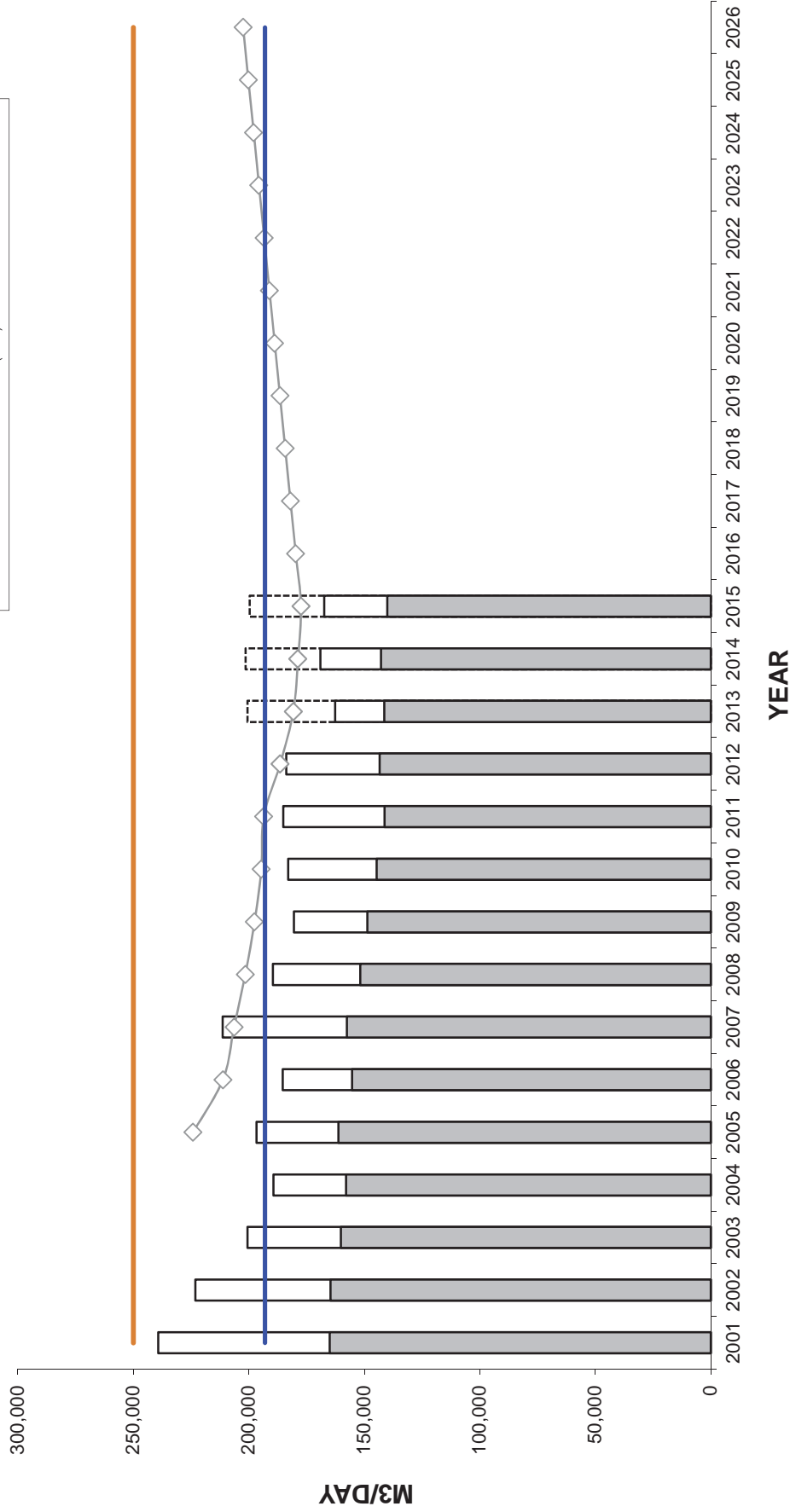
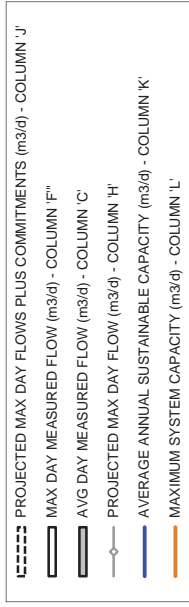
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APPENDIX - C WATER TABLES AND CHARTS

INTEGRATED URBAN SYSTEM (IUS) ANNUAL FLOWS AND COMMITMENTS

YEAR	A SUMMER POP.	B WINTER POP.	C		D* AVERAGE DAY		E = B x D		F	G* MAXIMUM WEEK		H = A x G	I COMMITMENTS (m ³ /d)	J = H + I PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	K SYSTEM CAPACITY SUSTAINABLE AVERAGE	L MAXIMUM CAPACITY (m ³ /d)	M = L - J REMAINING CAPACITY (m ³ /d)
			MEASURED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)		PROJECTED FLOW (m ³ /d)							
2001	402,890	412,500	165,011					239,190							193,000	250,000	
2002	411,550	421,890	164,641					223,088							193,000	250,000	
2003	417,355	426,805	160,087					200,577							193,000	250,000	
2004	440,659	446,068	157,900					189,300							193,000	250,000	
2005	451,768	457,224	161,225	0.3744	171,181	0.4962	224,187	196,652	0.4962	224,187	29,340	253,527	193,000	250,000	250,000	-3,527	
2006	461,284	467,115	155,260	0.3609	168,564	0.4579	211,207	185,343	0.4579	211,207	22,450	233,657	193,000	250,000	250,000	16,343	
2007	469,542	474,472	157,486	0.3492	165,684	0.4395	206,354	211,356	0.4395	206,354	24,460	230,814	193,000	250,000	250,000	19,186	
2008	476,396	480,806	151,752	0.3373	162,177	0.4229	201,488	189,560	0.4229	201,488	22,140	223,628	193,000	250,000	250,000	26,372	
2009	478,997	486,779	148,673	0.3276	159,465	0.4124	197,520	180,426	0.4124	197,520	19,857	217,377	193,000	250,000	250,000	32,623	
2010	485,642	493,472	144,619	0.3157	155,780	0.4006	194,570	182,950	0.4006	194,570	22,756	217,327	193,000	250,000	250,000	32,673	
2011	488,749	498,074	141,179	0.3059	152,358	0.3960	193,556	185,081	0.3960	193,556	21,755	215,311	193,000	250,000	250,000	34,689	
2012	489,073	508,841	143,347	0.2959	150,543	0.3812	186,415	183,801	0.3812	186,415	23,204	209,619	193,000	250,000	250,000	40,381	
2013	491,389	511,535	141,323	0.2880	147,314	0.3678	180,714	162,610	0.3678	180,714	19,857	200,571	193,000	250,000	250,000	49,429	
2014	495,663	517,487	142,802	0.2821	145,978	0.3606	178,735	168,951	0.3606	178,735	22,643	201,378	193,000	250,000	250,000	48,622	
2015	504,548	522,730	140,101	0.2771	144,839	0.3516	177,392	167,338	0.3516	177,392	22,177	199,570	193,000	250,000	250,000	50,430	
2016	511,030	529,416	146,691	0.2771	146,691	0.3516	179,671	167,338	0.3516	179,671	22,177	199,570	193,000	250,000	250,000	50,430	
2017	517,512	536,103	148,544	0.2771	148,544	0.3516	181,950	167,338	0.3516	181,950	22,177	199,570	193,000	250,000	250,000	50,430	
2018	523,994	542,789	150,397	0.2771	150,397	0.3516	184,229	167,338	0.3516	184,229	22,177	199,570	193,000	250,000	250,000	50,430	
2019	530,476	549,476	152,249	0.2771	152,249	0.3516	186,508	167,338	0.3516	186,508	22,177	199,570	193,000	250,000	250,000	50,430	
2020	536,958	556,162	154,102	0.2771	154,102	0.3516	188,787	167,338	0.3516	188,787	22,177	199,570	193,000	250,000	250,000	50,430	
2021	543,440	562,849	155,955	0.2771	155,955	0.3516	191,066	167,338	0.3516	191,066	22,177	199,570	193,000	250,000	250,000	50,430	
2022	549,922	569,535	157,807	0.2771	157,807	0.3516	193,345	167,338	0.3516	193,345	22,177	199,570	193,000	250,000	250,000	50,430	
2023	556,404	576,222	159,660	0.2771	159,660	0.3516	195,624	167,338	0.3516	195,624	22,177	199,570	193,000	250,000	250,000	50,430	
2024	562,886	582,908	161,513	0.2771	161,513	0.3516	197,903	167,338	0.3516	197,903	22,177	199,570	193,000	250,000	250,000	50,430	
2025	569,368	589,595	163,366	0.2771	163,366	0.3516	200,182	167,338	0.3516	200,182	22,177	199,570	193,000	250,000	250,000	50,430	
2026	575,850	596,281	165,218	0.2771	165,218	0.3516	202,461	167,338	0.3516	202,461	22,177	199,570	193,000	250,000	250,000	50,430	

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'D' and 'G'

INTEGRATED URBAN SYSTEM (IUS) ANNUAL FLOWS AND COMMITMENTS



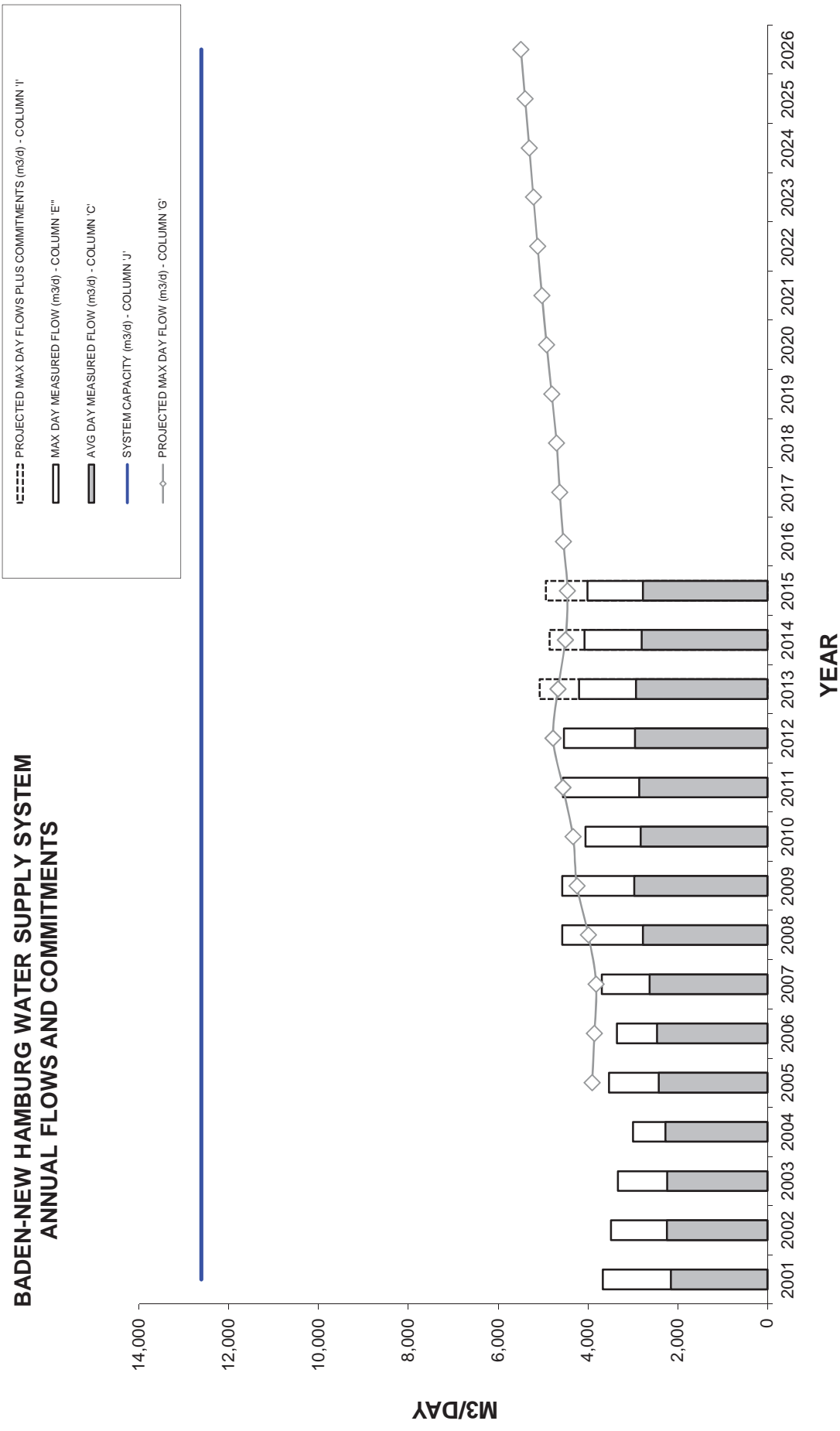
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - C WATER TABLES AND CHARTS

BADEN-NEW HAMBURG WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A		B		C*		D = A x C		E	F*		G = A x F		H	I = G + H	J	K = J - I	L = K / F
	POP.	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)	PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)		
2001	7,240	2,150						3,664						12,614				
2002	7,600	2,238					3,483							12,614				
2003	8,185	2,234					3,328							12,614				
2004	8,936	2,269					2,991							12,614				
2005	9,373	2,422	0.2763	2,581	3,528	0.4164	3,903	2,230	6,133	12,614			12,614	6,481	15,563			
2006	10,100	2,459	0.2646	2,673	3,351	0.3816	3,854	1,910	5,764	12,614			12,614	6,850	17,954			
2007	10,616	2,623	0.2552	2,709	3,687	0.3594	3,815	1,100	4,915	12,614			12,614	7,699	21,424			
2008	11,056	2,772	0.2507	2,772	4,569	0.3607	3,988	1,090	5,078	12,614			12,614	7,536	20,894			
2009	11,327	2,967	0.2523	2,858	4,572	0.3745	4,242	1,072	5,314	12,614			12,614	7,300	19,494			
2010	11,766	2,820	0.2486	2,925	4,052	0.3681	4,331	881	5,212	12,614			12,614	7,402	20,111			
2011	12,073	2,856	0.2472	2,984	4,555	0.3772	4,554	653	5,207	12,614			12,614	7,407	19,639			
2012	12,570	2,947	0.2447	3,075	4,530	0.3798	4,774	544	5,318	12,614			12,614	7,296	19,211			
2013	12,878	2,928	0.2400	3,091	4,195	0.3623	4,666	407	5,073	12,614			12,614	7,541	20,816			
2014	13,089	2,800	0.2304	3,016	4,077	0.3439	4,501	352	4,853	12,614			12,614	7,761	22,570			
2015	13,287	2,774	0.2242	2,979	4,006	0.3353	4,455	481	4,936	12,614			12,614	7,678	22,900			
2016	13,553		0.2242	3,039		0.3353	4,544			12,614			12,614					
2017	13,792		0.2242	3,092		0.3353	4,624			12,614			12,614					
2018	14,004		0.2242	3,140		0.3353	4,695			12,614			12,614					
2019	14,332		0.2242	3,213		0.3353	4,805			12,614			12,614					
2020	14,673		0.2242	3,290		0.3353	4,920			12,614			12,614					
2021	14,982		0.2242	3,359		0.3353	5,023			12,614			12,614					
2022	15,262		0.2242	3,422		0.3353	5,117			12,614			12,614					
2023	15,541		0.2242	3,485		0.3353	5,211			12,614			12,614					
2024	15,821		0.2242	3,547		0.3353	5,304			12,614			12,614					
2025	16,100		0.2242	3,610		0.3353	5,398			12,614			12,614					
2026	16,380		0.2242	3,673		0.3353	5,492			12,614			12,614					

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'C' and 'F'

BADEN-NEW HAMBURG WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS



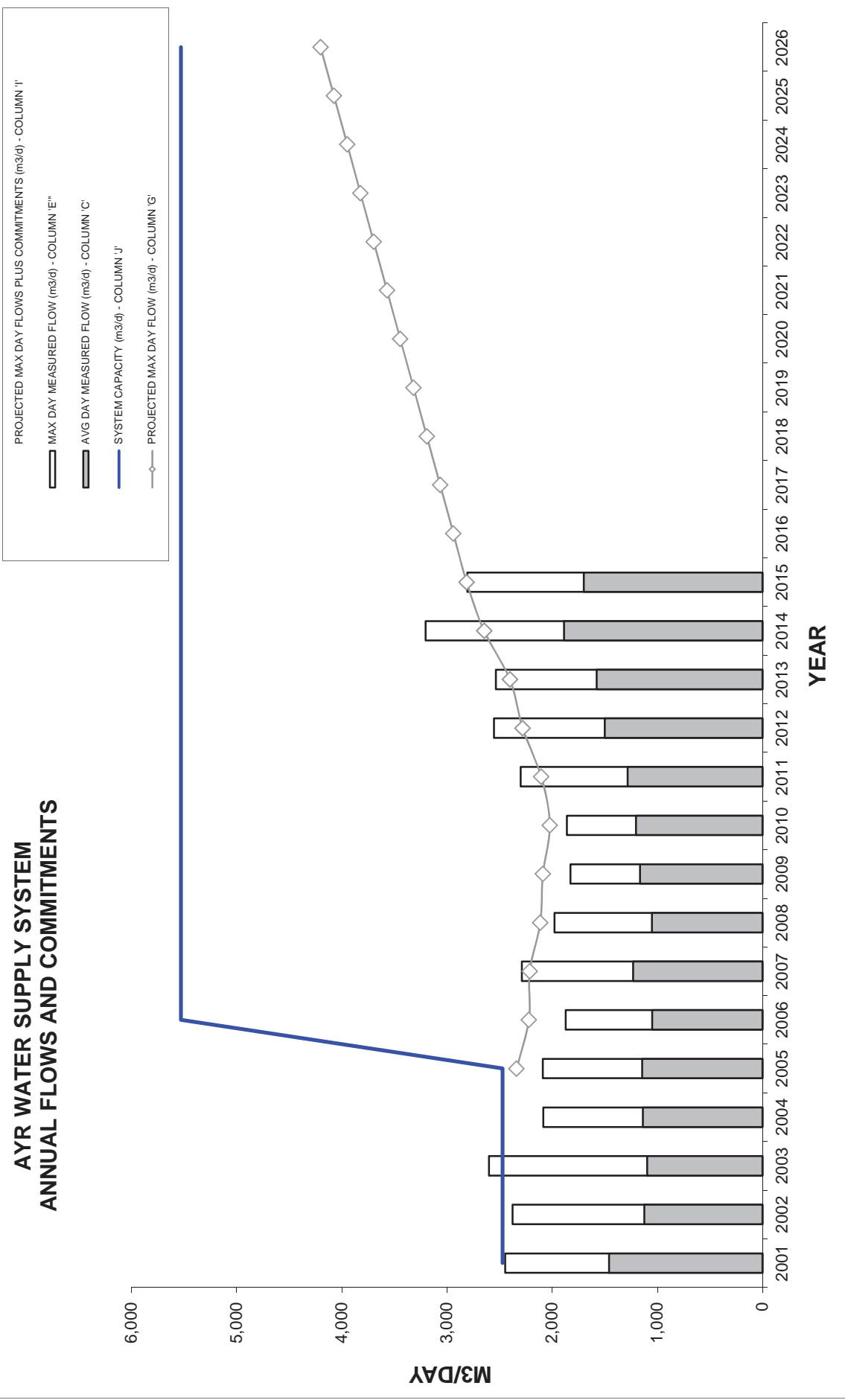
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - C WATER TABLES AND CHARTS

AYR WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E	F*		G = A x F		H COMMITMENTS (m ³ /d)	I = G + H PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	J SYSTEM CAPACITY (m ³ /d)	K = J - I REMAINING CAPACITY (m ³ /d)	L = K / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)		PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)							
2001	3,870	1,459						2,447							2,473		
2002	3,960	1,124						2,376							2,473		
2003	3,940	1,097						2,601							2,473		
2004	3,939	1,138						2,084							2,473		
2005	3,967	1,144	0.3033	1,203	2,090	0.5897	2,339	2,339	0.5897	2,339	2,339	130	2,469	2,473	4	6	
2006	3,988	1,050	0.2806	1,119	1,871	0.5570	2,222	1,871	0.5570	2,222	2,222	690	2,912	5,530	2,618	4,701	
2007	4,018	1,230	0.2850	1,145	2,289	0.5510	2,214	2,289	0.5510	2,214	2,214	540	2,754	5,530	2,776	5,039	
2008	4,099	1,051	0.2806	1,150	1,978	0.5154	2,113	1,978	0.5154	2,113	2,113	470	2,583	5,530	2,947	5,718	
2009	4,207	1,165	0.2782	1,170	1,826	0.4964	2,088	1,826	0.4964	2,088	2,088	848	2,937	5,530	2,593	5,224	
2010	4,220	1,204	0.2776	1,171	1,861	0.4793	2,022	1,861	0.4793	2,022	2,022	744	2,766	5,530	2,764	5,767	
2011	4,266	1,282	0.2850	1,216	2,299	0.4932	2,104	2,299	0.4932	2,104	2,104	704	2,808	5,530	2,722	5,518	
2012	4,667	1,499	0.2880	1,344	2,554	0.4887	2,281	2,554	0.4887	2,281	2,281	529	2,810	5,530	2,720	5,566	
2013	4,831	1,578	0.3021	1,459	2,536	0.4972	2,402	2,536	0.4972	2,402	2,402	469	2,871	5,530	2,659	5,348	
2014	4,888	1,888	0.3240	1,584	3,204	0.5415	2,647	3,204	0.5415	2,647	2,647	466	3,113	5,530	2,417	4,463	
2015	4,967	1,699	0.3353	1,666	2,807	0.5663	2,813	2,807	0.5663	2,813	2,813	1,285	4,098	5,530	1,432	2,528	
2016	5,190		0.3353	1,740		0.5663	2,939		0.5663	2,939	2,939			5,530			
2017	5,413		0.3353	1,815		0.5663	3,066		0.5663	3,066	3,066			5,530			
2018	5,636		0.3353	1,890		0.5663	3,192		0.5663	3,192	3,192			5,530			
2019	5,859		0.3353	1,965		0.5663	3,318		0.5663	3,318	3,318			5,530			
2020	6,082		0.3353	2,039		0.5663	3,444		0.5663	3,444	3,444			5,530			
2021	6,304		0.3353	2,114		0.5663	3,570		0.5663	3,570	3,570			5,530			
2022	6,527		0.3353	2,189		0.5663	3,697		0.5663	3,697	3,697			5,530			
2023	6,750		0.3353	2,263		0.5663	3,823		0.5663	3,823	3,823			5,530			
2024	6,973		0.3353	2,338		0.5663	3,949		0.5663	3,949	3,949			5,530			
2025	7,196		0.3353	2,413		0.5663	4,075		0.5663	4,075	4,075			5,530			
2026	7,419		0.3353	2,488		0.5663	4,202		0.5663	4,202	4,202			5,530			

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'C' and 'F'

AYR WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS



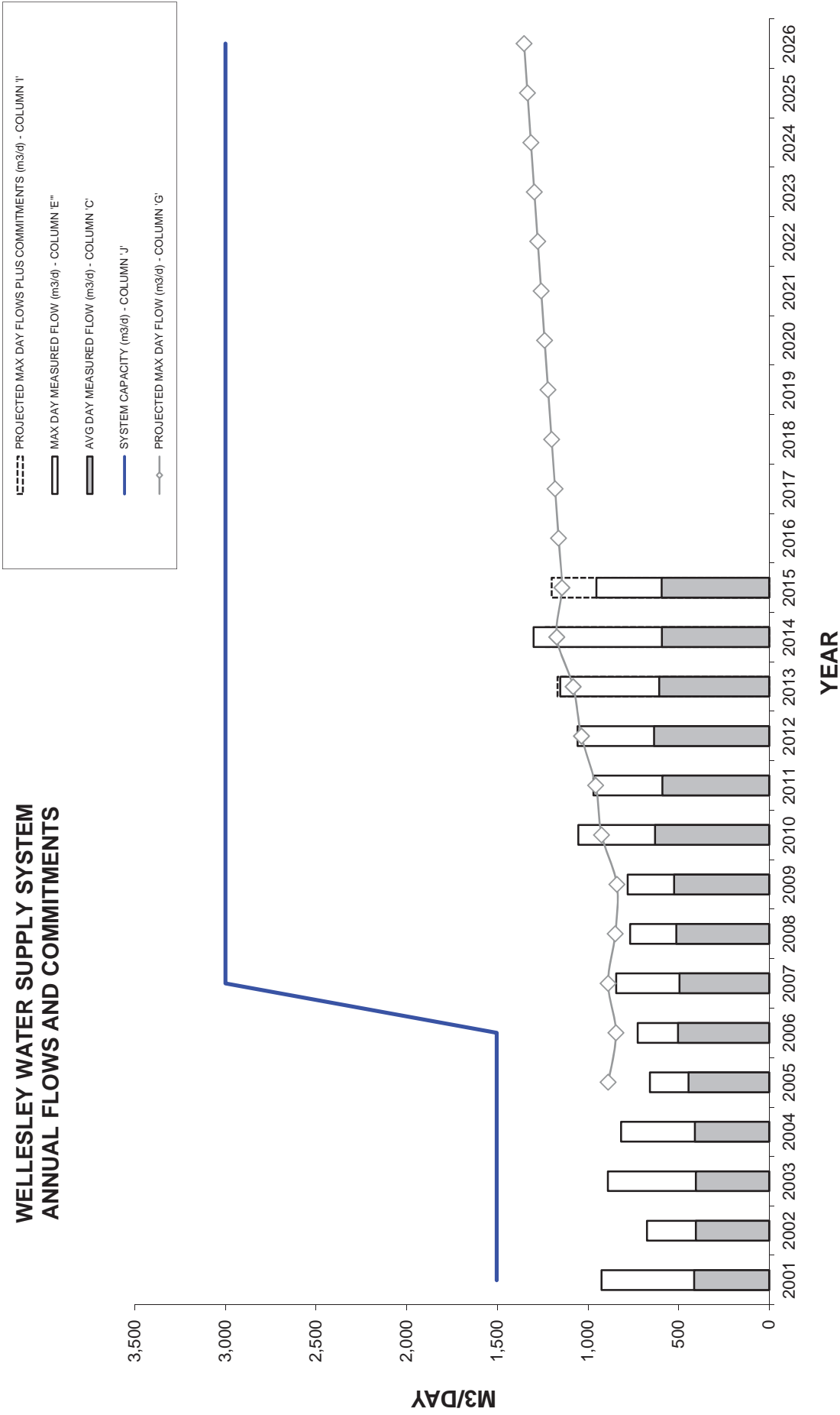
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - C WATER TABLES AND CHARTS

WELLESLEY WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A		B		C*		D = A x C		E	F*		G = A x F		H	I = G + H	J	K = J - I	L = K / F
	POP.	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)	PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)				
2001	1,750	415						925								1,503		
2002	1,840	405					675									1,503		
2003	1,916	405					890									1,503		
2004	2,051	410					818									1,503		
2005	2,152	446	0.2152	463	658	0.4129	888		530	1,418					1,503	85	205	
2006	2,279	503	0.2119	483	726	0.3709	845		550	1,395					1,503	108	290	
2007	2,420	495	0.2087	505	845	0.3674	889		320	1,209					3,000	1,791	4,875	
2008	2,536	513	0.2069	525	768	0.3350	850		280	1,130					3,000	1,870	5,583	
2009	2,681	525	0.2061	552	781	0.3135	841		244	1,085					3,000	1,915	6,109	
2010	2,829	630	0.2091	592	1,054	0.3269	925		170	1,095					3,000	1,905	5,828	
2011	2,901	590	0.2057	597	970	0.3301	957		125	1,083					3,000	1,917	5,808	
2012	3,169	635	0.2049	649	1,058	0.3270	1,036		135	1,171					3,000	1,829	5,594	
2013	3,195	607	0.2025	647	1,153	0.3386	1,082		86	1,167					3,000	1,833	5,412	
2014	3,254	592	0.1997	650	1,300	0.3602	1,172		63	1,235					3,000	1,765	4,899	
2015	3,337	594	0.1908	637	954	0.3429	1,144		57	1,201					3,000	1,799	5,247	
2016	3,392		0.1908	647		0.3429	1,163								3,000			
2017	3,447		0.1908	658		0.3429	1,182								3,000			
2018	3,502		0.1908	668		0.3429	1,201								3,000			
2019	3,558		0.1908	679		0.3429	1,220								3,000			
2020	3,613		0.1908	689		0.3429	1,239								3,000			
2021	3,668		0.1908	700		0.3429	1,258								3,000			
2022	3,723		0.1908	710		0.3429	1,277								3,000			
2023	3,778		0.1908	721		0.3429	1,295								3,000			
2024	3,833		0.1908	731		0.3429	1,314								3,000			
2025	3,888		0.1908	742		0.3429	1,333								3,000			
2026	3,943		0.1908	752		0.3429	1,352								3,000			

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'C' and 'F'

WELLESLEY WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS



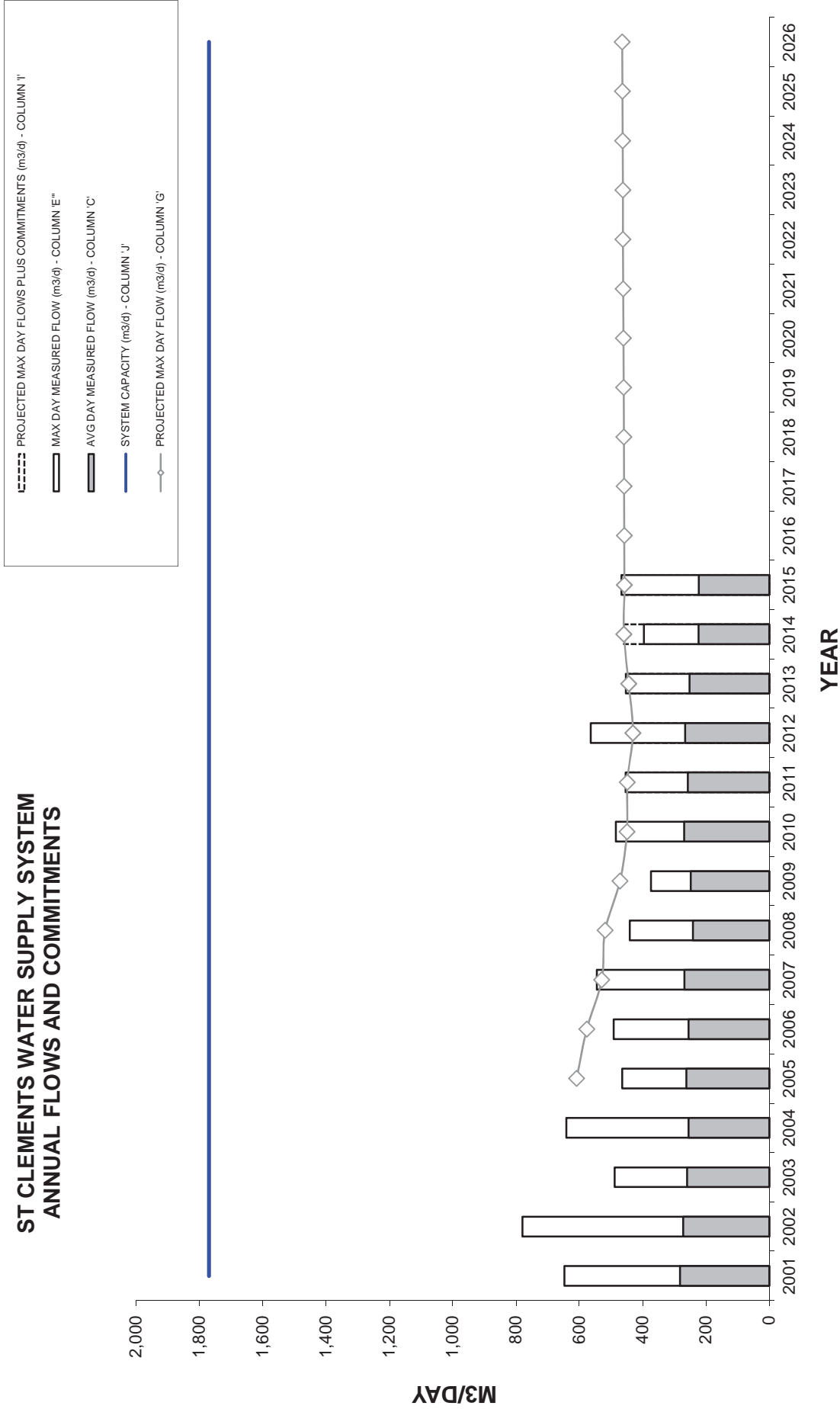
2016 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - C WATER TABLES AND CHARTS

ST CLEMENTS WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A		B		C*		D = A x C		E	F*		G = A x F		H	I = G + H	J	K = J - I	L = K / F
	POP.	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	COMMITMENTS (m ³ /d)	PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)				
2001	1,400	282							647							1,770		
2002	1,410	272							780							1,770		
2003	1,378	260							489							1,770		
2004	1,404	255							641							1,770		
2005	1,411	262	0.1901	268	465	0.4313	609		465					629	1,770	1,141	2,647	
2006	1,411	255	0.1859	262	492	0.4086	576		492					606	1,770	1,164	2,848	
2007	1,411	269	0.1854	262	545	0.3752	529		545					549	1,770	1,221	3,253	
2008	1,415	241	0.1818	257	441	0.3665	519		441					539	1,770	1,231	3,359	
2009	1,442	248	0.1799	259	374	0.3271	472		374					487	1,770	1,283	3,922	
2010	1,350	269	0.1826	247	485	0.3330	450		485					462	1,770	1,308	3,928	
2011	1,360	258	0.1843	251	454	0.3301	449		454					449	1,770	1,321	4,002	
2012	1,259	266	0.1885	237	564	0.3424	431		564					431	1,770	1,339	3,910	
2013	1,263	252	0.1943	245	453	0.3518	444		453					444	1,770	1,326	3,768	
2014	1,267	224	0.1952	247	396	0.3625	459		396					459	1,770	1,311	3,616	
2015	1,253	223	0.1909	239	467	0.3651	458		467					463	1,770	1,307	3,578	
2016	1,255		0.1909	240		0.3651	458								1,770			
2017	1,257		0.1909	240		0.3651	459								1,770			
2018	1,258		0.1909	240		0.3651	459								1,770			
2019	1,260		0.1909	241		0.3651	460								1,770			
2020	1,262		0.1909	241		0.3651	461								1,770			
2021	1,264		0.1909	241		0.3651	462								1,770			
2022	1,266		0.1909	242		0.3651	462								1,770			
2023	1,267		0.1909	242		0.3651	463								1,770			
2024	1,269		0.1909	242		0.3651	463								1,770			
2025	1,271		0.1909	243		0.3651	464								1,770			
2026	1,273		0.1909	243		0.3651	465								1,770			

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'C' and 'F'

ST CLEMENTS WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS



CONESTOGO GOLF COURSE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C AVERAGE DAY		D = A x C		E	F = E / A MAXIMUM DAY		G = A x F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)					
2010	517	180	0.4131	214	488	1.0437	540	601	61	58					
2011	517	152	0.4043	209	470	1.0365	536	601	65	63					
2012	521	178	0.3974	207	528	1.0059	524	601	77	76					
2013	484	149	0.3490	169	444	0.9476	459	601	142	150					
2014	480	135	0.3145	151	347	0.9012	433	601	168	187					
2015	480	153	0.3086	148	468	0.9076	436	601	165	182					

CONESTOGO PLAINS WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C AVERAGE DAY		D = A x C		E	F = E / A MAXIMUM DAY		G = A x F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)					
2010	373	82	0.2192	82	206	0.5207	194	786	592	1,137					
2011	373	82	0.2177	81	262	0.5548	207	786	579	1,044					
2012	371	92	0.2184	81	332	0.6180	229	786	557	901					
2013	378	76	0.2176	82	208	0.6322	239	786	547	865					
2014	378	76	0.2181	82	174	0.6320	239	786	547	866					
2015	378	80	0.2164	82	195	0.6247	236	786	550	880					

MARY HILL WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C AVERAGE DAY		D = A x C		E	F = E / A MAXIMUM DAY		G = A x F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)					
2010	160	82	0.4309	69	122	0.7190	115	157	42	58					
2011	160	72	0.4376	70	113	0.7400	118	157	39	52					
2012	166	91	0.4758	79	118	0.7643	127	157	30	39					
2013	144	64	0.4802	69	103	0.7645	110	157	47	61					
2014	144	60	0.4744	68	116	0.7401	107	157	50	68					
2015	144	66	0.4635	67	105	0.7334	106	157	51	70					

MARY HILL VILLAGE HEIGHTS WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C AVERAGE DAY		D = A x C PROJECTED FLOW (m ³ /d)	E MEASURED FLOW (m ³ /d)	F = E / A MAXIMUM DAY		G = A x F PROJECTED FLOW (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
			AVERAGE FLOW PER PER DAY (m ³ /cd)	AVERAGE FLOW PER PER DAY (m ³ /cd)			AVERAGE FLOW PER PER DAY (m ³ /cd)	AVERAGE FLOW PER PER DAY (m ³ /cd)				
2010	147	31	0.2378	0.7253	35	87	0.7253	107	820	713	984	
2011	147	33	0.2346	0.8680	34	190	0.8680	128	820	692	798	
2012	152	34	0.2149	0.7736	33	99	0.7736	118	820	702	908	
2013	136	39	0.2323	0.8529	32	132	0.8529	116	820	704	825	
2014	135	29	0.2321	0.8094	31	73	0.8094	109	820	711	878	
2015	135	30	0.2344	0.8629	32	116	0.8629	116	820	704	815	

WEST MONTROSE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C AVERAGE DAY		D = A x C PROJECTED FLOW (m ³ /d)	E MEASURED FLOW (m ³ /d)	F = E / A MAXIMUM DAY		G = A x F PROJECTED FLOW (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
			AVERAGE FLOW PER PER DAY (m ³ /cd)	AVERAGE FLOW PER PER DAY (m ³ /cd)			AVERAGE FLOW PER PER DAY (m ³ /cd)	AVERAGE FLOW PER PER DAY (m ³ /cd)				
2010	177	83	0.4190	0.8684	74	166	0.8684	154	238	84	97	
2011	177	78	0.4346	0.9060	77	180	0.9060	160	238	78	86	
2012	204	70	0.4152	0.9464	85	240	0.9464	193	238	45	47	
2013	234	47	0.3766	0.9009	88	114	0.9009	211	238	27	30	
2014	233	53	0.3362	0.8413	78	137	0.8413	196	238	42	50	
2015	233	71	0.3034	0.8048	71	176	0.8048	188	238	50	63	

HEIDELBERG WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C AVERAGE DAY		D = A x C		E	F = E / A MAXIMUM DAY		G = A x F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)		AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)			MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)				
2010	1,009	153		0.2530		255		269	0.4513		455		829	374	828
2011	1,009	152		0.2237		226		329	0.4186		422		829	407	971
2012	1,054	159		0.1950		206		326	0.3657		385		829	444	1,213
2013	1,054	155		0.1692		178		270	0.3075		324		829	505	1,642
2014	1,050	154		0.1494		157		318	0.2922		307		829	522	1,787
2015	1,050	147		0.1470		154		288	0.2937		308		829	521	1,772

LINWOOD WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C AVERAGE DAY		D = A x C		E	F = E / A MAXIMUM DAY		G = A x F		H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)		AVERAGE FLOW PER PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)			MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)				
2010	847	162		0.2128		180		247	0.4078		345		605	260	637
2011	850	158		0.2050		174		216	0.3711		315		605	290	780
2012	819	157		0.1974		162		242	0.3296		270		605	335	1,017
2013	804	157		0.1944		156		220	0.3044		245		605	360	1,183
2014	804	152		0.1905		153		226	0.2792		224		605	381	1,363
2015	804	179		0.1968		158		306	0.2970		239		605	366	1,233

FOXBORO WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C		D = A x C		E	F = E / A		G = A x F	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)					
2010	401	95	0.2483	100	134	0.3632	146	527	381	1,050				
2011	401	99	0.2471	99	222	0.3984	160	527	367	922				
2012	411	94	0.2429	100	181	0.4120	169	527	358	868				
2013	419	95	0.2372	99	127	0.3946	165	527	362	917				
2014	417	99	0.2353	98	128	0.3876	162	527	365	942				
2015	417	101	0.2364	99	134	0.3851	161	527	366	952				

NEW DUNDEE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B		C		D = A x C		E	F = E / A		G = A x F	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)	AVERAGE FLOW PER PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /cd)		PROJECTED FLOW (m ³ /d)					
2010	1,138	214	0.2038	232	465	0.3754	427	983	556	1,480				
2011	1,138	221	0.1988	226	415	0.3706	422	983	561	1,514				
2012	1,170	228	0.1927	225	454	0.3644	426	983	557	1,527				
2013	1,128	195	0.1882	212	462	0.3779	426	983	557	1,474				
2014	1,126	218	0.1888	213	459	0.3957	446	983	537	1,358				
2015	1,126	196	0.1860	209	404	0.3857	434	983	549	1,422				

ROSEVILLE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C AVERAGE DAY		D = A x C		E MEASURED FLOW (m ³ /d)	F = E / A MAXIMUM DAY		G = A x F PROJECTED FLOW (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
			AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)							
2010	290	81	0.2908	84	210	0.6741	195	358	163	241			
2011	290	77	0.2829	82	191	0.6586	191	358	167	254			
2012	301	84	0.2716	82	178	0.6131	185	358	173	283			
2013	298	81	0.2729	81	183	0.6346	189	358	169	266			
2014	298	71	0.2668	79	150	0.6183	184	358	174	281			
2015	298	73	0.2599	77	142	0.5688	169	358	189	331			

BRANCHTON WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C AVERAGE DAY		D = A x C		E MEASURED FLOW (m ³ /d)	F = E / A MAXIMUM DAY		G = A x F PROJECTED FLOW (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / F REMAINING CAPACITY (People)
			AVERAGE FLOW PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	PROJECTED FLOW (m ³ /d)	AVERAGE FLOW PER DAY (m ³ /cd)							
2010	121	36	0.3135	38	100	0.9480	115	130	15	16			
2011	121	34	0.3131	38	94	0.9459	114	130	16	16			
2012	106	40	0.3230	34	112	0.9212	98	130	32	35			
2013	110	36	0.3294	36	87	0.9286	102	130	28	30			
2014	110	36	0.3229	36	78	0.8320	92	130	38	46			
2015	110	32	0.3215	35	84	0.8194	90	130	40	49			

APPENDIX D

Population and Development Data

TABLE D-1

YEAR-END POPULATION BY SERVICE AREA

(Year-end total, including temporary university and college students)

Wastewater Service Area	2011	2012	2013	2014	2015	2021	2026
Galt S.A.	82,970	84,010	84,151	85,088	86,070	94,524	101,570
Preston S.A.	20,409	20,467	20,415	20,656	20,722	22,864	24,648
Hespeler S.A.	24,646	25,705	25,595	25,737	25,769	26,276	26,707
Kitchener S.A.	227,161	229,757	230,922	234,468	237,417	256,932	273,194
Waterloo S.A.	127,688	130,987	134,851	136,179	137,322	144,175	149,886
Ayr S.A.	4,255	4,736	4,822	4,879	4,962	6,292	7,408
Baden/New Hamburg S.A.	17,773	12,372	12,575	12,787	12,978	14,722	16,160
Wellesley S.A.	2,921	3,143	3,211	3,270	3,353	3,684	3,959
St. Jacobs S.A.	1,735	1,826	1,860	1,861	1,912	2,071	2,204
Elmira S.A.	9,586	9,531	9,824	9,899	10,025	12,509	14,579

TABLE D-2

2015 YEAR-END COMMITTED POPULATION BY SERVICE AREA WITHIN THE BUILT-UP AREA

Wastewater Service Area	Population in Building Permit Issued but not yet Occupied	Population in Unbuilt Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Galt S.A.	53	55	319	427
Preston S.A.	49	0	0	49
Hespeler S.A.	0	3	354	357
Kitchener S.A.	1,773	2,560	413	4,747
Waterloo S.A.	4,115	996	174	5,285
Ayr S.A.	10	0	0	10
Baden/New Hamburg S.A.	6	7	501	514
Wellesley S.A.	0	0	3	3
St. Jacobs S.A.	0	0	0	0
Elmira S.A.	0	0	0	0

TABLE D-3

2015 YEAR-END COMMITTED POPULATION BY SERVICE AREA WITHIN THE DESIGNATED GREENFIELD AREA

Wastewater Service Area	Population in Building Permit Issued but not yet Occupied	Population in Unbuilt Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Galt S.A.	417	158	2,199	2,773
Preston S.A.	192	1,704	0	1,896
Hespeler S.A.	71	0	0	71
Kitchener S.A.	1,948	7,147	25,212	34,307
Waterloo S.A.	777	2,726	4,161	7,663
Ayr S.A.	16	39	2,187	2,242
Baden/New Hamburg S.A.	89	528	308	925
Wellesley S.A.	13	68	72	153
St. Jacobs S.A.	0	0	0	0
Elmira S.A.	125	591	3,547	4,264

* in the Hespeler service area this includes the American Standard development (354 people) which has received City of Cambridge council approval

** St. Agatha Straus Court and St. Agatha Seniors Complex are included in the Integrated Urban System Water Service Area starting in 2012

*** St. Clements Service Area is not within the Built Up Area or the Designated Greenfield Area, however for reporting purposes, committed population has been attributed to the Designated Greenfield Area

TABLE D-4

MID-YEAR POPULATION BY WATER SERVICE AREA

(Mid-Year total, including temporary spring term, university and college students)

Water Service Area	2011	2012	2013	2014	2015	2021	2026
Integrated Urban System**	498,074	506,212	511,535	517,487	522,730	562,849	596,281
Baden/New Hamburg S.A.	12,073	12,676	12,878	13,089	13,287	14,982	16,380
Ayr S.A.	4,266	4,746	4,831	4,888	4,967	6,304	7,419
Wellesley S.A.	2,901	3,127	3,195	3,254	3,337	3,668	3,943
St. Clements S.A.	1,360	1,270	1,263	1,267	1,263	1,264	1,273

** St. Agatha Straus Court and St. Agatha Seniors Complex are included in the Integrated Urban System Water Service Area starting in 2012

*** St. Clements Service Area is not within the Built Up Area or the Designated Greenfield Area, however for reporting purposes, committed population has been attributed to the Designated Greenfield Area

TABLE D-5

YEAR-END POPULATION - SMALL WASTEWATER SYSTEMS

Service Area	2011	2012	2013	2014	2015	2013 PPU
Heidelberg	1,009	1,055	1,054	1,050	1,043	3,1290
Village Heights	147	136	136	135	134	2,8623
Maryhill	160	145	144	144	143	3,0350
Linwood	850	809	804	804	803	3,1524
West Montrose	177	228	234	233	233	4,0819
Branchton Meadows	121	110	110	110	109	2,7249
Conestoga Plains	373	378	378	378	363	3,3068
Conestoga Golf Course	517	484	484	480	481	2,9688
Roseville	290	299	298	298	298	3,2171
New Dundee	1,138	1,133	1,128	1,126	1,117	2,8744
St. Agatha Straus Court**	42					
St. Agatha Seniors Complex**	34					
Foxboro	401	419	419	417	415	1,9885

** St. Agatha Straus Court and St. Agatha Seniors Complex are included in the Integrated Urban System Water Service Area starting in 2012

*** St. Clements Service Area is not within the Built Up Area or the Designated Greenfield Area, however for reporting purposes, committed population has been attributed to the Designated Greenfield Area

APPENDIX E

Sample Calculations

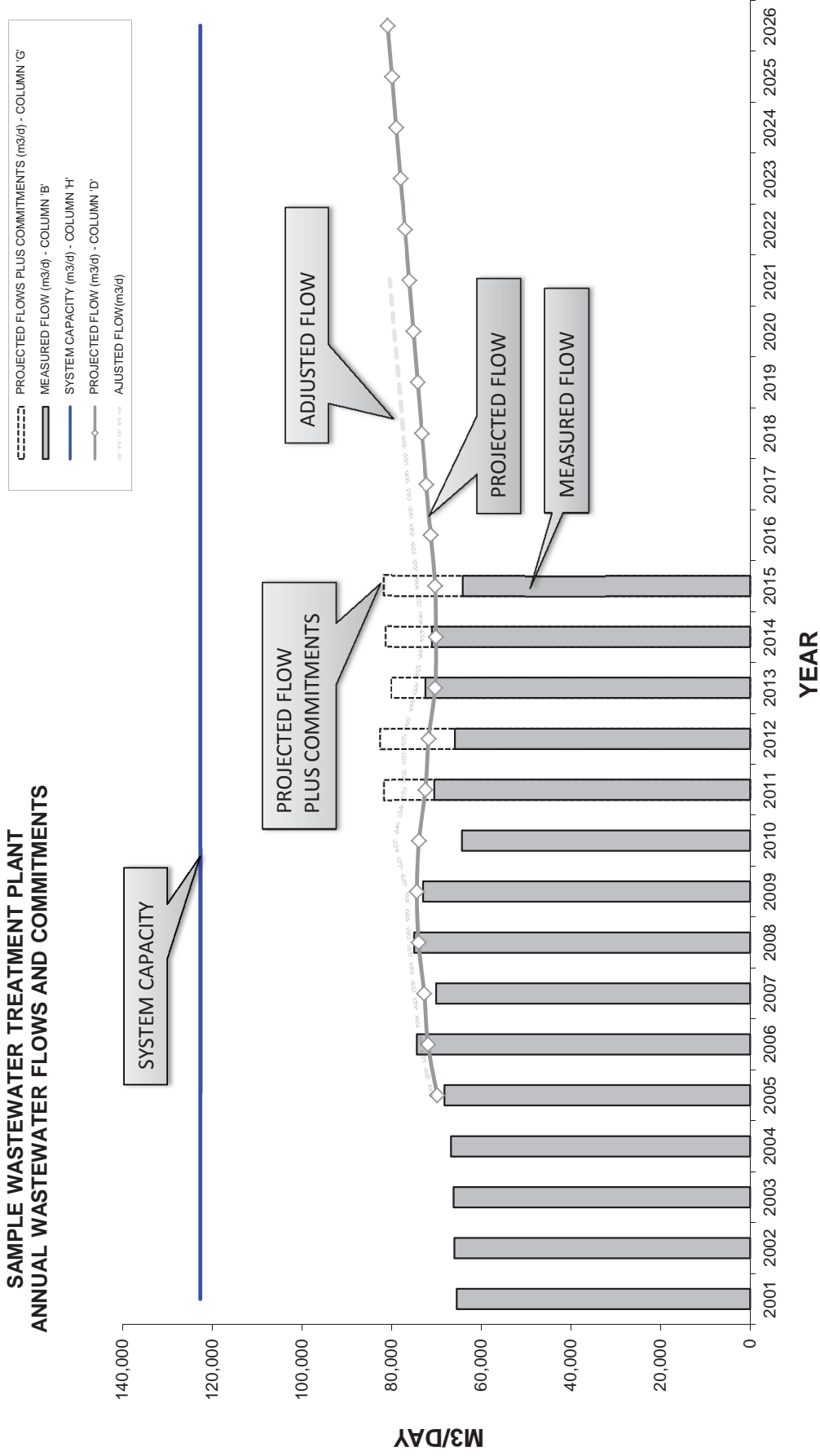
SAMPLE WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A POP.	B		C*		D = A x C		E COMMITMENTS (m3/d)	F COMMITMENTS (m3/d)	G = D + E + F PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	H SYSTEM CAPACITY (m ³ /d)	I = H - G REMAINING CAPACITY (m ³ /d)	J = I / C REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	BUA								
2001	A1	B1	C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26	=A5 x C5	E5 E6 E7 E8 E9 E10 E11 E12 E13 E14 E15	F11 F12 F13 F14 F15	122,700	122,700	=H5 - G5 =H6 - G6 =H7 - G7 =H8 - G8 =H9 - G9 =H10 - G10 =H11 - G11 =H12 - G12 =H13 - G13 =H14 - G14 =H15 - G15	=I5 / C5 =I6 / C6 =I7 / C7 =I8 / C8 =I9 / C9 =I10 / C10 =I11 / C11 =I12 / C12 =I13 / C13 =I14 / C14 =I15 / C15			
2002	A2	B2		=A6 x C6									
2003	A3	B3		=A7 x C7									
2004	A4	B4		=A8 x C8									
2005	A5	B5		=A9 x C9									
2006	A6	B6		=A10 x C10									
2007	A7	B7		=A11 x C11									
2008	A8	B8		=A12 x C12									
2009	A9	B9		=A13 x C13									
2010	A10	B10		=A14 x C14									
2011	A11	B11		=A15 x C15									
2012	A12	B12		=A16 x C16									
2013	A13	B13		=A17 x C17									
2014	A14	B14		=A18 x C18									
2015	A15	B15		=A19 x C19									
2016	A16	B16		=A20 x C20									
2017	A17	B17		=A21 x C21									
2018	A18	B18		=A22 x C22									
2019	A19	B19		=A23 x C23									
2020	A20	B20		=A24 x C24									
2021	A21	B21		=A25 x C25									
2022	A22	B22		=A21 x C21									
2023	A23	B23		=A22 x C22									
2024	A24	B24		=A23 x C23									
2025	A25	B25		=A24 x C24									
2026	A26	B26		=A25 x C25									

Refer To Section 2.6 For More Information

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

**SAMPLE WASTEWATER TREATMENT PLANT
 ANNUAL WASTEWATER FLOWS AND COMMITMENTS**



2016 WATER AND WASTEWATER MONITORING REPORT
WATER SAMPLE CALCULATIONS

SAMPLE ANNUAL FLOWS AND COMMITMENTS ANNUAL FLOWS AND COMMITMENTS

YEAR	A SUMMER POP.	B WINTER POP.	C		D* AVERAGE DAY		E = B x D		F MEASURED FLOW (m ³ /d)	G* MAXIMUM DAY/WEEK		H = A x G	I COMMITMENTS (m ³ /d)	J = H + I PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	K SYSTEM CAPACITY (m ³ /d)	L = K - J REMAINING CAPACITY (m ³ /d)	M = L / G REMAINING CAPACITY (People)
			MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /d)	PROJECTED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /d)	PROJECTED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /d)									
2001	A1	B1	C1	D5	=B5 x D5	G5	=A5 x G5	I5	F1						K1	=K5 - J5	=L5 / G5
2002	A2	B2	C2	D6	=B6 x D6	G6	=A6 x G6	I6	F2						K2	=K6 - J6	=L6 / G6
2003	A3	B3	C3	D7	=B7 x D7	G7	=A7 x G7	I7	F3						K3	=K7 - J7	=L7 / G7
2004	A4	B4	C4	D8	=B8 x D8	G8	=A8 x G8	I8	F4						K4	=K8 - J8	=L8 / G8
2005	A5	B5	C5	D9	=B9 x D9	G9	=A9 x G9	I9	F5						K5	=K9 - J9	=L9 / G9
2006	A6	B6	C6	D10	=B10 x D10	G10	=A10 x G10	I10	F6						K6	=K10 - J10	=L10 / G10
2007	A7	B7	C7	D11	=B11 x D11	G11	=A11 x G11	I11	F7						K7	=K11 - J11	=L11 / G11
2008	A8	B8	C8	D12	=B12 x D12	G12	=A12 x G12	I12	F8						K8	=K12 - J12	=L12 / G12
2009	A9	B9	C9	D13	=B13 x D13	G13	=A13 x G13	I13	F9						K9	=K13 - J13	=L13 / G13
2010	A10	B10	C10	D14	=B14 x D14	G14	=A14 x G14	I14	F10						K10	=K14 - J14	=L14 / G14
2011	A11	B11	C11	D15	=B15 x D15	G15	=A15 x G15	I15	F11						K11	=K15 - J15	=L15 / G15
2012	A12	B12	C12	D16	=B16 x D16	G16	=A16 x G16		F12						K12		
2013	A13	B13	C13	D17	=B17 x D17	G17	=A17 x G17		F13						K13		
2014	A14	B14	C14	D18	=B18 x D18	G18	=A18 x G18		F14						K14		
2015	A15	B15	C15	D19	=B19 x D19	G19	=A19 x G19		F15						K15		
2016	A16	B16	C16	D20	=B20 x D20	G20	=A20 x G20								K16		
2017	A17	B17	C17	D21	=B21 x D21	G21	=A21 x G21								K17		
2018	A18	B18	C18	D22	=B22 x D22	G22	=A22 x G22								K18		
2019	A19	B19	C19	D23	=B23 x D23	G23	=A23 x G23								K19		
2020	A20	B20	C20	D24	=B24 x D24	G24	=A24 x G24								K20		
2021	A21	B21	C21	D25	=B25 x D25	G25	=A25 x G25								K21		
2022	A22	B22	C22	D26	=B26 x D26	G26	=A26 x G26								K22		
2023	A23	B23	C23												K23		
2024	A24	B24	C24												K24		
2025	A25	B25	C25												K25		
2026	A26	B26	C26												K26		

Refer to Section 2.5 For More Information

*Average of the previous five years. See Section 2.5 for an explanation of the Max Flow Per Capita Per Day in Column 'D' and 'G'

SAMPLE ANNUAL FLOWS AND COMMITMENTS

