



Region of Waterloo

Water and Wastewater Monitoring Report

May

2017

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 24, 2017

This page was intentionally left blank

Table of Contents

1.0	INTRODUCTION	3
1.1	Overview	3
1.2	Changes from the 2016 Water and Wastewater Monitoring Report.....	3
2.0	METHODOLOGY	4
2.1	Ministry of Environment and Climate Change (MOECC) Guidelines	4
2.2	Servicing Commitments	5
2.3	Population Data	6
2.4	Development Data	7
2.5	Water Flows	8
2.5.1	Maximum Week Demand	9
2.5.2	Water Use Efficiency Measures	9
2.5.3	Water Supply Capacity.....	9
2.6	Wastewater Flows	10
2.7	Wastewater Treatment Capacity.....	10
3.1	Water Systems	11
3.1.1	Integrated Urban System (IUS)	11
3.1.2	Baden - New Hamburg Water System	12
3.1.3	Ayr Water System	12
3.1.4	Wellesley Water System	12
3.1.5	St. Clements Water System	13
3.2	Wastewater.....	14
3.2.1	Kitchener Wastewater Treatment Plant (KWWTP).....	14
3.2.2	Waterloo Wastewater Treatment Plant (WWWTP)	14
3.2.3	Galt Wastewater Treatment Plant (GWWTP).....	15
3.2.4	Preston Wastewater Treatment Plant (PWWTP)	15
3.2.5	Hespeler Wastewater Treatment Plant (HWWTP)	16
3.2.6	Elmira Wastewater Treatment Plant (EWWTP).....	16
3.2.7	St. Jacobs Wastewater Treatment Plant (SJWWTP)	17
3.2.8	Baden/New Hamburg WWTP (BNHWWTP)	17
3.2.9	Ayr Wastewater Treatment Plant (AWWTP)	18
3.2.10	Wellesley Wastewater Treatment (WEWWTP)	18
3.3	Small Systems	19
3.3.1	Water	19
3.3.2	Wastewater	19
4.0	SUMMARY OF SERVICE AREA ASSESSMENTS	19

LIST OF APPENDICES

APPENDIX "A"	Glossary
APPENDIX "B"	Wastewater Charts and Data
APPENDIX "C"	Water Charts and Data
APPENDIX "D"	Population and Development Data
APPENDIX "E"	Sample Calculations

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 2017 Water and Wastewater Monitoring Report (2017WWWMR) 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 2016 Water and Wastewater Monitoring Report

The changes from the 2016 WWWMR are as follows:

- Population and development data, including building permits issued, have been updated to December 31, 2016.
- Water consumption patterns and wastewater flows are a function of yearly weather fluctuations. In 2016, the annual precipitation was just below the average annual precipitation recorded at the University of Waterloo weather station. However, the distribution of the precipitation was not uniform: almost twice the precipitation fell in March, but it was a very dry summer. For the rest of the year the precipitation was

close to the monthly average. Seasonal impacts at some wastewater treatment plants showed generally average or slightly below average flows. The water consumption was slightly below average in 2016, with an average measured maximum week in 2016. Overall the 5-year average consumption is continuing to decrease.

- The commitment tables in Appendix D have been updated to reflect year end 2016 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:

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

Where:

- C_u = uncommitted hydraulic reserve capacity (m³/d)
- C_r = 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 2016 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 within the built-up areas. The implementation of the Growth Plan is carried out through the Regional and Area Municipal official plans. On June 15th, 2015 the Ontario Municipal Board approved a new Regional Official Plan (ROP) for the Region of Waterloo. The new ROP established a target that by 2015 and each year thereafter, a minimum of 45 per cent of all new dwellings are to be constructed in the built-up area.

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

The 2016 Census population estimates were being released by Statistics Canada at the time of the writing of this report, therefore, the 2016 results by water and wastewater service area were not available for this publication. Instead, population estimates for each service area were based on the forecasts for 2016 population from the previous year’s report. These figures were in-line with the initial 2016 Census results at a Regional level. The total Regional population estimate reflects year-end, 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 2016, and then the population for each service area was forecast. 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 2016 have been preserved for continuity with previous Monitoring Reports. It is anticipated that population figures will be retroactively updated in the 2018 report to incorporate the 2016 Census results.

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). In order to maintain a forecast of at least ten years, the forecast horizon for this report is 2026.

2.4 Development Data

Development data for each service area, shown in Appendix "D," was updated in April 2017 with subdivision plan status current to year-end 2016. 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 2016. 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 for the wastewater service areas 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 2017 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 2017 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 2016 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	174,306 (m ³ /d)
Commitments	22,163 (m ³ /d)
Remaining Capacity	53,531 (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 2016 was 138,360 m³/d, down approximately 1% from 2015. Maximum week water use in 2016 for the IUS is reported as 166,691 m³/d, which is virtually unchanged from maximum week use in 2015. Consumption in 2016 was below the 5-year average. The peaking factor between average day and maximum week in 2016 was 1.20. The 5-year average for maximum week projected demand is 174,306 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 0.3411 there is capacity to service approximately 156,941 additional people in the IUS as of December 31, 2016.

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 65,000 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	4,347 (m ³ /d)
Commitments	259 (m ³ /d)
Remaining Capacity	8,008 (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 2016 was measured at 4,130 m³/d which is up 2% from 2015. The 5-year average max day projected demand is 4,347 m³/d.

Using the 5-year average max day per capita demand of 0.3208 m³/c/d, there is capacity to service approximately 25,000 additional people in Baden-New Hamburg water system as of December 31, 2016.

3.1.3 Ayr Water System

Ayr System Capacity	5,530 (m ³ /d)
Max Day Projected Demand	2,627 (m ³ /d)
Commitments	1,391 (m ³ /d)
Remaining Capacity	1,234 (m ³ /d)

The firm capacity rating of the Ayr Water System is 5,530 m³/d. 2016 Maximum Day water use in Ayr was recorded at 2,627 m³/d, which is a 6% decrease from 2015. Higher than

normal consumption was observed in 2015 which was attributed to a substantial leak. The leak was repaired in early 2015. The 5-year average max day projected demand is 4,176 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 0.5598 m³/c/d, there is capacity to service approximately 2,200 additional people in the Ayr Water System as of December 31, 2016. 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	41 (m ³ /d)
Remaining Capacity	1,842 (m ³ /d)

The water supply system has a firm capacity of 3,000 m³/d. 2016 Maximum Day demand in Wellesley was measured as 904 m³/d, which is down approximately 5% from 2015. The 5-

year average max day projected demand is 1,117 m³/d.

Using the 5-year average per max day capita demand of 0.3293 m³/c/d, there is capacity to service approximately 5,600 additional people in the Wellesley Water System as of December 31, 2016. 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	460 (m ³ /d)
Commitments	10 (m ³ /d)
Remaining Capacity	1,300 (m ³ /d)

The water treatment plant has a firm capacity of 1,770 m³/d. 2016 Maximum Day Demand in St. Clements was measured as 428 m³/d, which is down approximately 8% from 2015. The 5-

year average max day projected demand is 460 m³/d.

Using the 5-year average per max per capita demand of 0.3666 m³/c/d, there is capacity to service approximately 3,600 additional people in the St. Clements Water System as of December 31, 2016. 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 2016 was recorded at 65,247 m³/d which is up about 2% from 2015. The 5-year Average Projected Flow is 69,417 m³/d.

KWWTP Rated Capacity	122,700 (m ³ /d)
Average Projected Flow	69,417 (m ³ /d)
Commitments	10,903 (m ³ /d)
Remaining Capacity	42,380 (m ³ /d)

Using the 5-year average flow per capita flow of 0.2884 m³/c/d, there is capacity to service approximately 147,000 additional people in the Kitchener Wastewater Service Area as of December 31, 2016. The present system capacity could service a population of approximately 425,000 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 2016 at the WWWTP was recorded at 39,750 m³/d, which is up 3% from 2015. The 5-year Average Projected Flow is 44,325 m³/d.

WWWTP Rated Capacity	57,500 (m ³ /d)
Average Projected Flow	44,325 (m ³ /d)
Commitments	3,519 (m ³ /d)
Remaining Capacity	11,255 (m ³ /d)

Using the 5-year average per capita flow of 0.3201 m³/c/d, there is capacity to service approximately 35,160 additional people in the Waterloo Wastewater Service Area as of December 31, 2016. The expected rated capacity of 57,500 m³/d could service a population of approximately 180,000 people.

The projected flows plus committed flows at the Waterloo WWTP is approximately 85% 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 33,739 m³/d in 2016 which is essentially unchanged from 2015. The 5-year Average Projected Flow is 34,799 m³/d.

GWWTP Rated Capacity	56,800 (m ³ /d)
Average Projected Flow	34,799 (m ³ /d)
Commitments	1,150 (m ³ /d)
Remaining Capacity	20,850 (m ³ /d)

Using the 5-year average per capita flow of 0.3978 m³/c/d, there is capacity to service approximately 52,000 additional people in the Galt Wastewater Service Area as of December 31, 2016. 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	8,969 (m ³ /d)
Commitments*	5,332 (m ³ /d)
Remaining Capacity	2,519 (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 2016 at the PWWTP was recorded at 8,646 m³/d which is up 2% from 2015 flows. The 5-year Average Projected Flow is 8,969 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. Partial occupancy in the Boxwood subdivision started in late 2014, and continued to increase in 2015 and 2016. However, the new buildings were generally not occupied until later in 2015 and early 2016, and represent a small portion of the proposed development, so therefore no adjustments to the reserve capacity have been made in the 2017 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 0.4255 m³/c/d, there is capacity to service approximately 5,900 additional people in the Preston Wastewater Service Area as of December 31, 2016. The present rated capacity could service a population of approximately 40,000 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 6,500 m³/d for 2016, which is up about 1% from 2015. The 5-year Average Projected Flow is 6,804 m³/d.

HWWTP Rated Capacity	9,320 (m ³ /d)
Average Projected Flow	6,804 (m ³ /d)
Commitments	187 (m ³ /d)
Remaining Capacity	2,329 (m ³ /d)

Using the 5-year average per capita flow of 0.2633 m³/c/d, there is capacity to service approximately 8,800 additional people in the Hespeler Wastewater Service Area as of December 31, 2016. The present rated capacity of 9,320 m³/d could service a population of approximately 35,000 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	4,183 (m ³ /d)
Commitments	1,402 (m ³ /d)
Remaining Capacity	2,215 (m ³ /d)

Flows in 2016 at the EWWTP were recorded at 3,669 m³/d which is up 14% from 2015. The 5-year Average Projected Flow is 4,183 m³/d.

Using the 5-year average per capita flow of 0.4007 m³/c/d, there is capacity to service approximately 5,500 additional people in the Elmira Wastewater Service Area as of December 31, 2016. The present rated capacity of 7,800 m³/d could service a population of approximately 19,500 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 2016 were recorded at 855 m³/d which is up approximately 18% from 2015. The 5-year Average Projected Flow is 895 m³/d.

SJWWTP Rated Capacity	1,450 (m ³ /d)
Average Projected Flow	895 (m ³ /d)
Commitments	225 (m ³ /d)
Remaining Capacity	330 (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 0.4617 m³/c/d, there is capacity to service approximately 710 additional people in the St. Jacobs Wastewater Service Area as of December 31, 2016. The present rated capacity of 1,450 m³/d could service a population of approximately 3,100 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 2016 was recorded at 3,532 m³/d which is up about 6% from 2015. The 5-year Average Projected Flow is 3,719 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	3,719 (m ³ /d)
Commitments	227 (m ³ /d)
Remaining Capacity	1,254 (m ³ /d)

Using the 5-year average per capita flow of 0.2807 m³/c/d, there is capacity to service approximately 4,500 additional people in the Baden/New Hamburg Wastewater Service Area as of December 31, 2016. The present rated capacity of 5,200 m³/d could service a population of approximately 18,500 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	1,372 (m ³ /d)
Commitments	657 (m ³ /d)
Remaining Capacity	970 (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 2016 was recorded at 1,322 m³/d which is up about 4% from 2015. The 5-year Average Projected Flow is 1,372 m³/d.

Using the 5-year average per capita flow of 0.2652 m³/c/d, there is capacity to service approximately 3,700 additional people in the Ayr Wastewater Service Area as of December 31, 2016. 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 2016 at the WEWWTP was measured at 806 m³/d which is up 17% from the previous year. The 5-year Average Projected Flow is 776 m³/d.

WEWWTP Rated Capacity	1,100 (m ³ /d)
Average Projected Flow	776 (m ³ /d)
Commitments	23 (m ³ /d)
Remaining Capacity	301 (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 0.2277 m³/c/d, there is capacity to service approximately 1,300 additional people in the Wellesley Wastewater Service Area as of December 31, 2016. The present rated capacity of 1,100 m³/d could service a population of approximately 4,800 people.

3.3 Small Systems

3.3.1 Water

The 11 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 2016. 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, 2016

		A	B	C	D = A - (B+C)	E	F = D / E * 1000
		2016 MAX CAPACITY (1000 m ³ /d)	MAX DAY / WEEK PROJECTED FLOW (1000 m ³ /d)	COMMITTED FLOW (1000 m ³ /d)	REMAINING CAPACITY (1000 m ³ /d)	MAX DAY / WEEK FLOWS PER CAPITA (m ³ /d/c)	REMAINING CAPACITY (PEOPLE)
WATER	INTEGRATED URBAN WATER SYSTEM	250.00	174.31	22.16	53.53	0.3411	156,941
	BADEN-NEW HAMBURG	12.61	4.35	0.26	8.01	0.3208	24,964
	AYR WATER SYSTEM	5.53	2.91	1.39	1.23	0.5598	2,204
	WELLESLEY	3.00	1.12	0.04	1.84	0.3293	5,594
	ST. CLEMENTS	1.77	0.46	0.01	1.30	0.3666	3,547

		A	B	C	D = A - (B+C)	E	F = D / E * 1000
		2016 CAPACITY (1000 m ³ /d)	AVERAGE PROJECTED FLOW (1000 m ³ /d)	COMMITTED FLOW (1000 m ³ /d)	REMAINING CAPACITY (1000 m ³ /d)	AVERAGE FLOWS PER CAPITA (m ³ /d/c)	REMAINING CAPACITY (PEOPLE)
WASTEWATER	KITCHENER WWTP	122.70	69.42	10.90	42.38	0.2884	146,931
	WATERLOO WWTP	57.50	44.32	3.52	9.66	0.3201	30,165
	GALT WWTP	56.80	34.80	1.15	20.85	0.3978	52,414
	PRESTON WWTP	16.82	8.97	5.33	2.52	0.4255	5,921
	HESPELER WWTP	9.32	6.80	0.19	2.33	0.2633	8,846
	ELMIRA WWTP	7.80	4.18	1.40	2.22	0.4007	5,529
	BADEN-NEW HAMBURG WWTP	5.20	3.72	0.23	1.25	0.2807	4,469
	AYR WWTP	3.00	1.37	0.66	0.97	0.2652	3,659
	ST. JACOBS WWTP	1.45	0.90	0.22	0.33	0.4617	714
	WELLESLEY WWTP	1.10	0.78	0.02	0.30	0.2277	1,322

TABLE 2: SMALL RURAL WATER SYSTEM SUMMARY AS OF DECEMBER 31, 2016

		A	B	C	D = A - B	E	F
		2016 CAPACITY (m ³ /d)	MAX DAY PROJECTED FLOW (m ³ /d)	COMMITTED FLOW (m ³ /d)	REMAINING CAPACITY (m ³ /d)	MAX DAY FLOWS PER CAPITA (m ³ /d/c)	REMAINING CAPACITY (PEOPLE)
WOOLWICH	CONESTOGO GOLF COURSE	601	442	N/A	159	0.9212	Case by Case
	CONESTOGO PLAINS	786	233	N/A	553	0.6176	Case by Case
	MARY HILL	157	107	N/A	50	0.7422	Case by Case
	MARY HILL VILLAGE HEIGHTS	820	104	N/A	716	0.7688	Case by Case
	WEST MONTROSE	238	167	N/A	71	0.7173	Case by Case
WEL	HEIDELBERG	829	296	N/A	533	0.2815	Case by Case
	LINWOOD	605	260	N/A	345	0.3235	Case by Case
WIL	FOXBORO	527	149	N/A	378	0.3569	Case by Case
	NEW DUNDEE	983	430	N/A	553	0.3817	Case by Case
ND	ROSEVILLE	358	175	N/A	183	0.5874	Case by Case
	BRANCHTON	130	91	N/A	39	0.8313	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 eRuals 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, 2016

	A			B	C = A x B			
	COMMITMENTS (PEOPLE)			MAX DAY / WEEK FLOWS PER CAPITA (m ³ /d/c)	COMMITMENTS (m3/d)			
	DGA	BUA	TOTAL		DGA	BUA	TOTAL	
WATER	INTEGRATED URBAN WATER SYSTEM	54,242	10,736	64,978	0.3411	18,501	3,662	22,163
	BADEN-NEW HAMBURG	805	2	807	0.3208	258	1	259
	AYR WATER SYSTEM	2,397	88	2,485	0.5598	1,342	49	1,391
	WELLESLEY	116	7	123	0.3293	38	2	41
	ST. CLEMENTS	26	0	26	0.3666	10	0	10

	A			B	C = A x B			
	COMMITMENTS (PEOPLE)			AVERAGE FLOWS PER CAPITA (m ³ /d/c)	COMMITMENTS (m3/d)			
	DGA	BUA	TOTAL		DGA	BUA	TOTAL	
WASTEWATER	KITCHENER WWTP	33,474	4,325	37,799	0.2884	9,655	1,247	10,903
	WATERLOO WWTP	5,997	4,995	10,992	0.3201	1,920	1,599	3,519
	GALT WWTP	2,476	415	2,891	0.3978	985	165	1,150
	PRESTON WWTP	8,040	120	8,160	0.4255	5,281	51	5,332
	HESPELER WWTP	77	633	710	0.2633	20	167	187
	ELMIRA WWTP	3,440	59	3,499	0.4007	1,378	24	1,402
	BADEN-NEW HAMBURG WWTP	805	2	807	0.2807	226	1	226
	AYR WWTP	2,397	81	2,478	0.2652	636	21	657
	ST. JACOBS WWTP	487	0	487	0.4617	225	0	225
	WELLESLEY WWTP	94	7	101	0.2277	21	2	23

(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

This page was intentionally left blank

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

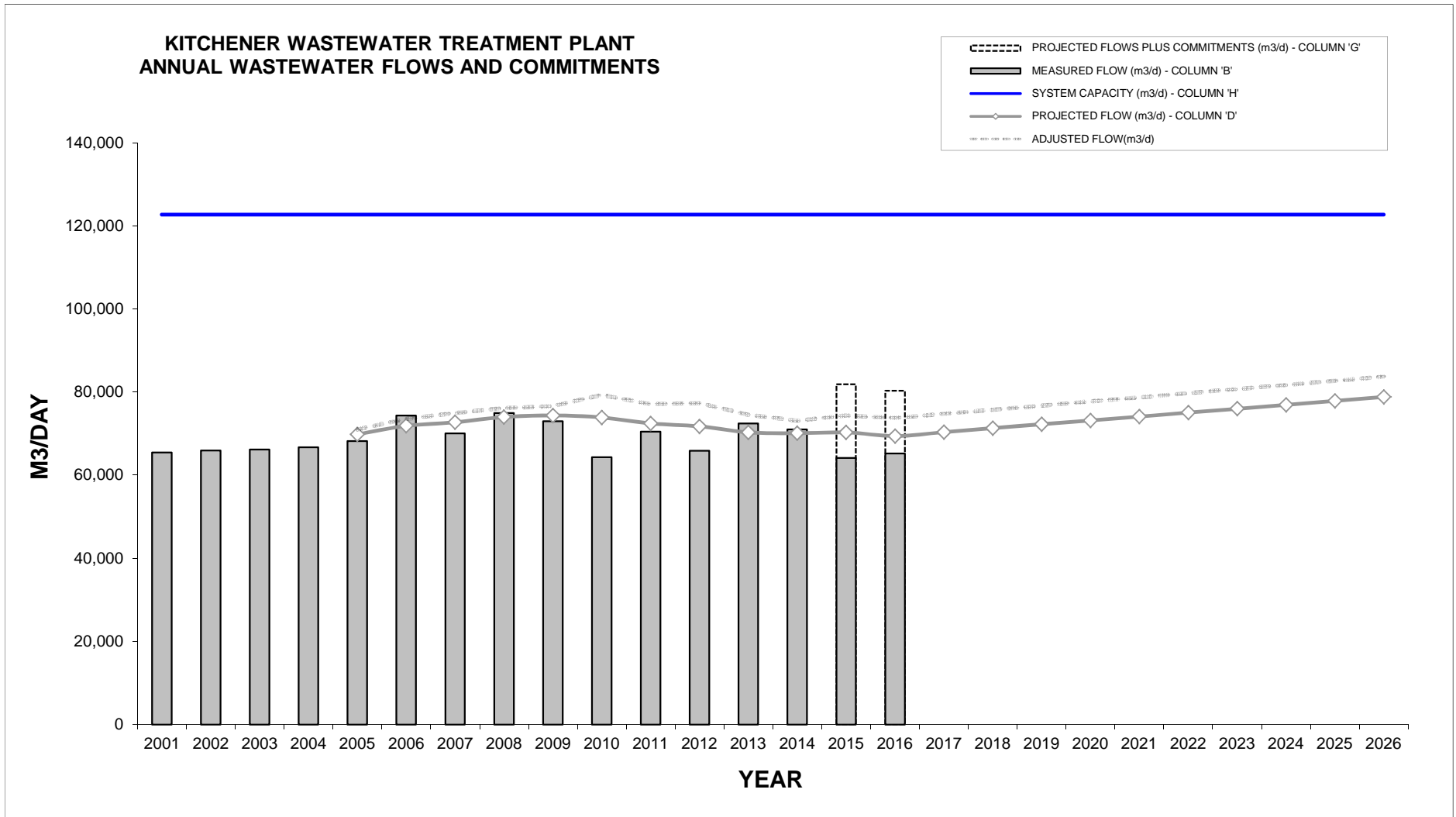
Wastewater Charts and Data

KITCHENER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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						122,700		
2002	193,540	65,960						122,700		
2003	191,281	66,148						122,700		
2004	200,030	66,730						122,700		
2005	205,792	68,224	0.3392	69,799	11,300		81,099	122,700	41,601	122,652
2006	210,854	74,344	0.3409	71,873	10,520		82,393	122,700	40,307	118,249
2007	215,247	70,051	0.3378	72,709	11,370		84,079	122,700	38,621	114,334
2008	219,596	74,935	0.3369	73,977	9,280		83,257	122,700	39,443	117,084
2009	221,223	73,002	0.3362	74,365	9,316		83,682	122,700	39,018	116,072
2010	226,106	64,329	0.3268	73,881	10,606		84,487	122,700	38,213	116,948
2011	227,761	70,443	0.3181	72,449	7,858	1,501	81,808	122,700	40,892	128,553
2012	231,488	65,858	0.3099	71,739	8,631	2,332	82,703	122,700	39,997	129,064
2013	230,922	72,433	0.3044	70,290	7,956	1,908	80,154	122,700	42,546	139,775
2014	234,466	70,988	0.2989	70,092	9,449	1,913	81,454	122,700	41,246	137,973
2015	237,417	64,136	0.2961	70,292	10,157	1,405	81,855	122,700	40,845	137,957
2016	240,669	65,247	0.2884	69,417	9,655	1,247	80,320	122,700	42,380	146,931
2017	243,922		0.2884	70,356				122,700		
2018	247,174		0.2884	71,294				122,700		
2019	250,427		0.2884	72,232				122,700		
2020	253,679		0.2884	73,170				122,700		
2021	256,932		0.2884	74,108				122,700		
2022	260,184		0.2884	75,046				122,700		
2023	263,437		0.2884	75,984				122,700		
2024	266,689		0.2884	76,922				122,700		
2025	269,942		0.2884	77,861				122,700		
2026	273,194		0.2884	78,799				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)

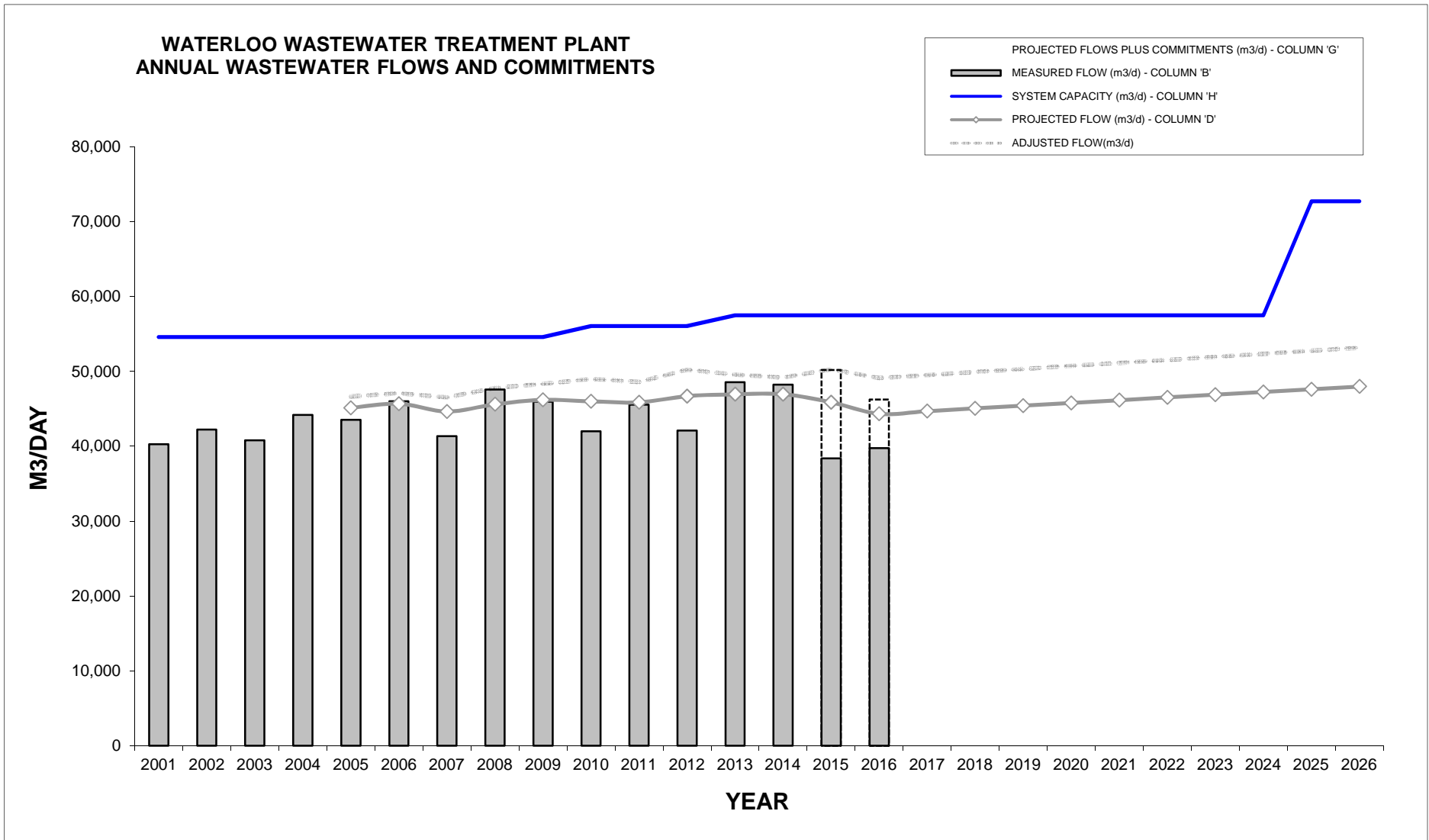


WATERLOO WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	102,070	40,285						54,600		
2002	105,390	42,235						54,600		
2003	110,197	40,781						54,600		
2004	114,568	44,192						54,600		
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	39,750	0.3201	44,325	1,920	1,599	46,245	57,500	11,255	35,160
2017	139,606		0.3201	44,690				57,500		
2018	140,749		0.3201	45,056				57,500		
2019	141,891		0.3201	45,422				57,500		
2020	143,033		0.3201	45,787				57,500		
2021	144,175		0.3201	46,153				57,500		
2022	145,317		0.3201	46,519				57,500		
2023	146,459		0.3201	46,884				57,500		
2024	147,602		0.3201	47,250				57,500		
2025	148,744		0.3201	47,616				72,730		
2026	149,886		0.3201	47,981				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)



2017 WATER AND WASTEWATER MONITORING REPORT

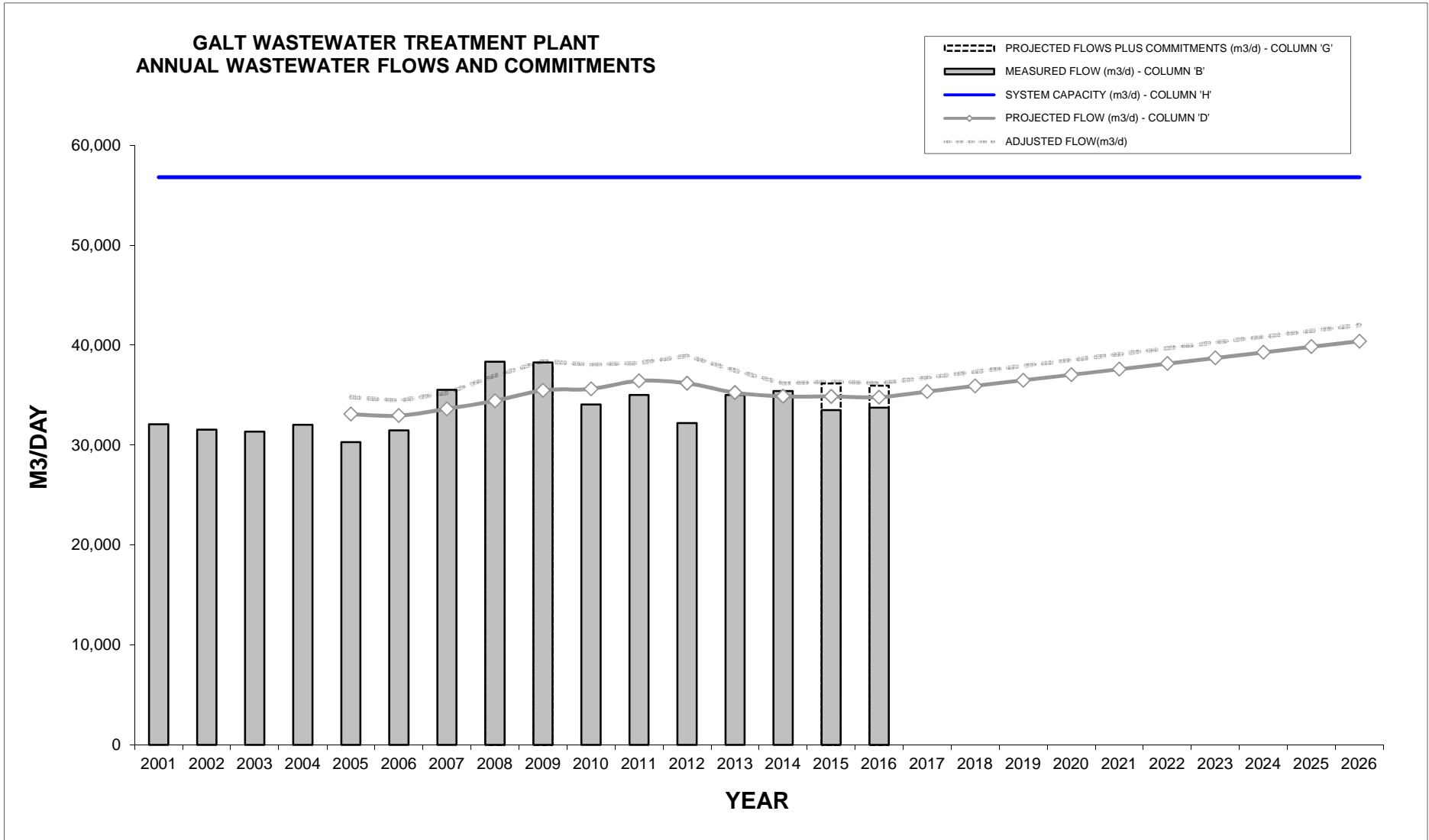
APPENDIX - B WASTEWATER TABLES AND CHARTS

GALT WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m3/d)		PROJECTED	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	FLOW PLUS 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	777	38,654	56,800	18,146	41,327
2012	84,412	32,200	0.4288	36,197	1,138	560	37,894	56,800	18,906	44,088
2013	84,151	35,020	0.4189	35,249	808	385	36,442	56,800	20,358	48,601
2014	85,088	35,423	0.4100	34,886	793	490	36,169	56,800	20,631	50,318
2015	86,070	33,516	0.4051	34,868	1,123	173	36,164	56,800	20,636	50,938
2016	87,479	33,739	0.3978	34,799	985	165	35,950	56,800	20,850	52,414
2017	88,888		0.3978	35,360				56,800		
2018	90,297		0.3978	35,920				56,800		
2019	91,706		0.3978	36,481				56,800		
2020	93,115		0.3978	37,041				56,800		
2021	94,524		0.3978	37,602				56,800		
2022	95,934		0.3978	38,163				56,800		
2023	97,343		0.3978	38,723				56,800		
2024	98,752		0.3978	39,284				56,800		
2025	100,161		0.3978	39,844				56,800		
2026	101,570		0.3978	40,405				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)



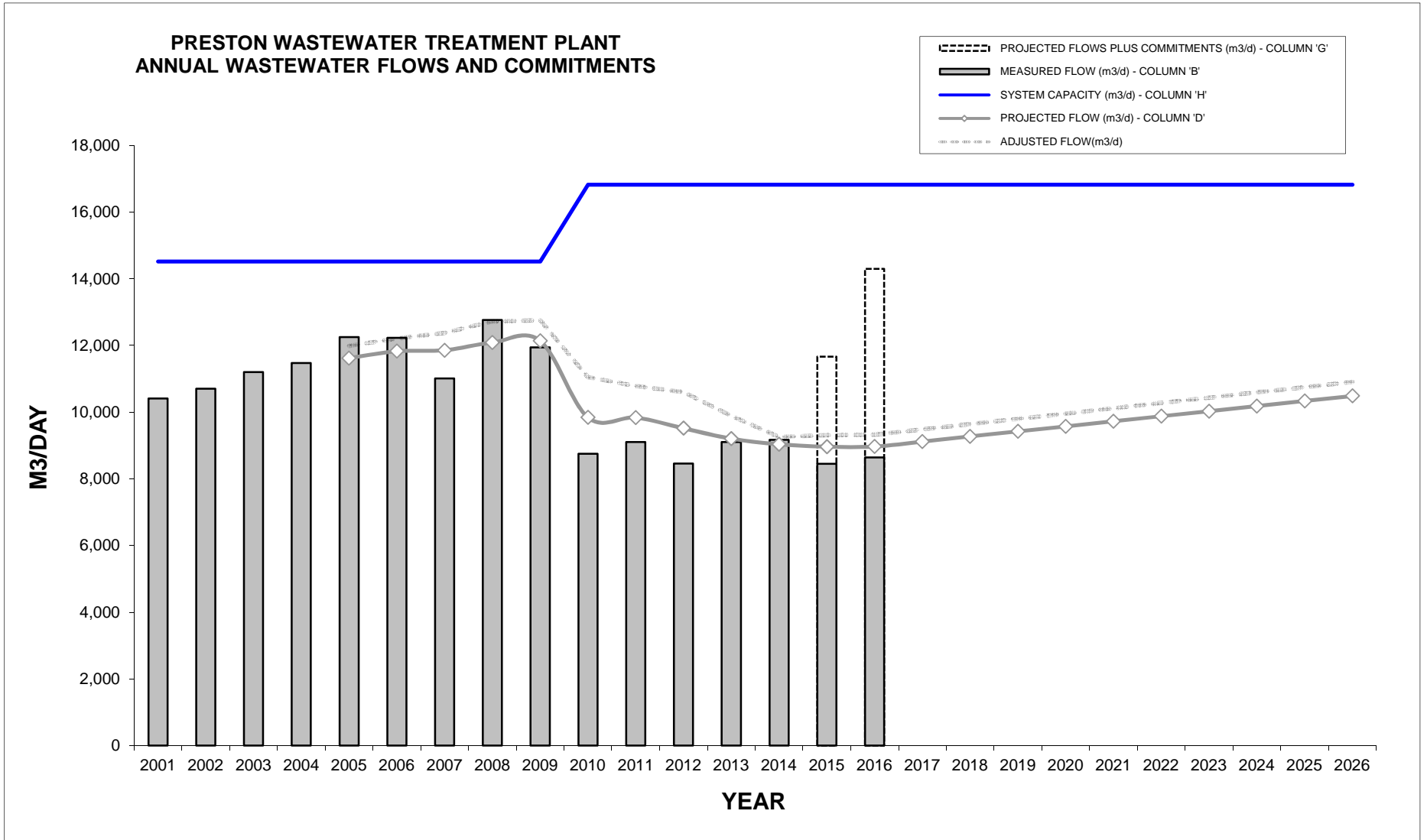
2017 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

PRESTON WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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		11,870	14,520	2,650	4,636
2006	20,357	12,234	0.5812	11,830	100		11,930	14,520	2,590	4,456
2007	20,559	11,015	0.5768	11,858	110		11,968	14,520	2,552	4,425
2008	20,646	12,767	0.5856	12,090	50		12,140	14,520	2,380	4,065
2009	20,682	11,945	0.5871	12,141	48		12,189	14,520	2,331	3,971
2010	20,257	8,754	0.5530	9,841	1,990		11,831	16,820	4,989	9,022
2011	20,409	9,109	0.5220	9,838	1,895	30	11,763	16,820	5,057	9,686
2012	20,174	8,463	0.4988	9,518	2,865	102	12,485	16,820	4,335	8,691
2013	20,415	9,107	0.4643	9,207	2,764	104	12,075	16,820	4,745	10,219
2014	20,656	9,168	0.4376	9,039	2,712	76	11,827	16,820	4,993	11,410
2015	20,722	8,450	0.4327	8,967	2,680	21	11,668	16,820	5,152	11,906
2016	21,079	8,646	0.4255	8,969	5,281	51	14,301	16,820	2,519	5,921
2017	21,436		0.4255	9,121				16,820		
2018	21,793		0.4255	9,272				16,820		
2019	22,150		0.4255	9,424				16,820		
2020	22,507		0.4255	9,576				16,820		
2021	22,864		0.4255	9,728				16,820		
2022	23,220		0.4255	9,880				16,820		
2023	23,577		0.4255	10,032				16,820		
2024	23,934		0.4255	10,183				16,820		
2025	24,291		0.4255	10,335				16,820		
2026	24,648		0.4255	10,487				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)



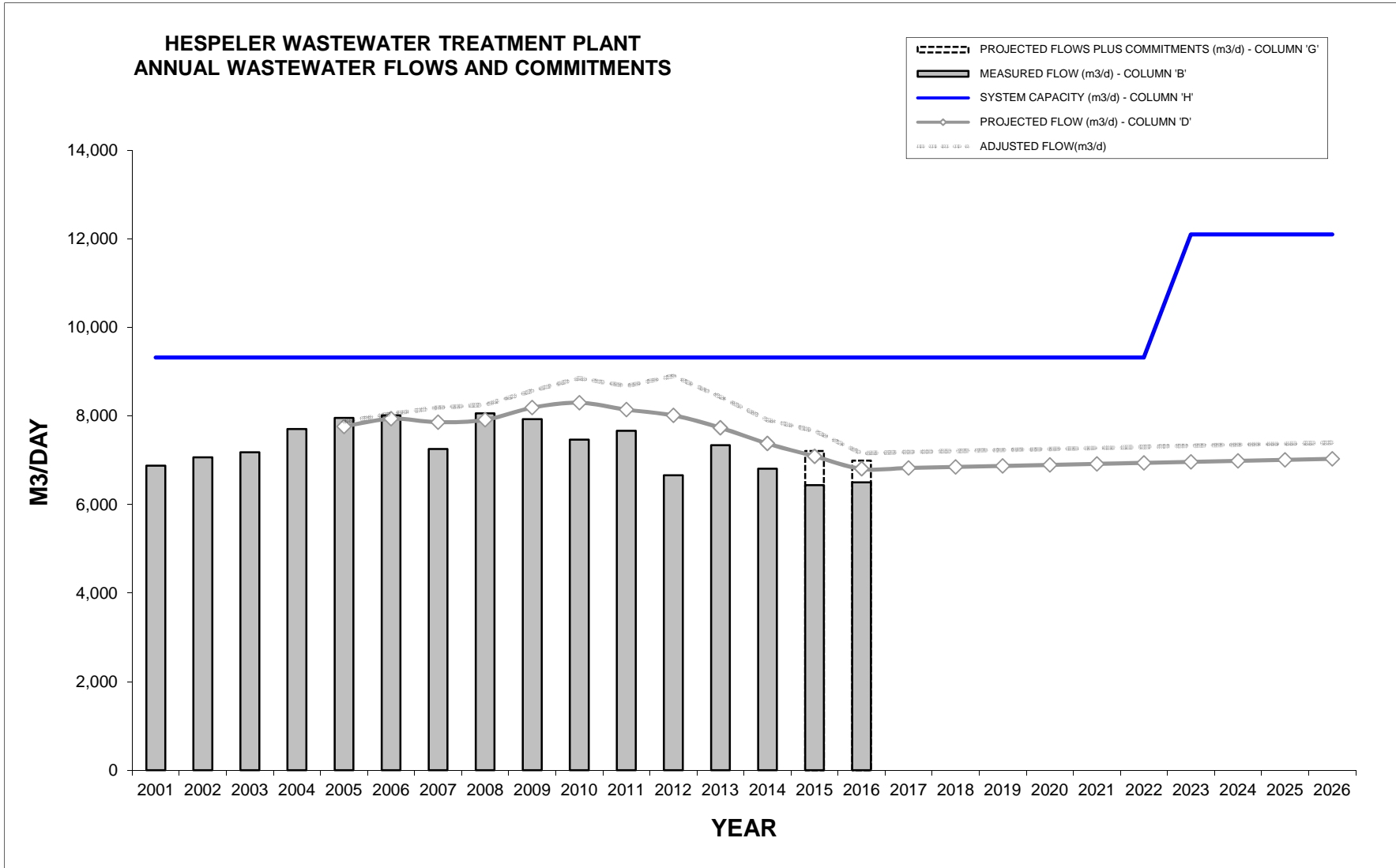
HESPELER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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	127	8,310	9,320	1,010	3,059
2012	25,239	6,660	0.3175	8,013	12	118	8,142	9,320	1,178	3,711
2013	25,595	7,337	0.3021	7,732	11	114	7,858	9,320	1,462	4,840
2014	25,737	6,808	0.2866	7,375	1	121	7,498	9,320	1,822	6,359
2015	25,759	6,435	0.2752	7,088	20	98	7,206	9,320	2,114	7,681
2016	25,845	6,500	0.2633	6,804	20	167	6,991	9,320	2,329	8,846
2017	25,931		0.2633	6,827				9,320		
2018	26,018		0.2633	6,850				9,320		
2019	26,104		0.2633	6,872				9,320		
2020	26,190		0.2633	6,895				9,320		
2021	26,276		0.2633	6,918				9,320		
2022	26,362		0.2633	6,940				9,320		
2023	26,449		0.2633	6,963				12,100		
2024	26,535		0.2633	6,986				12,100		
2025	26,621		0.2633	7,008				12,100		
2026	26,707		0.2633	7,031				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



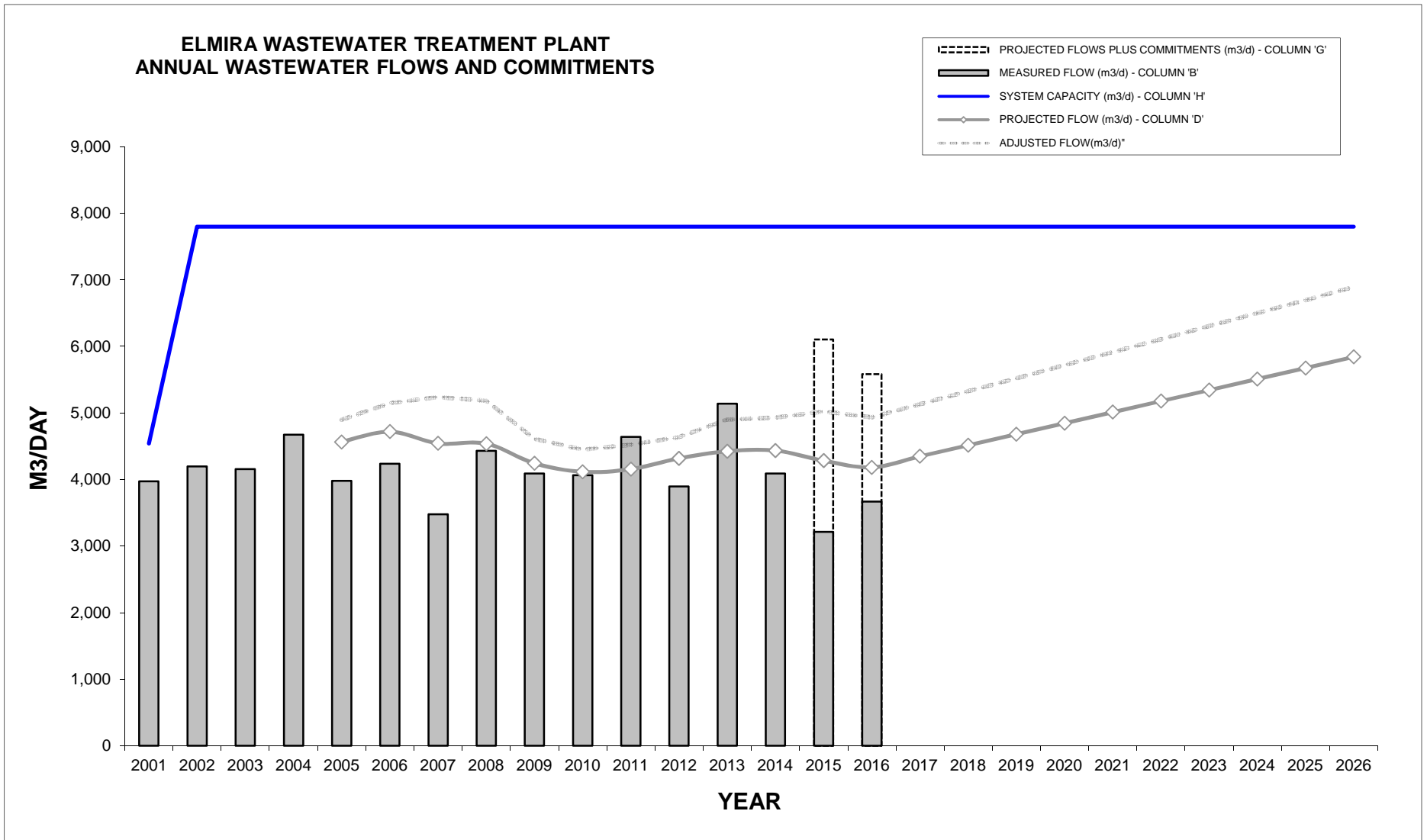
2017 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

ELMIRA WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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	3,669	0.4007	4,183	1,378	24	5,585	7,800	2,215	5,529
2017	10,853		0.4007	4,349				7,800		
2018	11,267		0.4007	4,514				7,800		
2019	11,681		0.4007	4,680				7,800		
2020	12,095		0.4007	4,846				7,800		
2021	12,509		0.4007	5,012				7,800		
2022	12,923		0.4007	5,178				7,800		
2023	13,337		0.4007	5,344				7,800		
2024	13,751		0.4007	5,510				7,800		
2025	14,165		0.4007	5,676				7,800		
2026	14,579		0.4007	5,842				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)



2017 WATER AND WASTEWATER MONITORING REPORT

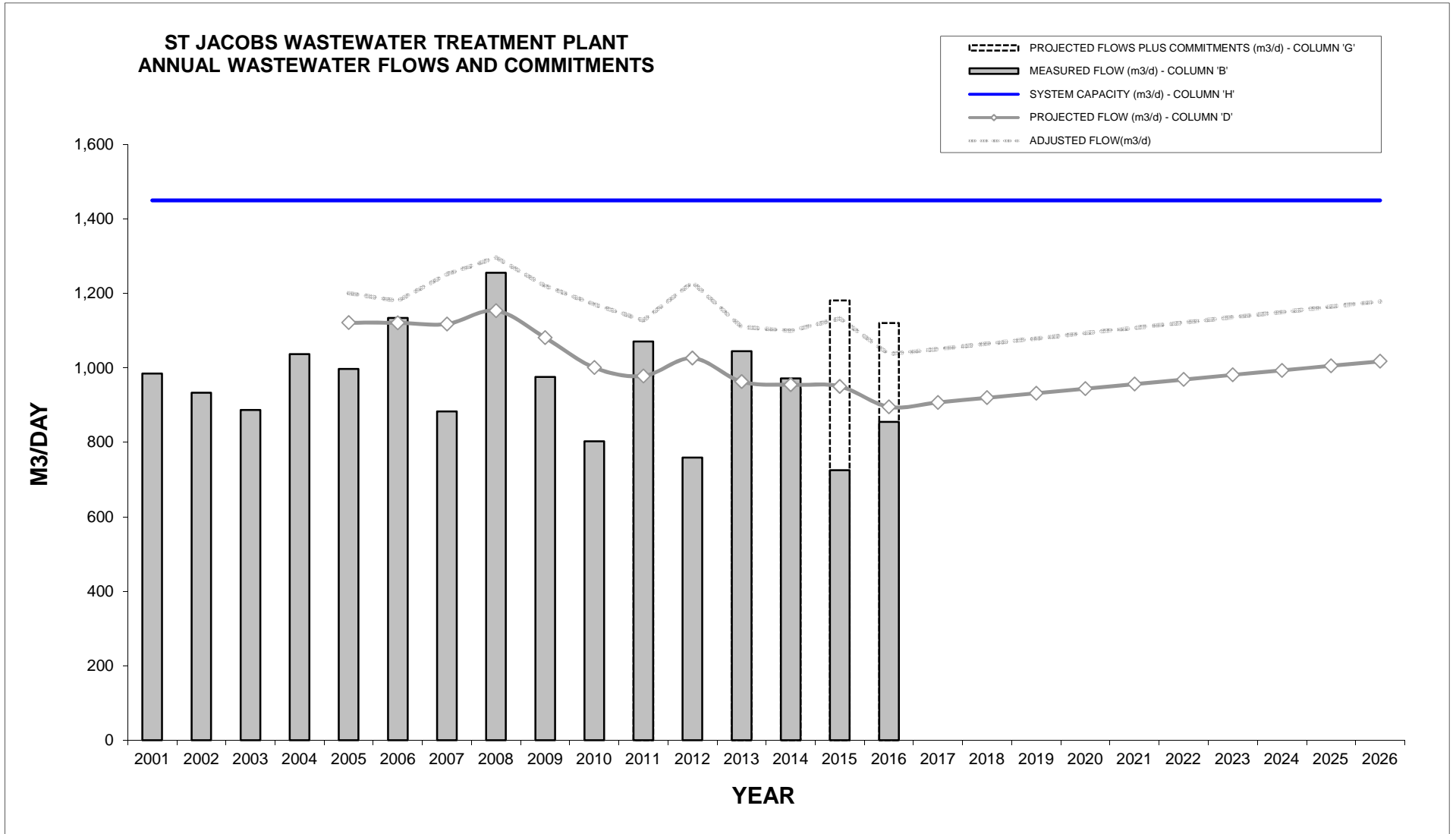
APPENDIX - B WASTEWATER TABLES AND CHARTS

ST JACOBS WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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	1,121	270		1,391	1,450	59	85
2006	1,665	1,134	0.6733	1,121	150		1,271	1,450	179	266
2007	1,769	883	0.6318	1,118	60		1,178	1,450	272	431
2008	1,811	1,255	0.6370	1,154	60		1,214	1,450	236	371
2009	1,783	976	0.6065	1,081	29		1,110	1,450	340	561
2010	1,735	803	0.5768	1,001	0		1,001	1,450	449	779
2011	1,735	1,071	0.5640	978	0	2	980	1,450	470	833
2012	1,884	759	0.5447	1,026	0	3	1,029	1,450	421	773
2013	1,857	1,045	0.5186	963	0	2	965	1,450	485	936
2014	1,858	972	0.5137	955	0	3	958	1,450	492	959
2015	1,912	725	0.4970	950	231	0	1,181	1,450	269	541
2016	1,939	855	0.4617	895	225	0	1,120	1,450	330	714
2017	1,965		0.4617	907				1,450		
2018	1,992		0.4617	920				1,450		
2019	2,018		0.4617	932				1,450		
2020	2,045		0.4617	944				1,450		
2021	2,071		0.4617	956				1,450		
2022	2,098		0.4617	969				1,450		
2023	2,125		0.4617	981				1,450		
2024	2,151		0.4617	993				1,450		
2025	2,178		0.4617	1,006				1,450		
2026	2,204		0.4617	1,018				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)

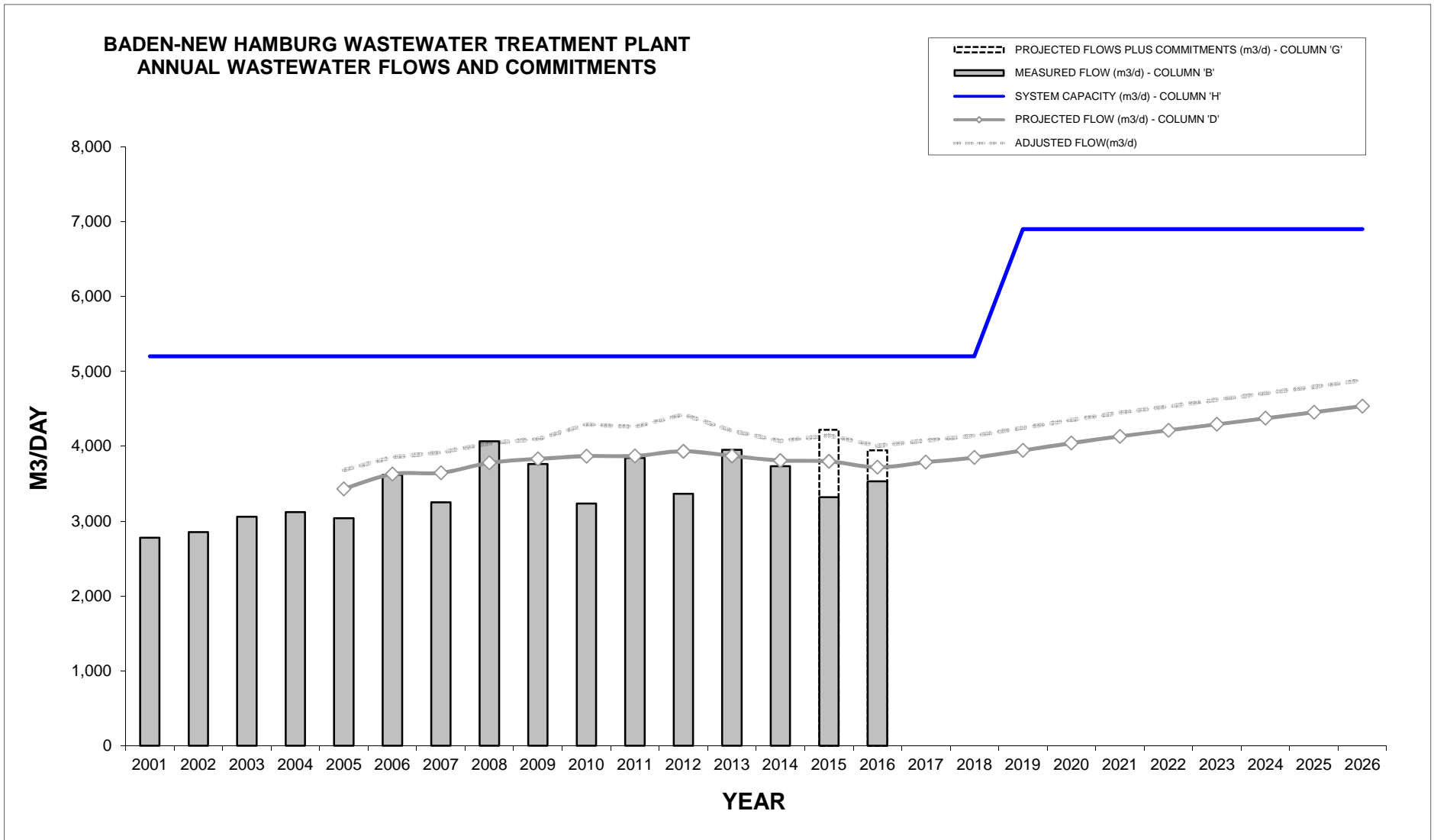


BADEN-NEW HAMBURG WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	6,830	2,778						5,200		
2002	7,150	2,855						5,200		
2003	7,912	3,058						5,200		
2004	8,648	3,122						5,200		
2005	9,083	3,039	0.3776	3,430	1,660		5,090	5,200	110	291
2006	9,804	3,620	0.3701	3,629	1,440		5,069	5,200	131	355
2007	10,319	3,252	0.3533	3,645	1,160		4,805	5,200	395	1,117
2008	10,742	4,066	0.3517	3,778	1,130		4,908	5,200	292	831
2009	11,016	3,763	0.3478	3,831	996		4,828	5,200	372	1,071
2010	11,467	3,235	0.3373	3,868	807		4,675	5,200	525	1,556
2011	11,773	3,844	0.3288	3,871	567	2	4,440	5,200	760	2,312
2012	12,268	3,367	0.3206	3,933	420	39	4,393	5,200	807	2,518
2013	12,575	3,953	0.3078	3,871	344	2	4,216	5,200	984	3,195
2014	12,787	3,736	0.2979	3,809	271	33	4,114	5,200	1,086	3,646
2015	12,978	3,320	0.2926	3,798	271	150	4,218	5,200	982	3,355
2016	13,252	3,532	0.2807	3,719	226	1	3,946	5,200	1,254	4,469
2017	13,497		0.2807	3,788				5,200		
2018	13,715		0.2807	3,849				5,200		
2019	14,053		0.2807	3,944				6,900		
2020	14,404		0.2807	4,043				6,900		
2021	14,722		0.2807	4,132				6,900		
2022	15,009		0.2807	4,212				6,900		
2023	15,297		0.2807	4,293				6,900		
2024	15,585		0.2807	4,374				6,900		
2025	15,872		0.2807	4,455				6,900		
2026	16,160		0.2807	4,535				6,900		

*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)



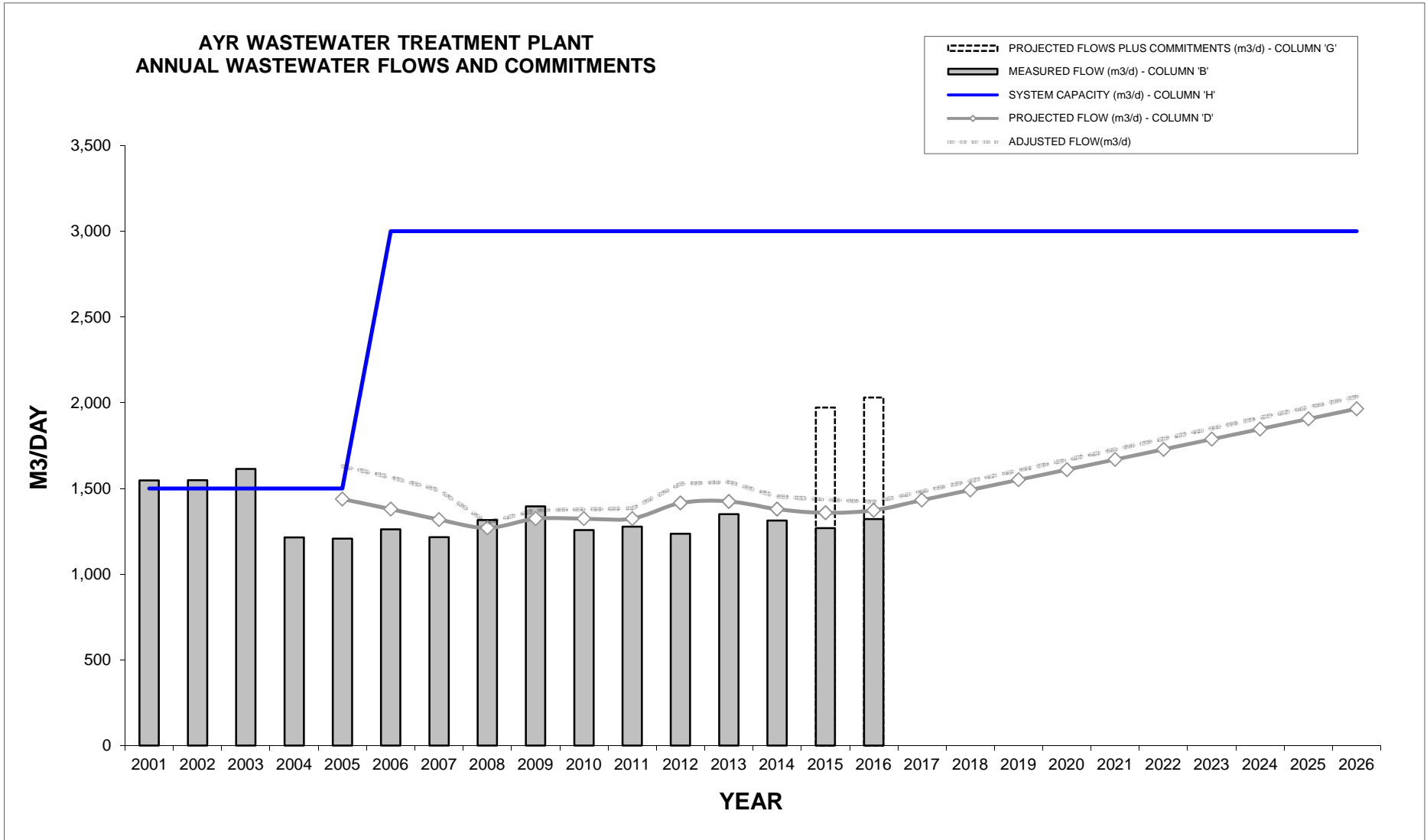
2017 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

AYR WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m3/d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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	1,322	0.2652	1,372	636	21	2,030	3,000	970	3,659
2017	5,399		0.2652	1,432				3,000		
2018	5,622		0.2652	1,491				3,000		
2019	5,845		0.2652	1,550				3,000		
2020	6,068		0.2652	1,609				3,000		
2021	6,292		0.2652	1,669				3,000		
2022	6,515		0.2652	1,728				3,000		
2023	6,738		0.2652	1,787				3,000		
2024	6,962		0.2652	1,846				3,000		
2025	7,185		0.2652	1,905				3,000		
2026	7,408		0.2652	1,965				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)

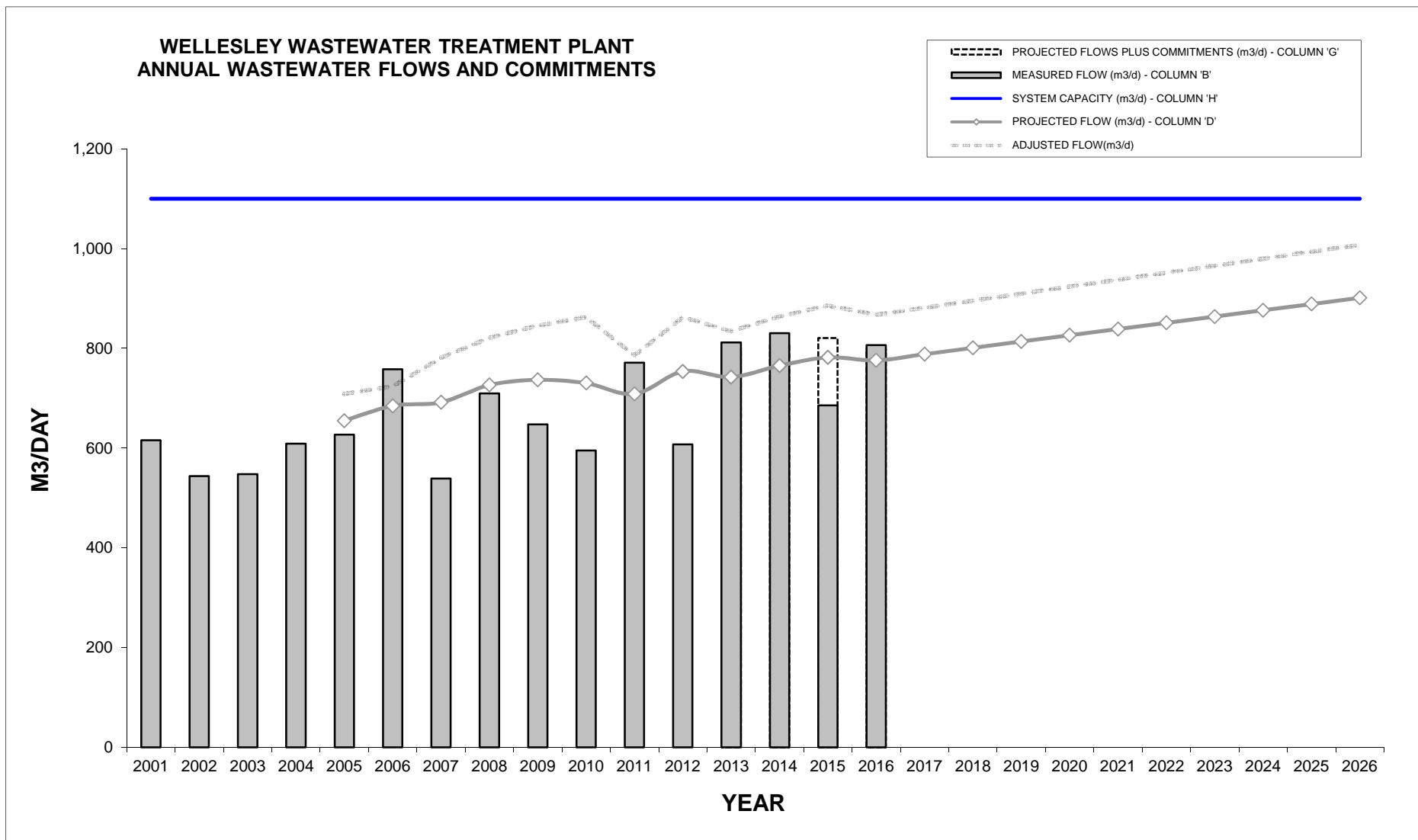


WELLESLEY WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	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	3	801	1,100	299	1,232
2012	3,191	608	0.2362	754	74	23	851	1,100	249	1,054
2013	3,211	812	0.2312	742	57	2	801	1,100	299	1,293
2014	3,270	831	0.2341	765	40	2	807	1,100	293	1,254
2015	3,353	686	0.2332	782	36	3	821	1,100	279	1,198
2016	3,408	806	0.2277	776	21	2	799	1,100	301	1,322
2017	3,463		0.2277	788				1,100		
2018	3,518		0.2277	801				1,100		
2019	3,574		0.2277	814				1,100		
2020	3,629		0.2277	826				1,100		
2021	3,684		0.2277	839				1,100		
2022	3,739		0.2277	851				1,100		
2023	3,794		0.2277	864				1,100		
2024	3,849		0.2277	876				1,100		
2025	3,904		0.2277	889				1,100		
2026	3,959		0.2277	901				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)



This page was intentionally left blank

APPENDIX C

Water Charts and Data

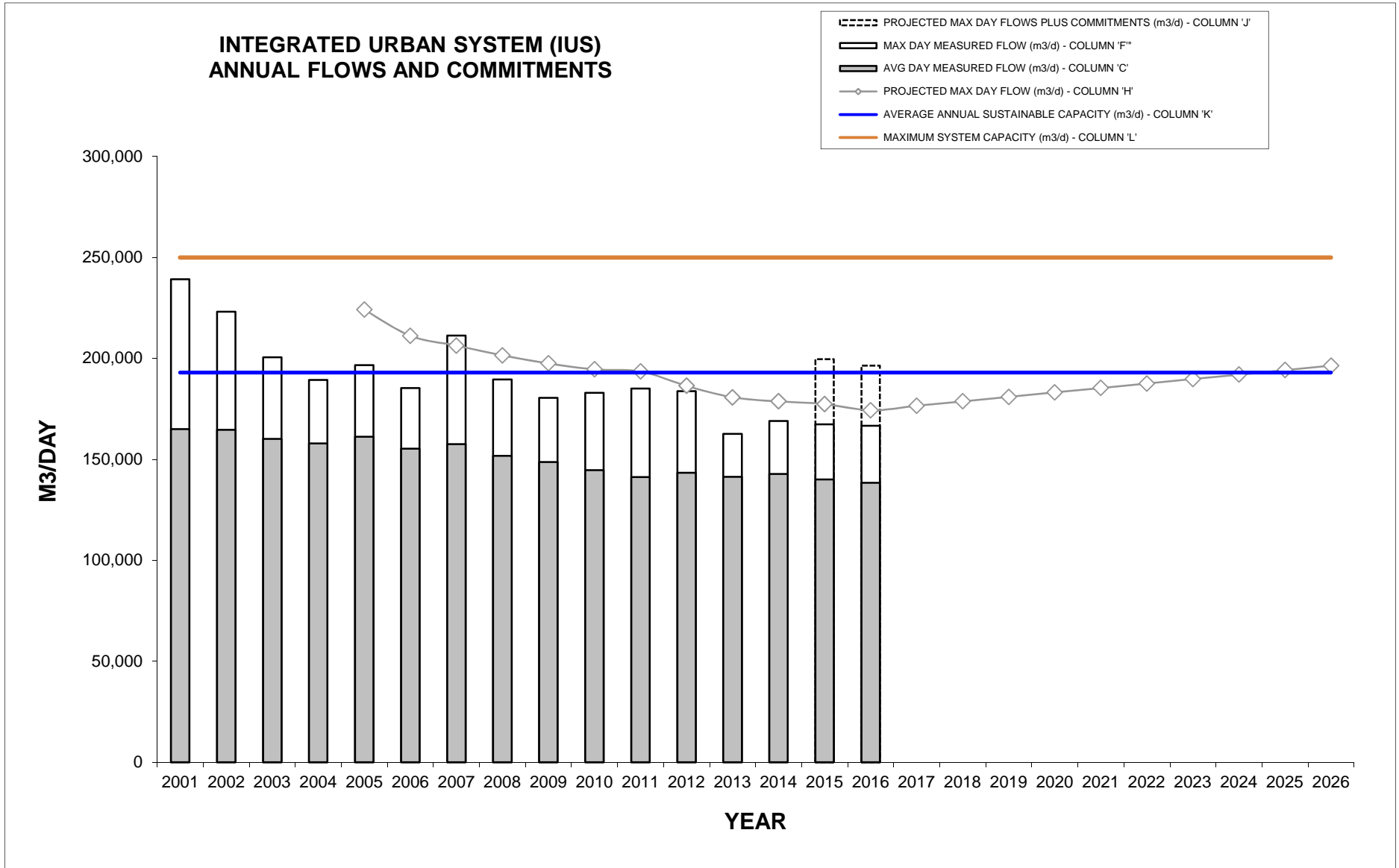
2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

INTEGRATED URBAN SYSTEM (IUS) ANNUAL FLOWS AND COMMITMENTS

YEAR	A	B	C			D*	E = B x D	F	G*			H = A x G	I	J = H + I	K	L	M = L - J	N = M / G
	SUMMER POP.	WINTER POP.	AVERAGE DAY			MAXIMUM WEEK			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)				
			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)			SUSTAINABLE AVERAGE	MAXIMUM						
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		196,652	0.4962	224,187	29,340	253,527		193,000	250,000	-3,527	-7,108		
2006	461,284	467,115	155,260	0.3609	168,564		185,343	0.4579	211,207	22,450	233,657		193,000	250,000	16,343	35,694		
2007	469,542	474,472	157,486	0.3492	165,684		211,356	0.4395	206,354	24,460	230,814		193,000	250,000	19,186	43,656		
2008	476,396	480,806	151,752	0.3373	162,177		189,560	0.4229	201,488	22,140	223,628		193,000	250,000	26,372	62,354		
2009	478,997	486,779	148,673	0.3276	159,465		180,426	0.4124	197,520	19,857	217,377		193,000	250,000	32,623	79,113		
2010	485,642	493,472	144,619	0.3157	155,780		182,950	0.4006	194,570	22,756	217,327		193,000	250,000	32,673	81,552		
2011	488,749	498,074	141,179	0.3059	152,358		185,081	0.3960	193,556	21,755	215,311		193,000	250,000	34,689	87,593		
2012	489,073	508,841	143,347	0.2959	150,543		183,801	0.3812	186,415	23,204	209,619		193,000	250,000	40,381	105,943		
2013	491,389	511,535	141,323	0.2880	147,314		162,610	0.3678	180,714	19,857	200,571		193,000	250,000	49,429	134,405		
2014	495,663	517,487	142,802	0.2821	145,978		168,951	0.3606	178,735	22,643	201,378		193,000	250,000	48,622	134,836		
2015	504,548	522,730	140,101	0.2771	144,839		167,338	0.3516	177,392	22,177	199,570		193,000	250,000	50,430	143,436		
2016	511,030	529,416	138,360	0.2727	144,351		166,691	0.3411	174,306	22,163	196,469		193,000	250,000	53,531	156,941		
2017	517,512	536,103		0.2727	146,174			0.3411	176,517				193,000	250,000				
2018	523,994	542,789		0.2727	147,997			0.3411	178,728				193,000	250,000				
2019	530,476	549,476		0.2727	149,820			0.3411	180,939				193,000	250,000				
2020	536,958	556,162		0.2727	151,643			0.3411	183,150				193,000	250,000				
2021	543,440	562,849		0.2727	153,466			0.3411	185,361				193,000	250,000				
2022	549,922	569,535		0.2727	155,289			0.3411	187,572				193,000	250,000				
2023	556,404	576,222		0.2727	157,113			0.3411	189,783				193,000	250,000				
2024	562,886	582,908		0.2727	158,936			0.3411	191,993				193,000	250,000				
2025	569,368	589,595		0.2727	160,759			0.3411	194,204				193,000	250,000				
2026	575,850	596,281		0.2727	162,582			0.3411	196,415				193,000	250,000				

*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'



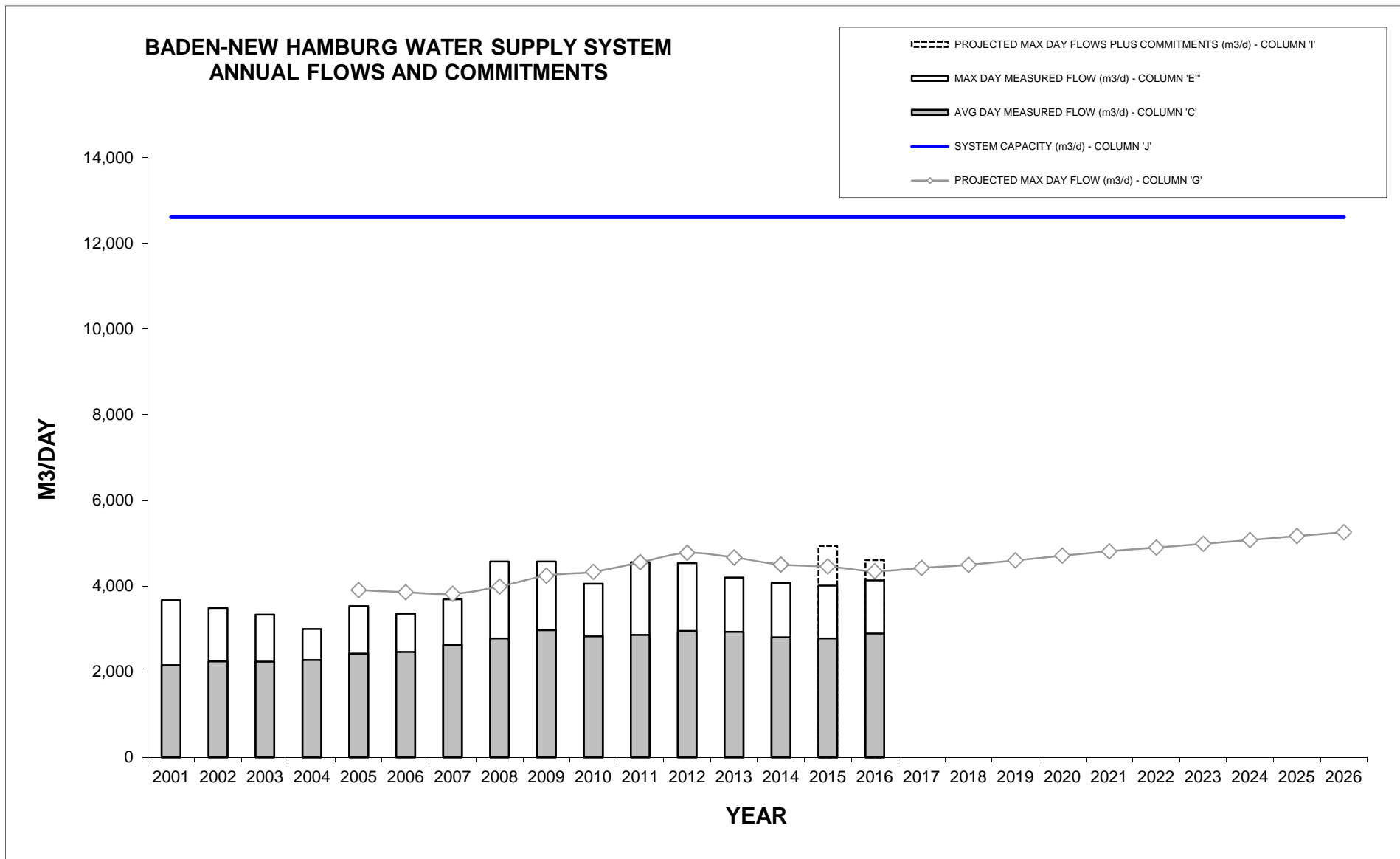
2017 WATER AND WASTEWATER MONITORING REPORT

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.	AVERAGE DAY			MAXIMUM DAY			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)
		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	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	0.2753	2,581	3,528	0.4164	3,903	2,230	6,133	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	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	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	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	7,300	19,494
2010	11,766	2,820	0.2486	2,925	4,052	0.3681	4,331	881	5,212	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	7,407	19,639
2012	12,570	2,947	0.2447	3,075	4,530	0.3798	4,774	544	5,318	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	7,541	20,816
2014	13,089	2,800	0.2304	3,016	4,077	0.3439	4,501	352	4,853	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	7,678	22,900
2016	13,553	2,890	0.2195	2,976	4,130	0.3208	4,347	259	4,606	12,614	8,008	24,964
2017	13,792		0.2195	3,028		0.3208	4,424			12,614		
2018	14,004		0.2195	3,075		0.3208	4,492			12,614		
2019	14,332		0.2195	3,147		0.3208	4,597			12,614		
2020	14,673		0.2195	3,221		0.3208	4,707			12,614		
2021	14,982		0.2195	3,289		0.3208	4,806			12,614		
2022	15,262		0.2195	3,351		0.3208	4,896			12,614		
2023	15,541		0.2195	3,412		0.3208	4,985			12,614		
2024	15,821		0.2195	3,473		0.3208	5,075			12,614		
2025	16,100		0.2195	3,535		0.3208	5,164			12,614		
2026	16,380		0.2195	3,596		0.3208	5,254			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'



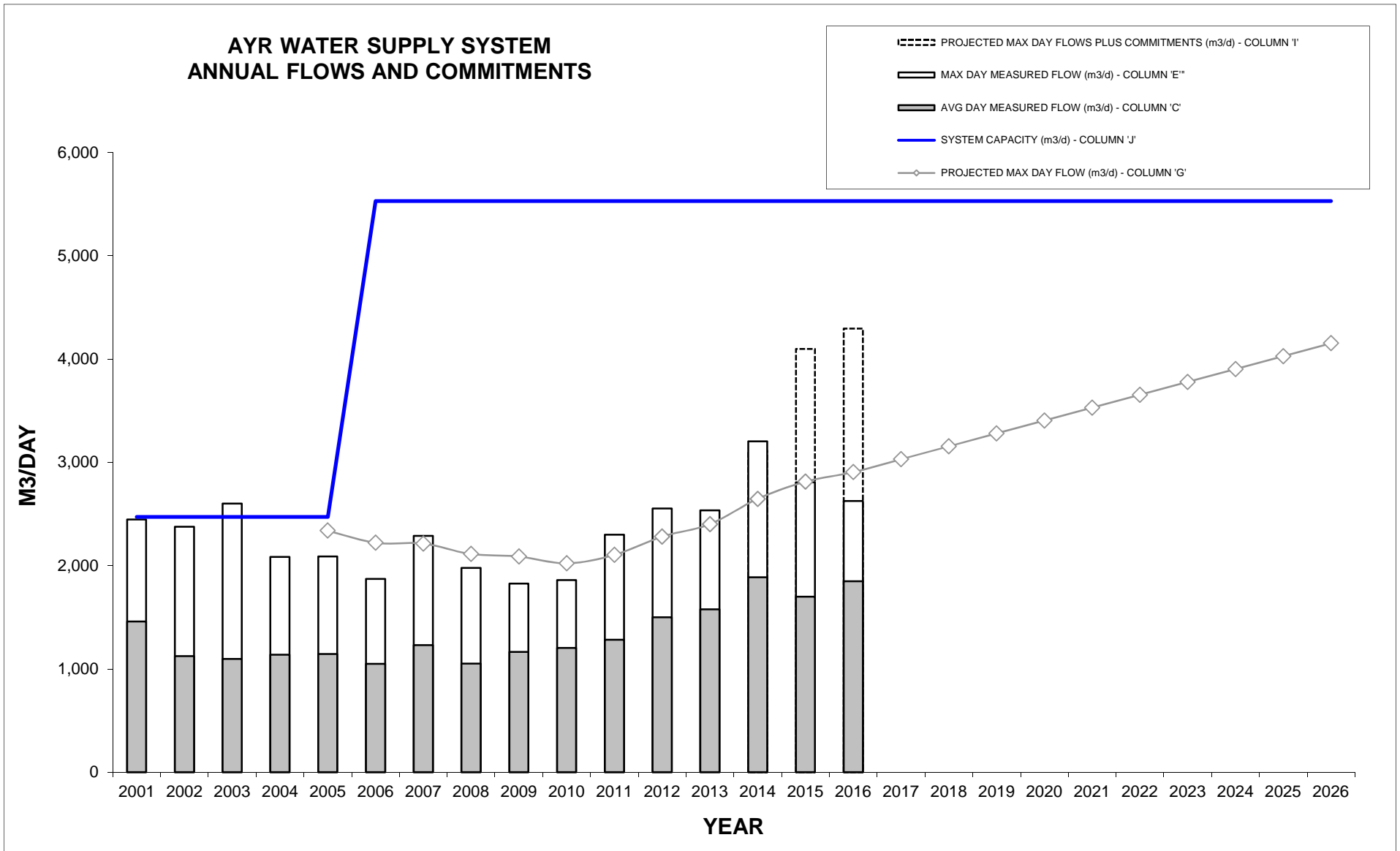
2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

AYR 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.	AVERAGE DAY			MAXIMUM DAY			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)
		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	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	130	2,469	2,473	4	6
2006	3,988	1,050	0.2806	1,119	1,871	0.5570	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	540	2,754	5,530	2,776	5,039
2008	4,099	1,051	0.2806	1,150	1,978	0.5154	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	848	2,937	5,530	2,593	5,224
2010	4,220	1,204	0.2776	1,171	1,861	0.4793	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	704	2,808	5,530	2,722	5,518
2012	4,667	1,499	0.2880	1,344	2,554	0.4887	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	469	2,871	5,530	2,659	5,348
2014	4,888	1,888	0.3240	1,584	3,204	0.5415	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	1,285	4,098	5,530	1,432	2,528
2016	5,190	1,848	0.3464	1,798	2,627	0.5598	2,905	1,391	4,296	5,530	1,234	2,204
2017	5,413		0.3464	1,875		0.5598	3,030			5,530		
2018	5,636		0.3464	1,953		0.5598	3,155			5,530		
2019	5,859		0.3464	2,030		0.5598	3,280			5,530		
2020	6,082		0.3464	2,107		0.5598	3,405			5,530		
2021	6,304		0.3464	2,184		0.5598	3,529			5,530		
2022	6,527		0.3464	2,261		0.5598	3,654			5,530		
2023	6,750		0.3464	2,338		0.5598	3,779			5,530		
2024	6,973		0.3464	2,416		0.5598	3,903			5,530		
2025	7,196		0.3464	2,493		0.5598	4,028			5,530		
2026	7,419		0.3464	2,570		0.5598	4,153			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'



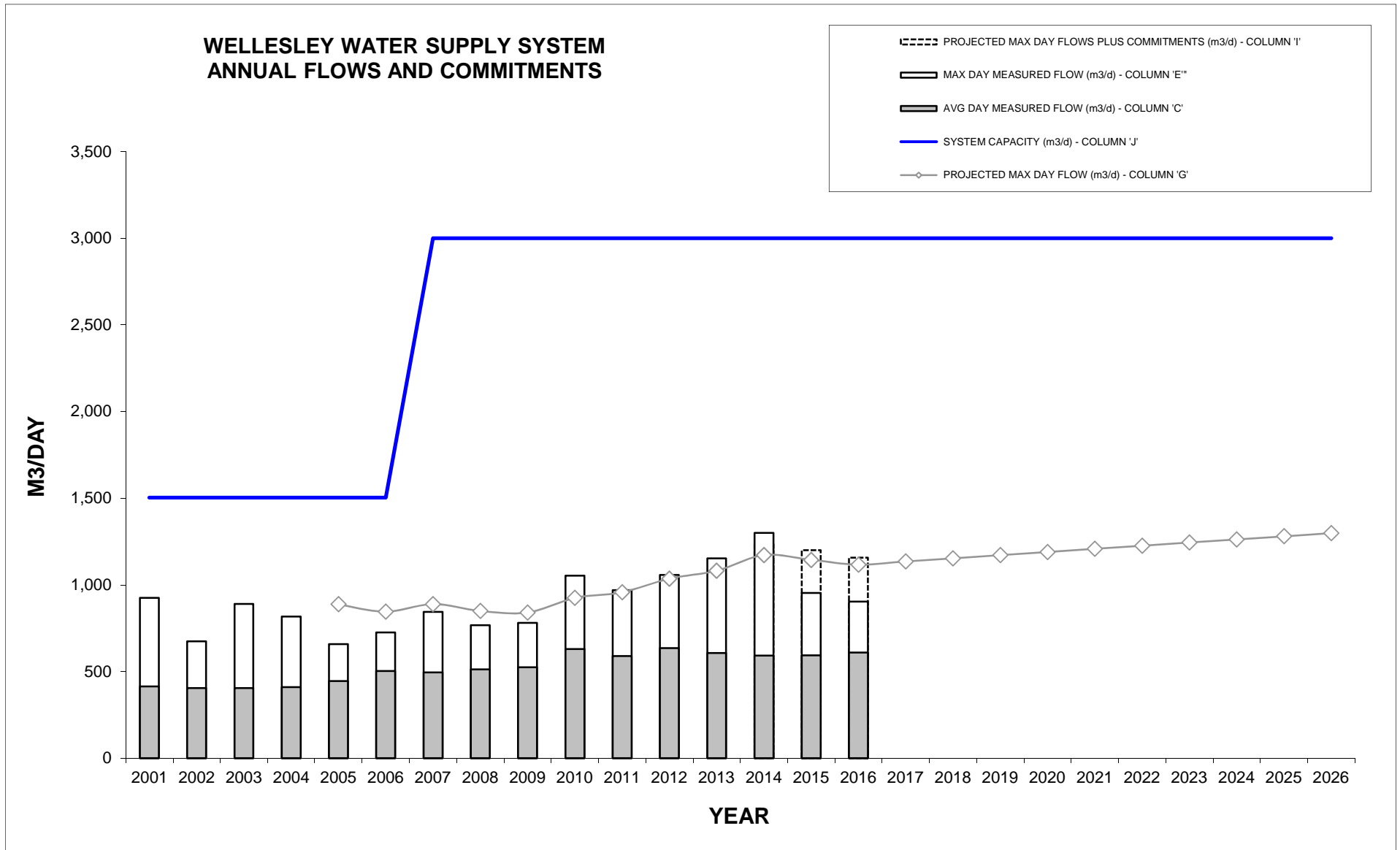
2017 WATER AND WASTEWATER MONITORING REPORT

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.	AVERAGE DAY			MAXIMUM DAY			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)
		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	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	610	0.1860	631	904	0.3293	1,117	41	1,158	3,000	1,842	5,594
2017	3,447		0.1860	641		0.3293	1,135			3,000		
2018	3,502		0.1860	651		0.3293	1,153			3,000		
2019	3,558		0.1860	662		0.3293	1,172			3,000		
2020	3,613		0.1860	672		0.3293	1,190			3,000		
2021	3,668		0.1860	682		0.3293	1,208			3,000		
2022	3,723		0.1860	693		0.3293	1,226			3,000		
2023	3,778		0.1860	703		0.3293	1,244			3,000		
2024	3,833		0.1860	713		0.3293	1,262			3,000		
2025	3,888		0.1860	723		0.3293	1,280			3,000		
2026	3,943		0.1860	734		0.3293	1,299			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'



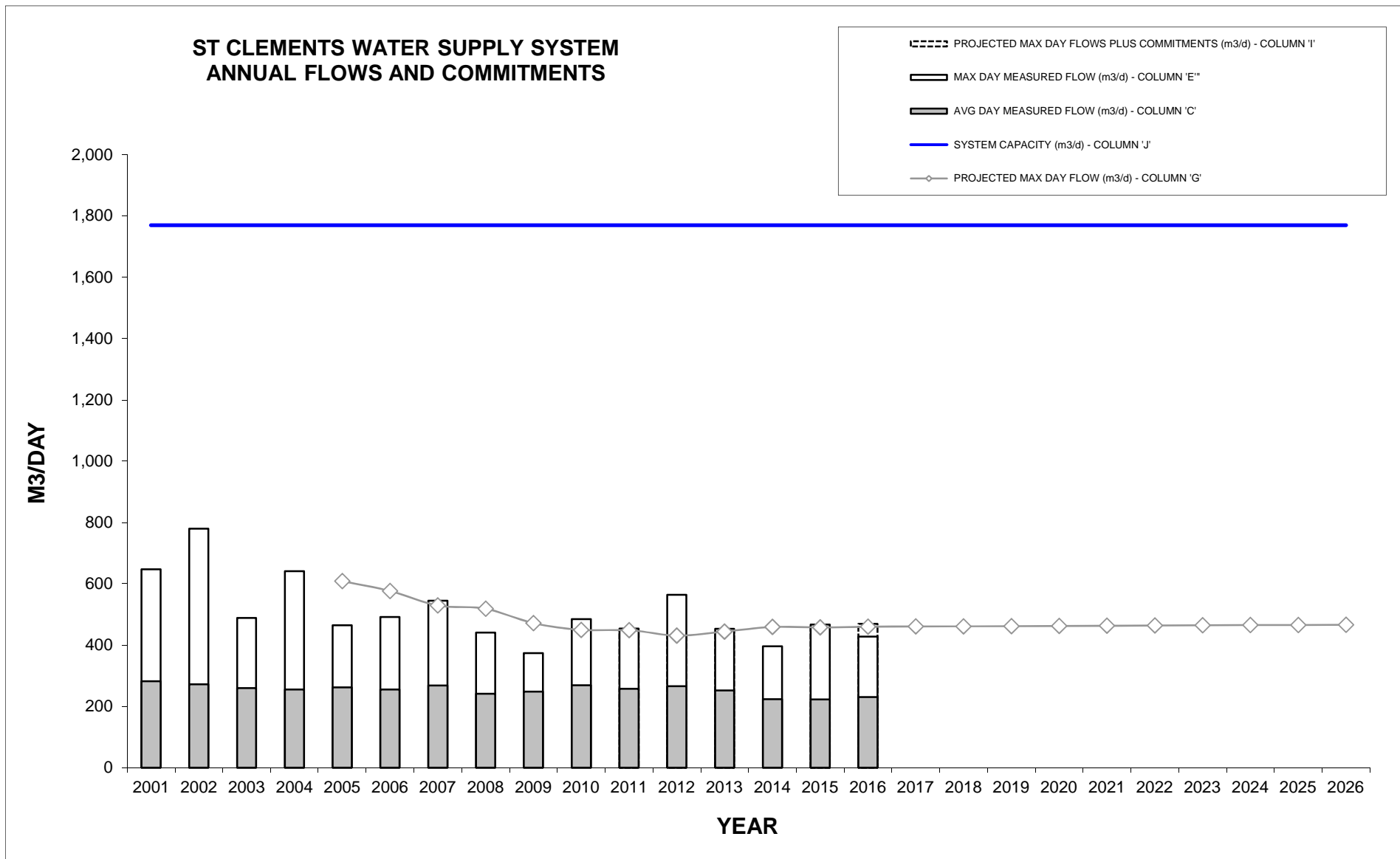
2017 WATER AND WASTEWATER MONITORING REPORT

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.	AVERAGE DAY			MAXIMUM DAY			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)
		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	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	20	629	1,770	1,141	2,647
2006	1,411	255	0.1859	262	492	0.4086	576	30	606	1,770	1,164	2,848
2007	1,411	269	0.1854	262	545	0.3752	529	20	549	1,770	1,221	3,253
2008	1,415	241	0.1818	257	441	0.3665	519	20	539	1,770	1,231	3,359
2009	1,442	248	0.1799	259	374	0.3271	472	15	487	1,770	1,283	3,922
2010	1,350	269	0.1826	247	485	0.3330	450	12	462	1,770	1,308	3,928
2011	1,360	258	0.1843	251	454	0.3301	449	0	449	1,770	1,321	4,002
2012	1,259	266	0.1885	237	564	0.3424	431	0	431	1,770	1,339	3,910
2013	1,263	252	0.1943	245	453	0.3518	444	0	444	1,770	1,326	3,768
2014	1,267	224	0.1952	247	396	0.3625	459	0	459	1,770	1,311	3,616
2015	1,253	223	0.1909	239	467	0.3651	458	6	463	1,770	1,307	3,578
2016	1,255	231	0.1899	238	428	0.3666	460	10	470	1,770	1,300	3,547
2017	1,257		0.1899	239		0.3666	461			1,770		
2018	1,258		0.1899	239		0.3666	461			1,770		
2019	1,260		0.1899	239		0.3666	462			1,770		
2020	1,262		0.1899	240		0.3666	463			1,770		
2021	1,264		0.1899	240		0.3666	463			1,770		
2022	1,266		0.1899	240		0.3666	464			1,770		
2023	1,267		0.1899	241		0.3666	464			1,770		
2024	1,269		0.1899	241		0.3666	465			1,770		
2025	1,271		0.1899	241		0.3666	466			1,770		
2026	1,273		0.1899	242		0.3666	467			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'



2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

CONESTOGO GOLF COURSE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		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)			
2011	517	152	0.4043	209	470	1.0365	536	601	65	-
2012	521	178	0.3974	207	528	1.0059	524	601	77	-
2013	484	149	0.3490	169	444	0.9476	459	601	142	-
2014	480	135	0.3145	151	347	0.9012	433	601	168	-
2015	480	153	0.3086	148	468	0.9076	436	601	165	-
2016	480	168	0.3199	154	469	0.9212	442	601	159	-

CONESTOGO PLAINS WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	373	82	0.2177	81	262	0.5548	207	786	579	-
2012	371	92	0.2184	81	332	0.6180	229	786	557	-
2013	378	76	0.2176	82	208	0.6322	239	786	547	-
2014	378	76	0.2181	82	174	0.6320	239	786	547	-
2015	378	80	0.2164	82	195	0.6247	236	786	550	-
2016	378	84	0.2168	82	252	0.6176	233	786	553	-

MARY HILL WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	160	72	0.4376	70	113	0.7400	118	157	39	-
2012	166	91	0.4758	79	118	0.7643	127	157	30	-
2013	144	64	0.4802	69	103	0.7645	110	157	47	-
2014	144	60	0.4744	68	116	0.7401	107	157	50	-
2015	144	66	0.4635	67	105	0.7334	106	157	51	-
2016	144	57	0.4527	65	108	0.7422	107	157	50	-

WOOLWICH WATER SUPPLY SYSTEMS

2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

MARY HILL VILLAGE HEIGHTS WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	147	33	0.2346	34	190	0.8680	128	820	692	-
2012	152	34	0.2149	33	99	0.7736	118	820	702	-
2013	136	39	0.2323	32	132	0.8529	116	820	704	-
2014	135	29	0.2321	31	73	0.8094	109	820	711	-
2015	135	30	0.2344	32	116	0.8629	116	820	704	-
2016	135	33	0.2384	32	111	0.7688	104	820	716	-

WEST MONTROSE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	177	78	0.4346	77	180	0.9060	160	238	78	-
2012	204	70	0.4152	85	240	0.9464	193	238	45	-
2013	234	47	0.3766	88	114	0.9009	211	238	27	-
2014	233	53	0.3362	78	137	0.8413	196	238	42	-
2015	233	71	0.3034	71	176	0.8048	188	238	50	-
2016	233	51	0.2590	60	135	0.7173	167	238	71	-

2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

HEIDELBERG WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		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)			
2011	1,009	152	0.2237	226	329	0.4186	422	829	407	-
2012	1,054	159	0.1950	206	326	0.3657	385	829	444	-
2013	1,054	155	0.1692	178	270	0.3075	324	829	505	-
2014	1,050	154	0.1494	157	318	0.2922	307	829	522	-
2015	1,050	147	0.1470	154	288	0.2937	308	829	521	-
2016	1,050	150	0.1455	153	278	0.2815	296	829	533	-

LINWOOD WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	850	158	0.2050	174	216	0.3711	315	605	290	-
2012	819	157	0.1974	162	242	0.3296	270	605	335	-
2013	804	157	0.1944	156	220	0.3044	245	605	360	-
2014	804	152	0.1905	153	226	0.2792	224	605	381	-
2015	804	179	0.1968	158	306	0.2970	239	605	366	-
2016	804	208	0.2115	170	311	0.3235	260	605	345	-

2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

FOXBORO WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		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)			
2011	401	99	0.2471	99	222	0.3984	160	527	367	-
2012	411	94	0.2429	100	181	0.4120	169	527	358	-
2013	419	95	0.2372	99	127	0.3946	165	527	362	-
2014	417	99	0.2353	98	128	0.3876	162	527	365	-
2015	417	101	0.2364	99	134	0.3851	161	527	366	-
2016	417	94	0.2321	97	172	0.3569	149	527	378	-

NEW DUNDEE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	1,138	221	0.1988	226	415	0.3706	422	983	561	-
2012	1,170	228	0.1927	225	454	0.3644	426	983	557	-
2013	1,128	195	0.1882	212	462	0.3779	426	983	557	-
2014	1,126	218	0.1888	213	459	0.3957	446	983	537	-
2015	1,126	196	0.1860	209	404	0.3857	434	983	549	-
2016	1,126	221	0.1863	210	388	0.3817	430	983	553	-

2017 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

ROSEVILLE WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		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)			
2011	290	77	0.2829	82	191	0.6586	191	358	167	-
2012	301	84	0.2716	82	178	0.6131	185	358	173	-
2013	298	81	0.2729	81	183	0.6346	189	358	169	-
2014	298	71	0.2668	79	150	0.6183	184	358	174	-
2015	298	73	0.2599	77	142	0.5688	169	358	189	-
2016	298	67	0.2518	75	224	0.5874	175	358	183	-

BRANCHTON WATER SUPPLY SYSTEM ANNUAL FLOWS

YEAR	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
	POP.	AVERAGE DAY			MAXIMUM DAY			SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2011	121	34	0.3131	38	94	0.9459	114	130	16	-
2012	106	40	0.3230	34	112	0.9212	98	130	32	-
2013	110	36	0.3294	36	87	0.9286	102	130	28	-
2014	110	36	0.3229	36	78	0.8320	92	130	38	-
2015	110	32	0.3215	35	84	0.8194	90	130	40	-
2016	110	31	0.3209	35	92	0.8313	91	130	39	-

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	2012	2013	2014	2015	2016	2021	2026
Galt S.A.	84,010	84,151	85,088	86,070	87,479	94,524	101,570
Preston S.A.	20,467	20,415	20,656	20,722	21,079	22,864	24,648
Hespeler S.A.	25,705	25,595	25,737	25,759	25,845	26,276	26,707
Kitchener S.A.	229,757	230,922	234,466	237,417	240,669	256,932	273,194
Waterloo S.A.	130,987	134,851	136,179	137,322	138,464	144,175	149,886
Ayr S.A.	4,736	4,822	4,879	4,952	5,175	6,292	7,408
Baden/New Hamburg S.A.	12,372	12,575	12,787	12,978	13,252	14,722	16,160
Wellesley S.A.	3,143	3,211	3,270	3,353	3,408	3,684	3,959
St. Jacobs S.A.	1,826	1,860	1,861	1,912	1,939	2,071	2,204
Elmira S.A.	9,531	9,824	9,899	10,025	10,439	12,509	14,579

Water Service Area	2012	2013	2014	2015	2016	2021	2026
Integrated Urban System	506,212	511,535	517,487	522,730	529,416	562,849	596,281
Baden/New Hamburg S.A.	12,676	12,878	13,089	13,287	13,553	14,982	16,380
Ayr S.A.	4,746	4,831	4,888	4,967	5,190	6,304	7,419
Wellesley S.A.	3,127	3,195	3,254	3,337	3,392	3,668	3,943
St. Clements S.A.	1,270	1,263	1,267	1,253	1,255	1,264	1,273

MID-YEAR POPULATION BY WATER SERVICE AREA

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

Water Service Area	2012	2013	2014	2015	2016	2021	2026
Integrated Urban System	487,766	491,389	495,663	504,548	511,030	543,440	575,850

YEAR-END POPULATION - SMALL WASTEWATER SYSTEMS

Wastewater Service Area	Total Population				
	2012	2013	2014	2015	2016
Foxboro	419	419	417	415	415
Heidelberg	265	265	263	262	262
Conestoga Golf Course	254	254	252	251	253

YEAR-END POPULATION - SMALL WATER SYSTEMS

Water Service Area	Total Population				
	2012	2013	2014	2015	2016
St. Clements S.A.	1,270	1,263	1,267	1,253	1,255
Heidelberg	1,055	1,054	1,050	1,043	1,044
Village Heights	136	136	135	134	134
Maryhill	145	144	144	143	143
Linwood	809	804	804	803	808
West Montrose	228	234	233	233	233
Branchton Meadows	110	110	110	109	109
Conestoga Plains	378	378	378	363	364
Conestoga Golf Course	484	484	480	481	483
Roseville	299	298	298	296	296
New Dundee	1,133	1,128	1,126	1,117	1,124
Foxboro	419	419	417	415	415

TABLE D-2

2016 YEAR-END COMMITTED POPULATION BY SERVICE AREA WITHIN THE BUILT-UP AREA

Wastewater Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Galt S.A.	415	0	415
Preston S.A.	120	0	120
Hespeler S.A.	279	354	633
Kitchener S.A.	3,913	412	4,325
Waterloo S.A.	4,821	174	4,995
Ayr S.A.	81	0	81
Baden/New Hamburg S.A.	2	0	2
Wellesley S.A.	7	0	7
St. Jacobs S.A.	0	0	0
Elmira S.A.	56	3	59

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Integrated Urban System S.A.	9,793	943	10,736
Baden/New Hamburg S.A.	2	0	2
Ayr S.A.	88	0	88
Wellesley S.A.	7	0	7
St. Clements S.A.**	**	**	**

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

** The St. Clements Service Area is not within either the Built Up Area or the Designated Greenfield Area; however, for reporting purposes, committed population has been shown in the Designated Greenfield Area.

*** The 2016 populations are consistent with the estimated 2016 values from the previous year's Water and Wastewater Monitoring Report

TABLE D-3

2016 YEAR-END COMMITTED POPULATION BY SERVICE AREA WITHIN THE DESIGNATED GREENFIELD AREA

Wastewater Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Galt S.A.	440	2,036	2,476
Preston S.A.	1,240	6,800	8,040
Hespeler S.A.	77	0	77
Kitchener S.A.	8,627	24,847	33,474
Waterloo S.A.	2,067	3,930	5,997
Ayr S.A.	398	2,000	2,397
Baden/New Hamburg S.A.	497	308	805
Wellesley S.A.	22	72	94
St. Jacobs S.A.	23	464	487
Elmira S.A.	857	2,583	3,440

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Integrated Urban System S.A.	13,536	40,706	54,242
Baden/New Hamburg S.A.	497	308	805
Ayr S.A.	398	2,000	2,397
Wellesley S.A.	45	72	116
St. Clements S.A.	26	0	26

APPENDIX E

Sample Calculations

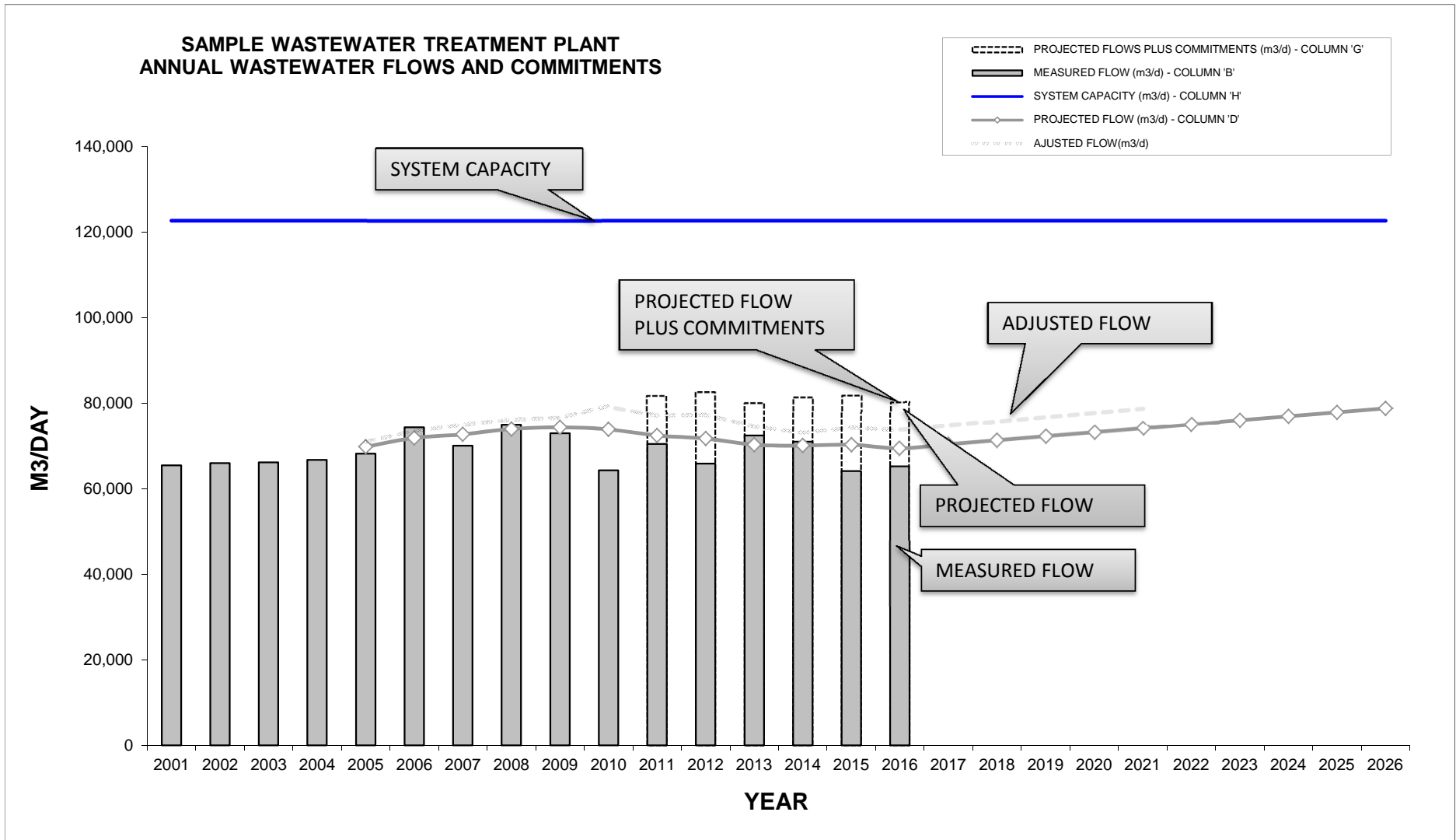
2017 WATER AND WASTEWATER MONITORING REPORT
WASTEWATER SAMPLE CALCULATIONS

SAMPLE WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*		D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	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	A1	B1							122,700		
2002	A2	B2							122,700		
2003	A3	B3							122,700		
2004	A4	B4							122,700		
2005	A5	B5	}	C5	=A5 x C5	E5		=D5 + E5	122,700	=H5 - G5	=I5 / C5
2006	A6	B6		C6	=A6 x C6	E6		=D6 + E6	122,700	=H6 - G6	=I6 / C6
2007	A7	B7		C7	=A7 x C7	E7		=D7 + E7	122,700	=H7 - G7	=I7 / C7
2008	A8	B8		C8	=A8 x C8	E8		=D8 + E8	122,700	=H8 - G8	=I8 / C8
2009	A9	B9		C9	=A9 x C9	E9		=D9 + E9	122,700	=H9 - G9	=I9 / C9
2010	A10	B10		C10	=A10 x C10	E10		=D10 + E10	122,700	=H10 - G10	=I10 / C10
2011	A11	B11		C11	=A11 x C11	E11	F11	=D11 + E11 + F11	122,700	=H11 - G11	=I11 / C11
2012	A12	B12		C12	=A12 x C12	E12	F12	=D12 + E12 + F12	122,700	=H12 - G12	=I12 / C12
2013	A13	B13		C13	=A13 x C13	E13	F13	=D13 + E13 + F13	122,700	=H13 - G13	=I13 / C13
2014	A14	B14		C14	=A14 x C14	E14	F14	=D14 + E14 + F14	122,700	=H14 - G14	=I14 / C14
2015	A15	B15		C15	=A15 x C15	E15	F15	=D15 + E15 + F15	122,700	=H15 - G15	=I15 / C15
2016	A16	B16	C16	=A16 x C16	E16	F16	=D15 + E15 + F16	122,700	=H15 - G16	=I15 / C16	
2017	A17	B17	C17	=A17 x C17				122,700			
2018	A18	B18	C18	=A18 x C18				122,700			
2019	A19	B19	C19	=A19 x C19				122,700			
2020	A20	B20	C20	=A20 x C20				122,700			
2021	A21	B21	C21	=A21 x C21				122,700			
2022	A22	B22	C22	=A22 x C22				122,700			
2023	A23	B23	C23	=A23 x C23				122,700			
2024	A24	B24	C24	=A24 x C24				122,700			
2025	A25	B25	C25	=A25 x C25				122,700			
2026	A26	B26	C26	=A21 x C26				122,700			

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)



2017 WATER AND WASTEWATER MONITORING REPORT
WATER SAMPLE CALCULATIONS

SAMPLE ANNUAL FLOWS AND COMMITMENTS ANNUAL FLOWS AND COMMITMENTS

YEAR	A	B	C	D*	E = B x D	F	G*	H = A x G	I	J = H + I	K	L = K - J	M = L / G	
	SUMMER POP.	WINTER POP.	MEASURED FLOW (m ³ /d)	AVERAGE DAY			MAXIMUM DAY/WEEK			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)
				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	A1	B1	C1			F1					K1			
2002	A2	B2	C2			F2					K2			
2003	A3	B3	C3			F3					K3			
2004	A4	B4	C4			F4					K4			
2005	A5	B5	C5	D5	=B5 x D5	F5	G5	=A5 x G5	15	=H5 + I5	K5	=K5 - J5	=L5 / G5	
2006	A6	B6	C6	D6	=B6 x D6	F6	G6	=A6 x G6	16	=H6 + I6	K6	=K6 - J6	=L6 / G6	
2007	A7	B7	C7	D7	=B7 x D7	F7	G7	=A7 x G7	17	=H7 + I7	K7	=K7 - J7	=L7 / G7	
2008	A8	B8	C8	D8	=B8 x D8	F8	G8	=A8 x G8	18	=H8 + I8	K8	=K8 - J8	=L8 / G8	
2009	A9	B9	C9	D9	=B9 x D9	F9	G9	=A9 x G9	19	=H9 + I9	K9	=K9 - J9	=L9 / G9	
2010	A10	B10	C10	D10	=B10 x D10	F10	G10	=A10 x G10	110	=H10 + I10	K10	=K10 - J10	=L10 / G10	
2011	A11	B11	C11	D11	=B11 x D11	F11	G11	=A11 x G11	111	=H11 + I11	K11	=K11 - J11	=L11 / G11	
2012	A12	B12	C12	D12	=B12 x D12	F12	G12	=A12 x G12	112	=H12 + I12	K12	=K12 - J12	=L12 / G12	
2013	A13	B13	C13	D13	=B13 x D13	F13	G13	=A13 x G13	113	=H13 + I13	K13	=K13 - J13	=L13 / G13	
2014	A14	B14	C14	D14	=B14 x D14	F14	G14	=A14 x G14	114	=H14 + I14	K14	=K14 - J14	=L14 / G14	
2015	A15	B15	C15	D15	=B15 x D15	F15	G15	=A15 x G15	115	=H15 + I15	K15	=K15 - J15	=L15 / G15	
2016	A16	B16	C16	D16	=B16 x D16	F16	G16	=A16 x G16	116	=H16 + I16	K16	=K16 - J16	=L16 / G16	
2017	A17	B17	C17	D17	=B17 x D17	F17	G17	=A17 x G17			K17			
2018	A18	B18	C18	D18	=B18 x D18	F18	G18	=A18 x G18			K18			
2019	A19	B19	C19	D19	=B19 x D19	F19	G19	=A19 x G19			K19			
2020	A20	B20	C20	D20	=B20 x D20	F20	G20	=A20 x G20			K20			
2021	A21	B21	C21	D21	=B21 x D21	F21	G21	=A21 x G21			K21			
2022	A22	B22	C22	D22	=B22 x D22	F22	G22	=A22 x G22			K22			
2023	A23	B23	C23	D23	=B23 x D23	F23	G23	=A23 x G23			K23			
2024	A24	B24	C24	D24	=B24 x D24	F24	G24	=A24 x G24			K24			
2025	A25	B25	C25	D25	=B25 x D25	F25	G25	=A25 x G25			K25			
2026	A26	B26	C26	D26	=B26 x D26	F26	G26	=A26 x G26			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'

