



Region of Waterloo

Water and
Wastewater
Monitoring Report

May

2019

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 8, 2019

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1.0 Introduction

1.1 Overview

The Region of Waterloo Transportation & Environmental Services Department produces the Water and Wastewater Monitoring Report annually with input from the Region's Planning, Development and Legislative Services Department. 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 2019 Water and Wastewater Monitoring Report (2019WWWMR) 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 2031. 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 2018 Water and Wastewater Monitoring Report

The changes from the 2018 WWWMR are as follows:

- Population and development data, including building permits issued, have been updated to December 31, 2018.
- Water consumption patterns and wastewater flows are a function of yearly weather fluctuations. In 2018, the annual precipitation was just above the average annual precipitation recorded at the University of Waterloo weather station. The beginning of the year experienced higher than average precipitation, especially though April and May. June and July were relatively dryer than average, and the rest of the year

balanced out. Seasonal impacts at some wastewater treatment plants showed slightly below average flows at the five largest plants: Galt, Hespeler, Preston, Kitchener and Waterloo. Seasonal impacts at most of the smaller plants were average or slightly below average. For water, the average day water consumption was aligned with the 5-year average in 2018 for all water systems, with a higher than average measured maximum week/day in the IUS and smaller systems.

- The commitment tables in Appendix D have been updated to reflect year end 2018 conditions.

2.0 Methodology

2.1 Ministry of Environment Conservation and Parks (MECP) Guidelines

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

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

Where:

- Cu = uncommitted hydraulic reserve capacity (m³/d)
- Cr = hydraulic reserve capacity (m³/d) from MECP 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 MECP.

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 MECP policies. However, a significant portion of all residential development is occurring outside of plans of subdivision. For example, in 2018 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, and registered plans with units that have no building permit issued or a building permit has been issued but is not yet occupied.

2.3 Population Data

Population estimates for each service area were updated in April 2019. The Regional population estimate reflects year-end 2018, 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 2016 Census of Canada, but additionally includes students and the undercoverage (an estimate of those who were missed in the Census enumeration).

Building Permit activity as reported by the Area Municipalities was used to update this base to year-end 2018, 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.

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). The forecasts are consistent with the 2031 population targets as implemented in the Regions moderate forecast which achieves this level of growth ten years later. For further details on this forecast please refer to the Wastewater Treatment Master Plan Update. In order to maintain a forecast of at least ten years, the forecast horizon for this report is 2031.

2.4 Development Data

Development data for each service area, shown in Appendix D, was updated in April 2019 with subdivision plan status current to year-end 2018. 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 2018. 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, MECP 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 MECP 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 MECP 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 2019 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 2019 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 MECP 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 2018 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 MECP 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 MECP Certificates of Approval (CofA). These are usually identical to the rated hydraulic capacity. In recent

years, the characteristics of the influent loading at some of the wastewater treatment plants have been higher than the design parameters for the plant. The higher loading influent is typically associated with industrial processes, many of which are subject to surcharge agreements. While the treatment plant's hydraulic capacity may show that there is available capacity for growth, the nature of the influent may result in reduced treatment effectiveness. The approval of growth, specifically industrial related, will be reviewed on a case-by-case basis in order to ensure that the influent characteristics are aligned with the design parameters for each plant.

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	172,666 (m ³ /d)
Commitments	20,306 (m ³ /d)
Remaining Capacity	57,029 (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 2018 was 139,550 m³/d, up approximately 3% from 2017. Maximum week water use in 2018 for the IUS is reported as 170,916 m³/d, which is up approximately 7% from maximum week use in 2017. Consumption in 2018 was below the 5-year average. The peaking factor between average day and maximum week in 2018 was 1.25. The 5-year average for maximum week projected demand is 172,666 m³/d. Due to the high maximum week in 2018, the projected maximum week demand increased in 2018 for the first time in over 15 years. 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 0.3260 m³/c/d there is capacity to service approximately 175,000 additional people in the IUS as of December 31, 2018.

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 62,300 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	4,653 (m ³ /d)
Commitments	101 (m ³ /d)
Remaining Capacity	7,860 (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 2018 was measured at 5,480 m³/d which is up 22% from 2017. The 5-year average max day projected demand is 4,653 m³/d.

Using the 5-year average max day per capita demand of 0.3240 m³/c/d, there is capacity to service approximately 24,300 additional people in Baden-New Hamburg water system as of December 31, 2018.

3.1.3 Ayr Water System

Ayr System Capacity	5,530 (m ³ /d)
Max Day Projected Demand	3,389 (m ³ /d)
Commitments	1,269 (m ³ /d)
Remaining Capacity	873 (m ³ /d)

The firm capacity rating of the Ayr Water System is 5,530 m³/d. 2018 Maximum Day water use in Ayr was recorded at 3,540 m³/d, which is a 3% decrease from 2017. The 5-year

average max day projected demand is 3,389 m³/d.

Using the 5-year average max day per capita demand of 0.6076 m³/c/d, there is capacity to service approximately 1,400 additional people in the Ayr Water System as of December 31, 2018. The present firm capacity could service a population of approximately 9,100 people.

3.1.4 Wellesley Water System

Wellesley System Capacity	3,000 (m ³ /d)
Max Day Projected Demand	1,083 (m ³ /d)
Commitments	52 (m ³ /d)
Remaining Capacity	1,865 (m ³ /d)

The water supply system has a firm capacity of 3,000 m³/d. 2018 Maximum Day demand in Wellesley was measured as 1,134 m³/d, which is up approximately 20% from 2017. The 5-

year average max day projected demand is 1,083 m³/d.

Using the 5-year average per max day capita demand of 0.3095 m³/c/d, there is capacity to service approximately 6,000 additional people in the Wellesley Water System as of December 31, 2018. The present system capacity could service a population of approximately 9,700 people.

3.1.5 St. Clements Water System

St. Clements System Capacity	1,770 (m ³ /d)
Max Day Projected Demand	436 (m ³ /d)
Commitments	8 (m ³ /d)
Remaining Capacity	1,327 (m ³ /d)

The water treatment plant has a firm capacity of 1,770 m³/d. 2018 Maximum Day Demand in St. Clements was measured as 415 m³/d, which is down approximately 9% from 2017. The 5-year average max day projected demand is 436 m³/d.

Using the 5-year average per max per capita demand of 0.3438 m³/c/d, there is capacity to service approximately 3,800 additional people in the St. Clements Water System as of December 31, 2018. The present system capacity could service a population of approximately 5,200 people.

3.2 Wastewater

3.2.1 Kitchener Wastewater Treatment Plant (KWWTP)

The KWWTP has a rated capacity of 122,700 m³/d. Average flow in 2018 was recorded at 67,902 m³/d which is down about 1% from 2017. The 5-year Average Projected Flow is 70,413 m³/d.

KWWTP Rated Capacity	122,700 (m ³ /d)
Average Projected Flow	70,413 (m ³ /d)
Commitments	11,069 (m ³ /d)
Remaining Capacity	41,218 (m ³ /d)

Using the 5-year average flow per capita flow of 0.2776 m³/c/d, there is capacity to service approximately 148,000 additional people in the Kitchener Wastewater Service Area as of December 31, 2018. The present system capacity could service a population of approximately 440,000 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 2018 at the WWWTP was recorded at 41,805 m³/d, which is down 2% from 2017. The 5-year Average Projected Flow is 45,546 m³/d.

WWWTP Rated Capacity	57,500 (m ³ /d)
Average Projected Flow	45,546 (m ³ /d)
Commitments	2,741 (m ³ /d)
Remaining Capacity	9,213 (m ³ /d)

Using the 5-year average per capita flow of 0.2972 m³/c/d, there is capacity to service approximately 31,000 additional people in the Waterloo Wastewater Service Area as of December 31, 2018. The expected rated capacity of 57,500 m³/d could service a population of approximately 193,000 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 27,807 m³/d in 2018 which is essentially unchanged from 2017. The 5-year Average Projected Flow is 31,890 m³/d.

GWWTP Rated Capacity	56,800 (m ³ /d)
Average Projected Flow	31,890 (m ³ /d)
Commitments	2,295 (m ³ /d)
Remaining Capacity	22,615 (m ³ /d)

Using the 5-year average per capita flow of 0.3678 m³/c/d, there is capacity to service approximately 61,500 additional people in the Galt Wastewater Service Area as of December 31, 2018. The present rated capacity could service a population of approximately 155,000 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 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.

PWWTP Rated Capacity	16,820 (m ³ /d)
Average Projected Flow	9,441 (m ³ /d)
Commitments*	3,610 (m ³ /d)
Remaining Capacity	3,769 (m ³ /d)

*Includes 1,116 m³/d for Boxwood

Flow in 2018 at the PWWTP was recorded at 9,239 m³/d which is up 1% from 2017 flows. The 5-year Average Projected Flow is 9,441 m³/d.

In the 2011 WWWMR, wastewater capacity was reserved for the Boxwood Industrial Subdivision in the Preston Wastewater Service Area in the amount of 1,860 m³/d. Occupancy of the Boxwood Subdivision has been steadily increasing since 2014 and approximately 50% of the developable area has been occupied for at least a year at the end of 2018. Therefore, the reserve capacity has been reduced to 50% of the original amount, and a reserve of 930 m³/d will remain to accommodate the remaining lot development. In future years, the reserved capacity will be further reduced

proportionally based on the development activity.

Using the 5-year average per capita flow of 0.4193 m³/c/d, there is capacity to service approximately 9,000 additional people in the Preston Wastewater Service Area as of December 31, 2018. 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 6,320 m³/d for 2018, which is down about 6% from 2017. The 5-year Average Projected Flow is 6,599 m³/d.

HWWTP Rated Capacity	9,320 (m ³ /d)
Average Projected Flow	6,599 (m ³ /d)
Commitments	574 (m ³ /d)
Remaining Capacity	2,148 (m ³ /d)

Using the 5-year average per capita flow of 0.2539 m³/c/d, there is capacity to service approximately 8,500 additional people in the Hespeler Wastewater Service Area as of December 31, 2018. The present rated capacity of 9,320 m³/d could service a population of approximately 36,000 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	4,118 (m ³ /d)
Commitments	1,868 (m ³ /d)
Remaining Capacity	1,814 (m ³ /d)

Flows in 2018 at the EWWTP were recorded at 4,112 m³/d which is down 9% from 2017. The 5-year Average Projected Flow is 4,118 m³/d.

Using the 5-year average per capita flow of 0.3757 m³/c/d, there is capacity to service approximately 4,800 additional people in the Elmira Wastewater Service Area as of December 31, 2018. The present rated capacity of 7,800 m³/d could service a population of approximately 20,700 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.

3.2.7 St. Jacobs Wastewater Treatment Plant (SJWWTP)

The hydraulic capacity of the SJWWTP is 1,450 m³/d. Flows in 2018 were recorded at 890 m³/d which is down approximately 11% from 2017. The 5-year Average Projected Flow is 898 m³/d.

SJWWTP Rated Capacity	1,450 (m ³ /d)
Average Projected Flow	898 (m ³ /d)
Commitments	297 (m ³ /d)
Remaining Capacity	254 (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. Background work has been initiated through the current Wastewater Treatment Master Plan to confirm the timing of a future expansion and/or alternative options.

Using the 5-year average per capita flow of 0.4648 m³/c/d, there is capacity to service approximately 550 additional people in the St. Jacobs Wastewater Service Area as of December 31, 2018. 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 2018 was recorded at 4,039 m³/d which is unchanged from 2017. The 5-year Average Projected Flow is 3,926 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	3,926 (m ³ /d)
Commitments	159 (m ³ /d)
Remaining Capacity	1,116 (m ³ /d)

Using the 5-year average per capita flow of 0.2796 m³/c/d, there is capacity to service approximately 4,000 additional people in the Baden/New Hamburg Wastewater Service Area as of December 31, 2018. 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 2019/20 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

AWWTP Rated Capacity	3,000 (m ³ /d)
Average Projected Flow	1,438 (m ³ /d)
Commitments	581 (m ³ /d)
Remaining Capacity	982 (m ³ /d)

to 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 2018 was recorded at 1,319 m³/d which is down about 12% from 2017. The 5-year Average Projected Flow is 1,438 m³/d.

Using the 5-year average per capita flow of 0.2603 m³/c/d, there is capacity to service approximately 3,800 additional people in the Ayr Wastewater Service Area as of December 31, 2018. The present rated capacity of 3,000 m³/d could service a population of approximately 11,200 people.

3.2.10 Wellesley Wastewater Treatment (WEWWTP)

The WEWWTP has a rated capacity of 1,100 m³/d. Flow in 2018 at the WEWWTP was measured at 800 m³/d which is down 13% from the previous year. The 5-year Average Projected Flow is 836 m³/d.

WEWWTP Rated Capacity	1,100 (m ³ /d)
Average Projected Flow	836 (m ³ /d)
Commitments	58 (m ³ /d)
Remaining Capacity	206 (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 0.2373 m³/c/d, there is capacity to service approximately 870 additional people in the Wellesley Wastewater Service Area as of December 31, 2018. The present rated capacity of 1,100 m³/d could service a population of approximately 4,600 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 2018. The only exception was in West Montrose where operation limitations reduced the ability to operate the wells to their rated capacity. In early 2019 the West Montrose Water Supply System was connected to the Conestoga Plains Water System. The West Montrose water treatment plant is no longer in operation, and the West Montrose system will be included with the Conestoga Plains system in future versions of this annual monitoring report.

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 generally 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 WWWWMR.

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, 2018

		A	B	C	D = A - (B+C)	E	F = D / E * 1000
		2018 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	172.67	20.31	57.03	0.3260	174,961
	BADEN-NEW HAMBURG	12.61	4.65	0.10	7.86	0.3240	24,257
	AYR WATER SYSTEM	5.53	3.39	1.27	0.87	0.6076	1,436
	WELLESLEY	3.00	1.08	0.05	1.86	0.3095	6,024
	ST. CLEMENTS	1.77	0.44	0.01	1.33	0.3438	3,859

		A	B	C	D = A - (B+C)	E	F = D / E * 1000
		2018 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	70.41	11.07	41.22	0.2776	148,464
	WATERLOO WWTP	57.50	45.55	2.33	9.62	0.2972	32,387
	GALT WWTP	56.80	31.89	2.30	22.61	0.3678	61,495
	PRESTON WWTP	16.82	9.44	3.61	3.77	0.4193	8,990
	HESPELER WWTP	9.32	6.60	0.57	2.15	0.2539	8,460
	ELMIRA WWTP	7.80	4.12	1.87	1.81	0.3757	4,829
	BADEN-NEW HAMBURG WWTP	5.20	3.93	0.16	1.12	0.2796	3,990
	AYR WWTP	3.00	1.44	0.58	0.98	0.2603	3,771
	ST. JACOBS WWTP	1.45	0.90	0.30	0.25	0.4648	547
	WELLESLEY WWTP	1.10	0.84	0.06	0.21	0.2373	869

TABLE 2: SMALL RURAL WATER SYSTEM SUMMARY AS OF DECEMBER 31, 2018

		A	B	C	D = A - B	E	F
		2018 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	423	N/A	178	0.8775	Case by Case
	CONESTOGO PLAINS	786	233	N/A	553	0.6466	Case by Case
	MARY HILL	157	100	N/A	57	0.7066	Case by Case
	MARY HILL VILLAGE HEIGHTS	820	150	N/A	670	0.8860	Case by Case
	WEST MONTROSE	238	112	N/A	126	0.5438	Case by Case
WEL	HEIDELBERG	829	308	N/A	521	0.3036	Case by Case
	LINWOOD	605	288	N/A	317	0.3685	Case by Case
WIL	FOXBORO	527	154	N/A	373	0.3760	Case by Case
	NEW DUNDEE	983	383	N/A	600	0.3626	Case by Case
ND	ROSEVILLE	358	161	N/A	197	0.5553	Case by Case
	BRANCHTON	130	89	N/A	41	0.7374	Case by Case

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

TABLE 3: COMMITMENTS AS OF DECEMBER 31, 2018

		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	52,863	9,434	62,297	0.3260	17,231	3,075	20,306
	BADEN-NEW HAMBURG	285	28	313	0.3240	92	9	101
	AYR WATER SYSTEM	2,078	10	2,088	0.6076	1,263	6	1,269
	WELLESLEY	159	10	169	0.3095	49	3	52
	ST. CLEMENTS	23	0	23	0.3438	8	0	8

		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	37,231	2,637	39,868	0.2776	10,336	732	11,069
	WATERLOO WWTP	6,456	1,384	7,840	0.2972	1,918	411	2,330
	GALT WWTP	5,458	784	6,242	0.3678	2,007	288	2,295
	PRESTON WWTP	6,391	0	6,391	0.4193	3,610	0	3,610
	HESPELER WWTP	6	2,253	2,259	0.2539	2	572	574
	ELMIRA WWTP	4,502	469	4,971	0.3757	1,691	176	1,868
	BADEN-NEW HAMBURG WWTP	483	84	567	0.2796	135	23	159
	AYR WWTP	2,124	107	2,231	0.2603	553	28	581
	ST. JACOBS WWTP	640	0	640	0.4648	297	0	297
	WELLESLEY WWTP	237	7	244	0.2373	56	2	58

- (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 930 m3/day for the Boxwood Industrial Subdivision

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 Plans Units 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 MECP 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.

MECP

Ministry of Environment Conservation and Parks.
Formerly Ministry of Environment and Climate Change

	(MOECC), and formerly Ministry of the Environment (MOE).
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

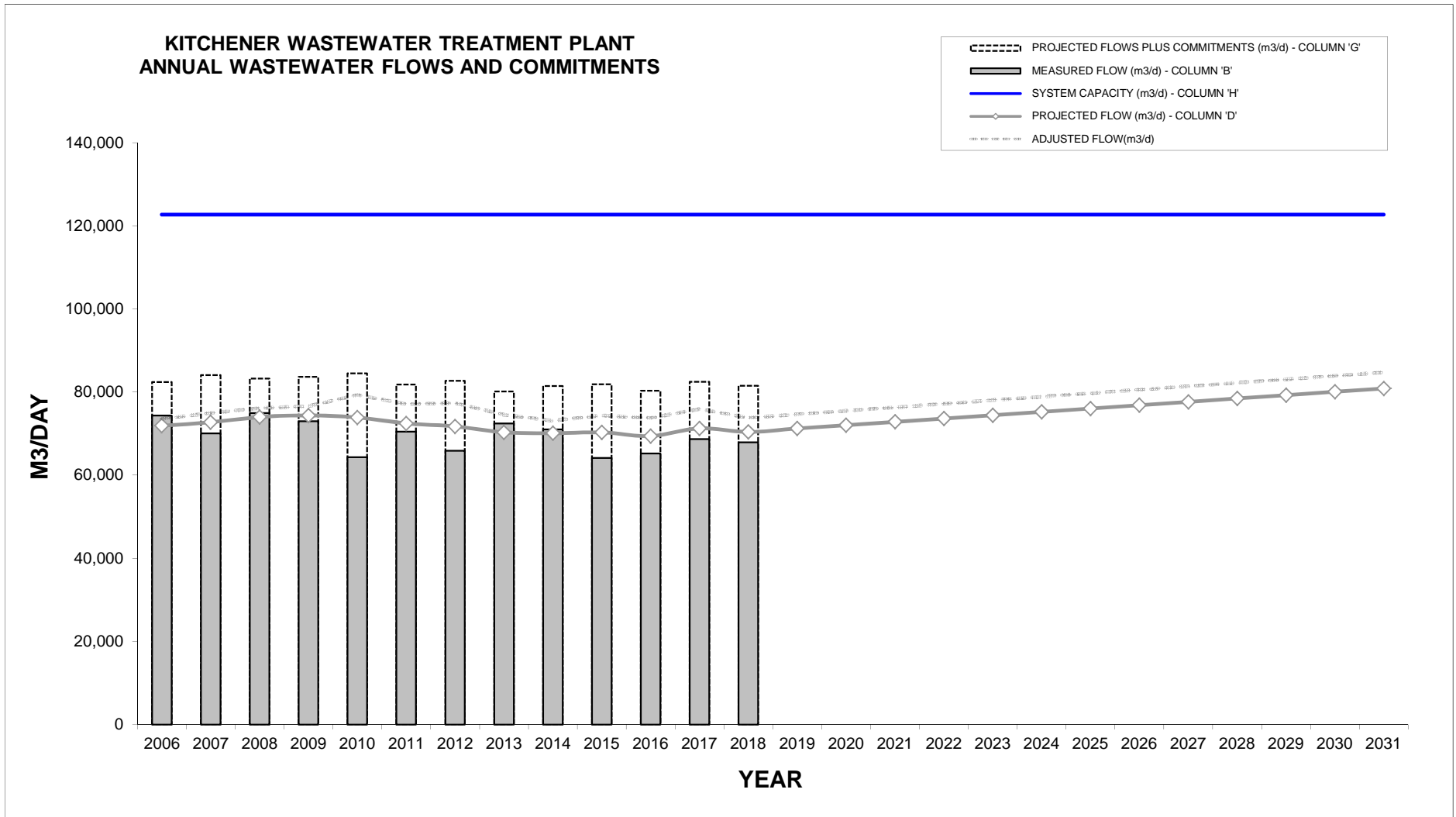
Wastewater Charts and Data

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				
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	248,481	68,684	0.2868	71,269	9,682	1,527	82,478	122,700	40,222	140,236
2018	253,621	67,902	0.2776	70,413	10,336	732	81,482	122,700	41,218	148,464
2019	256,513		0.2776	71,216				122,700		
2020	259,404		0.2776	72,019				122,700		
2021	262,296		0.2776	72,822				122,700		
2022	265,187		0.2776	73,624				122,700		
2023	268,079		0.2776	74,427				122,700		
2024	270,970		0.2776	75,230				122,700		
2025	273,862		0.2776	76,033				122,700		
2026	276,753		0.2776	76,835				122,700		
2027	279,645		0.2776	77,638				122,700		
2028	282,536		0.2776	78,441				122,700		
2029	285,428		0.2776	79,244				122,700		
2030	288,319		0.2776	80,046				122,700		
2031	291,211		0.2776	80,849				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)

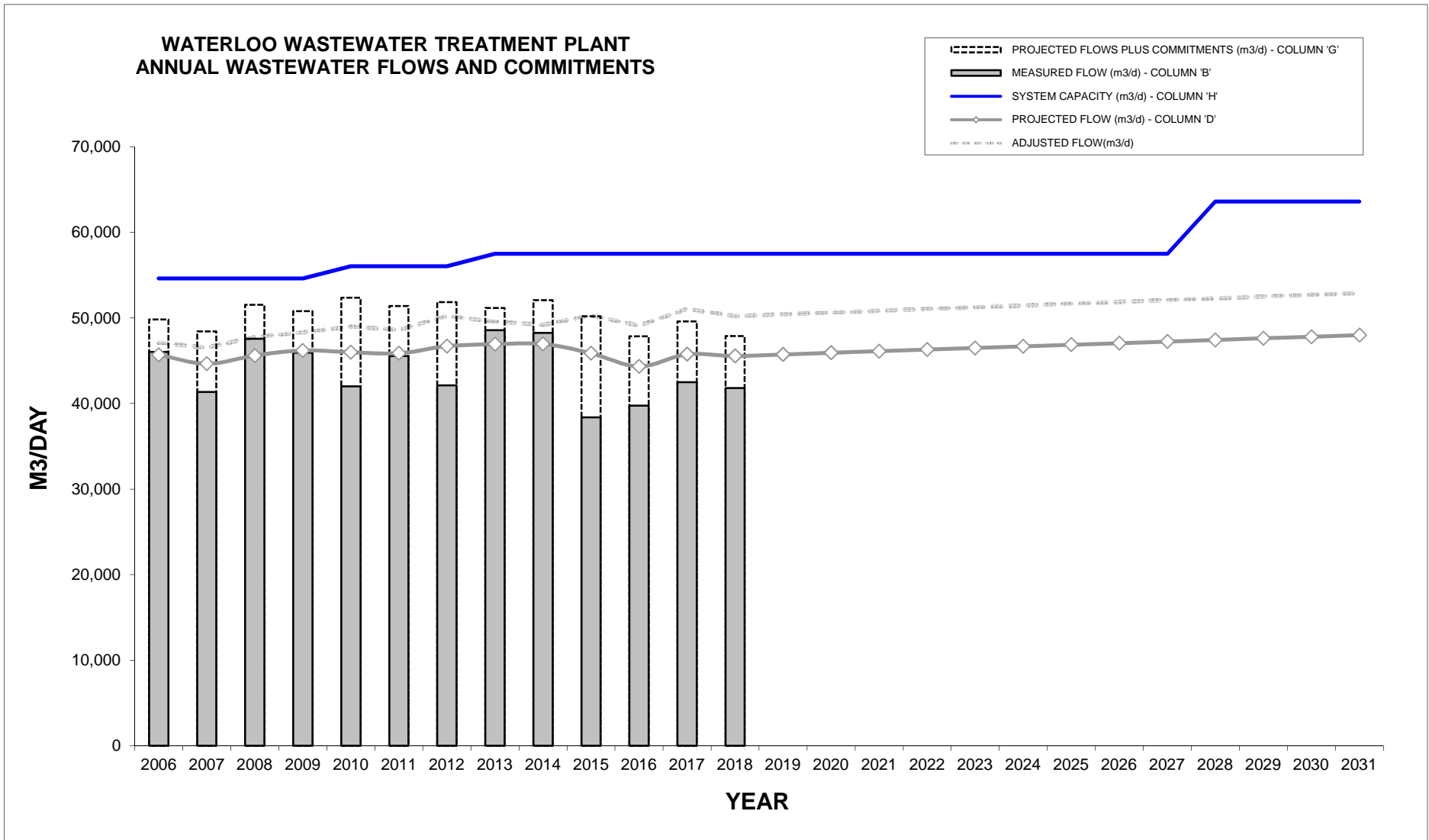


WATERLOO WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	47,844	57,500	9,656	30,165
2017	145,381	42,473	0.3146	45,743	1,992	1,844	49,580	57,500	7,920	25,171
2018	153,271	41,805	0.2972	45,546	1,918	411	47,876	57,500	9,624	32,387
2019	153,902		0.2972	45,734				57,500		
2020	154,532		0.2972	45,921				57,500		
2021	155,163		0.2972	46,108				57,500		
2022	155,794		0.2972	46,296				57,500		
2023	156,424		0.2972	46,483				57,500		
2024	157,055		0.2972	46,671				57,500		
2025	157,685		0.2972	46,858				57,500		
2026	158,316		0.2972	47,045				57,500		
2027	158,947		0.2972	47,233				57,500		
2028	159,577		0.2972	47,420				63,600		
2029	160,208		0.2972	47,608				63,600		
2030	160,838		0.2972	47,795				63,600		
2031	161,469		0.2972	47,982				63,600		

*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)



2019 WATER AND WASTEWATER MONITORING REPORT

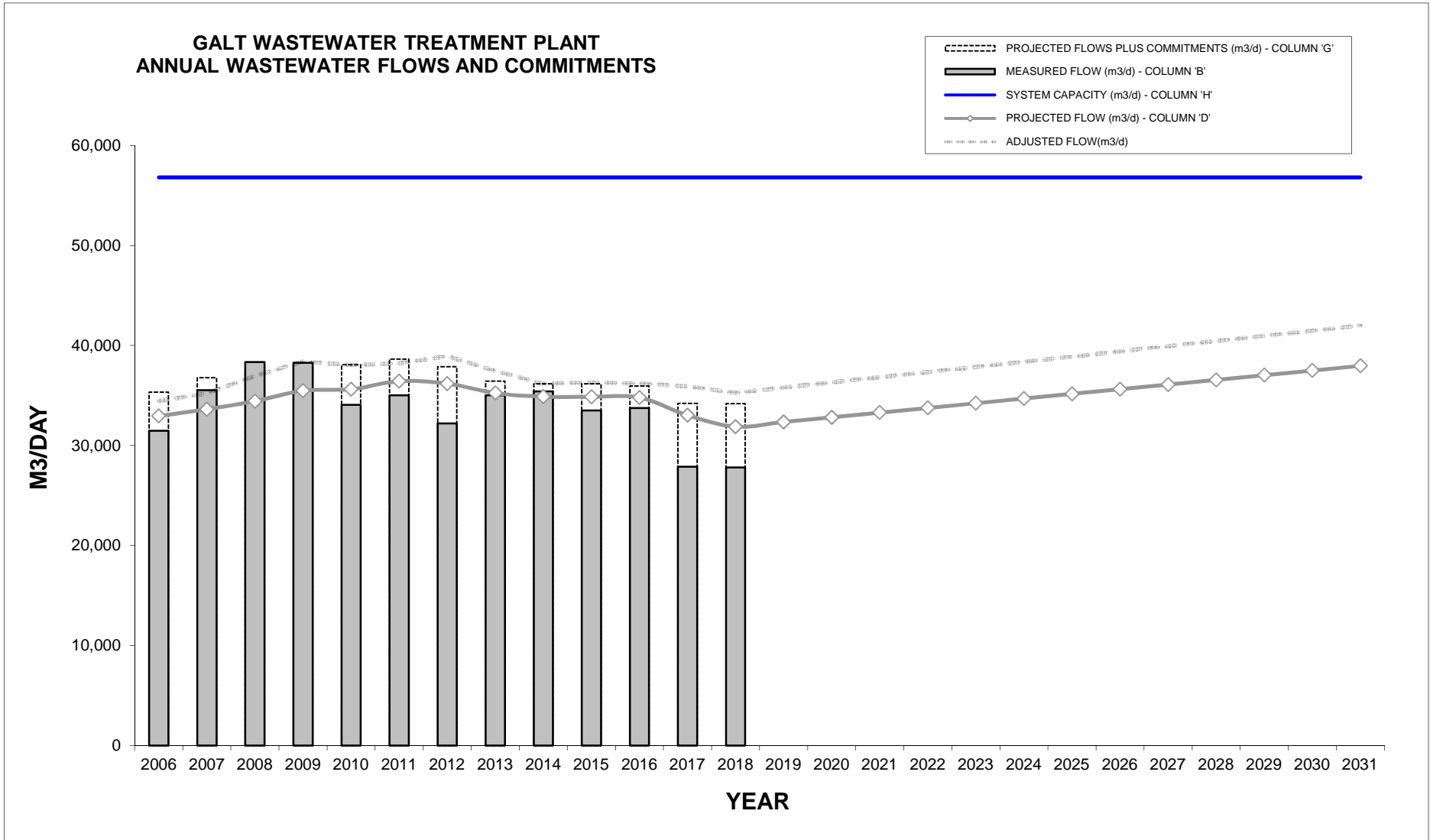
APPENDIX - B WASTEWATER TABLES AND CHARTS

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 (m ³ /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)			
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	85,369	27,888	0.3868	33,025	957	229	34,210	56,800	22,590	58,395
2018	86,716	27,807	0.3678	31,890	2,007	288	34,185	56,800	22,615	61,495
2019	87,988		0.3678	32,358				56,800		
2020	89,259		0.3678	32,825				56,800		
2021	90,531		0.3678	33,293				56,800		
2022	91,803		0.3678	33,761				56,800		
2023	93,075		0.3678	34,228				56,800		
2024	94,346		0.3678	34,696				56,800		
2025	95,618		0.3678	35,164				56,800		
2026	96,890		0.3678	35,631				56,800		
2027	98,162		0.3678	36,099				56,800		
2028	99,434		0.3678	36,567				56,800		
2029	100,705		0.3678	37,034				56,800		
2030	101,977		0.3678	37,502				56,800		
2031	103,249		0.3678	37,970				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)

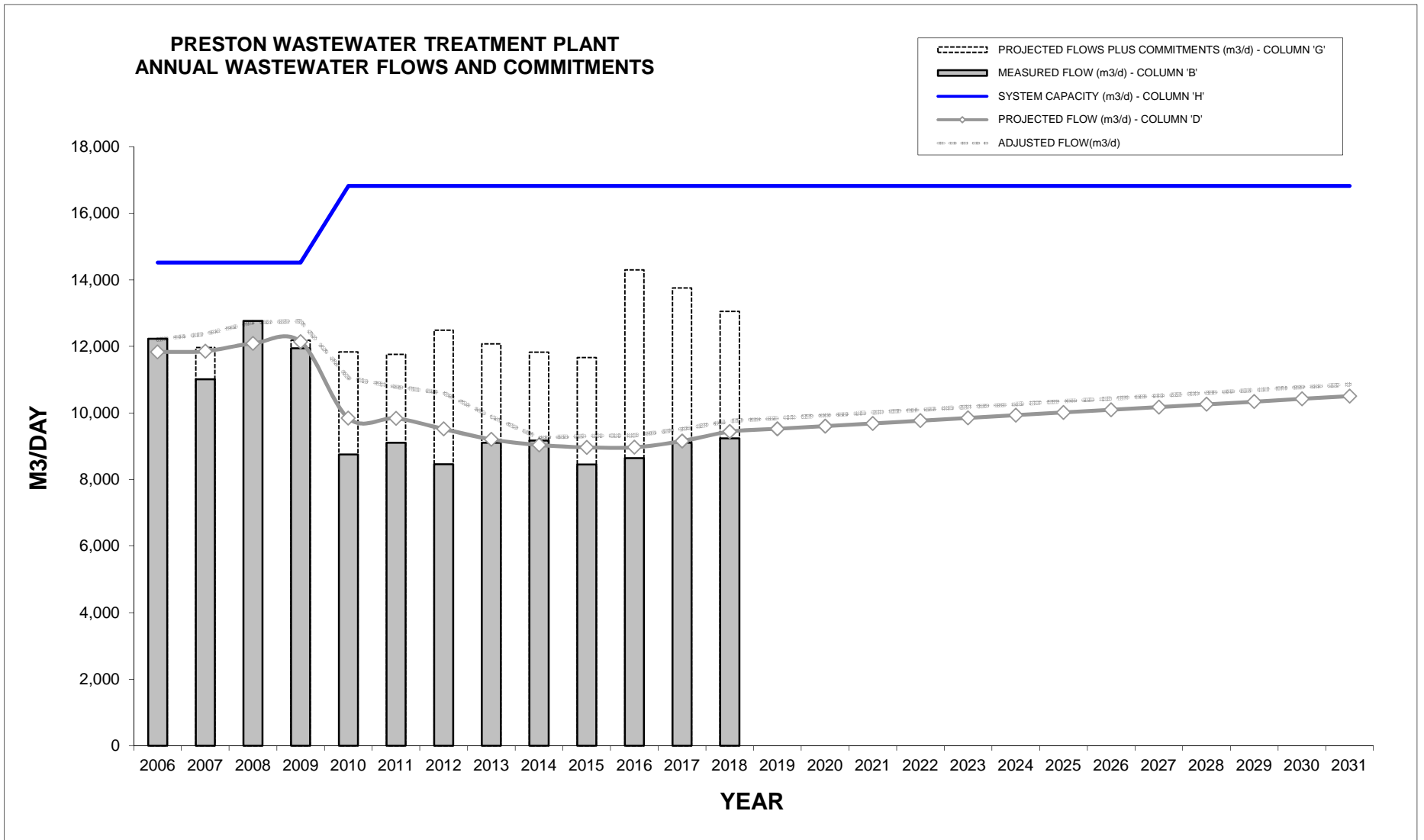


PRESTON WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	21,469	9,109	0.4264	9,155	4,545	60	13,760	16,820	3,060	7,176
2018	22,517	9,239	0.4193	9,441	3,610	0	13,051	16,820	3,769	8,990
2019	22,712		0.4193	9,523				16,820		
2020	22,908		0.4193	9,605				16,820		
2021	23,103		0.4193	9,687				16,820		
2022	23,298		0.4193	9,769				16,820		
2023	23,493		0.4193	9,850				16,820		
2024	23,689		0.4193	9,932				16,820		
2025	23,884		0.4193	10,014				16,820		
2026	24,079		0.4193	10,096				16,820		
2027	24,274		0.4193	10,178				16,820		
2028	24,470		0.4193	10,260				16,820		
2029	24,665		0.4193	10,342				16,820		
2030	24,861		0.4193	10,424				16,820		
2031	25,056		0.4193	10,506				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)

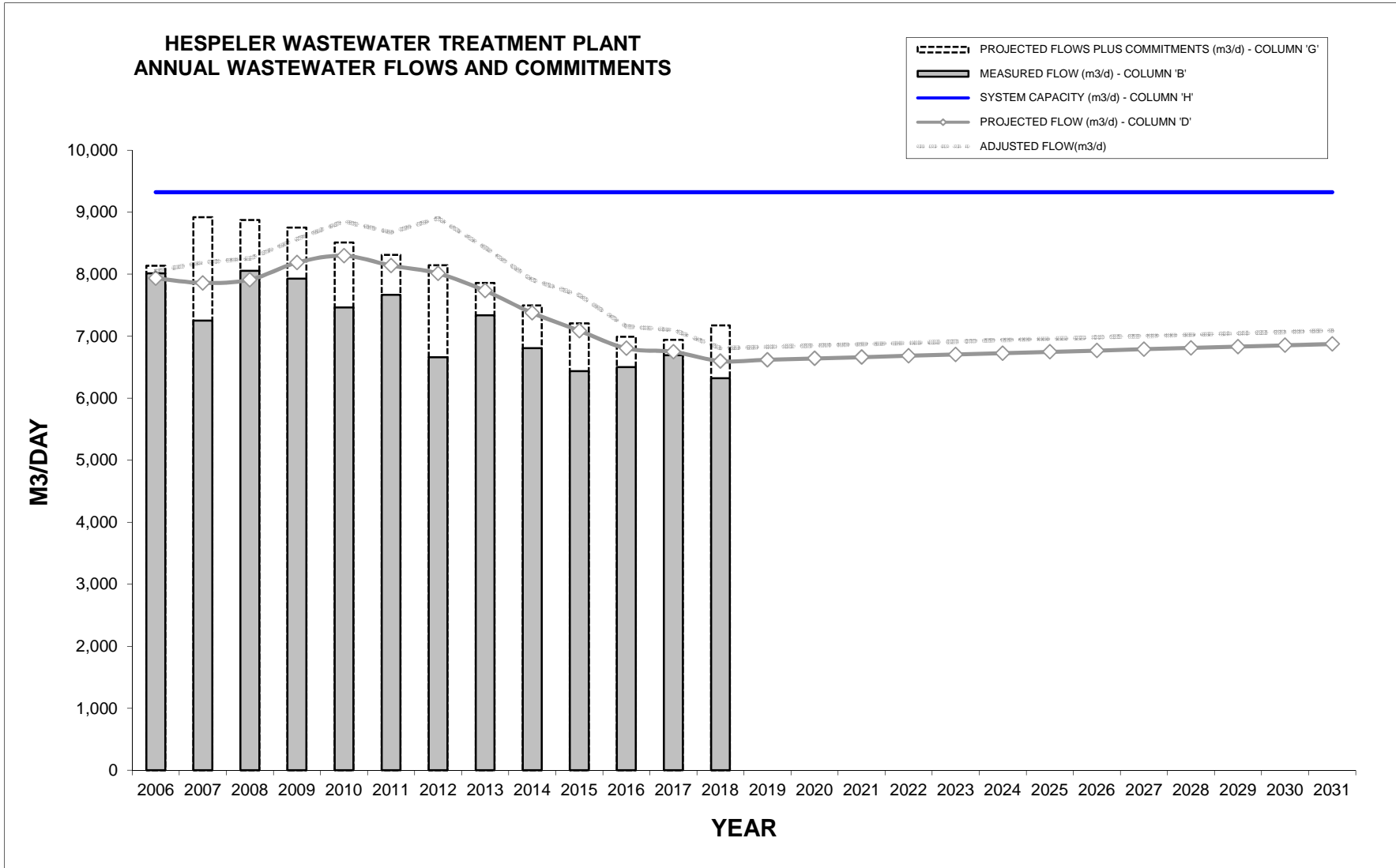


HESPELER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	25,699	6,692	0.2626	6,748	20	173	6,941	9,320	2,379	9,061
2018	25,991	6,320	0.2539	6,599	2	572	7,172	9,320	2,148	8,460
2019	26,075		0.2539	6,620				9,320		
2020	26,158		0.2539	6,641				9,320		
2021	26,242		0.2539	6,662				9,320		
2022	26,325		0.2539	6,684				9,320		
2023	26,409		0.2539	6,705				9,320		
2024	26,492		0.2539	6,726				9,320		
2025	26,576		0.2539	6,747				9,320		
2026	26,659		0.2539	6,768				9,320		
2027	26,743		0.2539	6,789				9,320		
2028	26,826		0.2539	6,811				9,320		
2029	26,910		0.2539	6,832				9,320		
2030	26,993		0.2539	6,853				9,320		
2031	27,077		0.2539	6,874				9,320		

*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'

(F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)

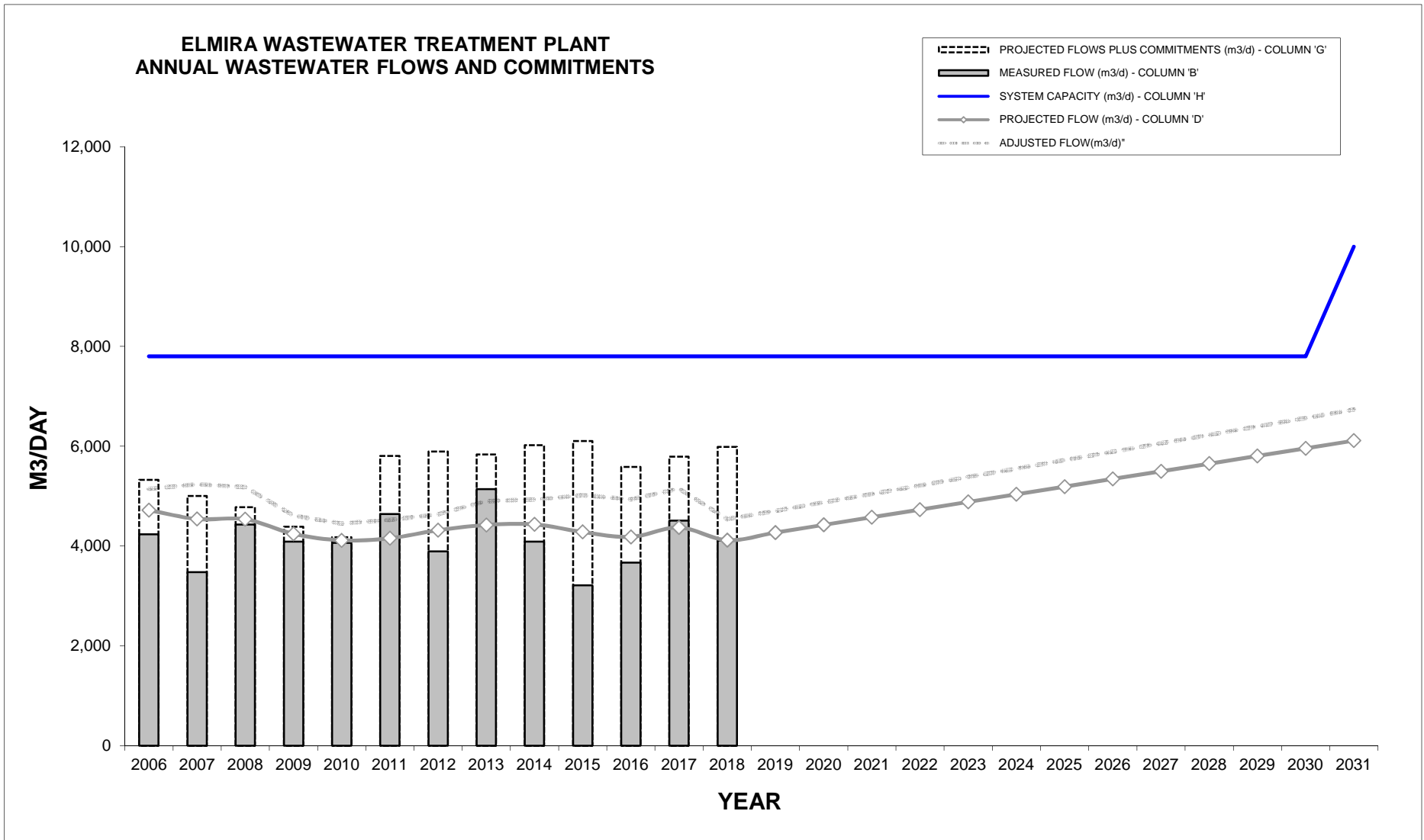


ELMIRA WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	10,788	4,508	0.4053	4,372	1,393	25	5,790	7,800	2,010	4,959
2018	10,962	4,112	0.3757	4,118	1,691	176	5,986	7,800	1,814	4,829
2019	11,370		0.3757	4,272				7,800		
2020	11,778		0.3757	4,425				7,800		
2021	12,186		0.3757	4,578				7,800		
2022	12,594		0.3757	4,732				7,800		
2023	13,002		0.3757	4,885				7,800		
2024	13,411		0.3757	5,038				7,800		
2025	13,819		0.3757	5,192				7,800		
2026	14,227		0.3757	5,345				7,800		
2027	14,635		0.3757	5,498				7,800		
2028	15,043		0.3757	5,652				7,800		
2029	15,452		0.3757	5,805				7,800		
2030	15,860		0.3757	5,958				7,800		
2031	16,268		0.3757	6,112				10,000		

*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)



2019 WATER AND WASTEWATER MONITORING REPORT

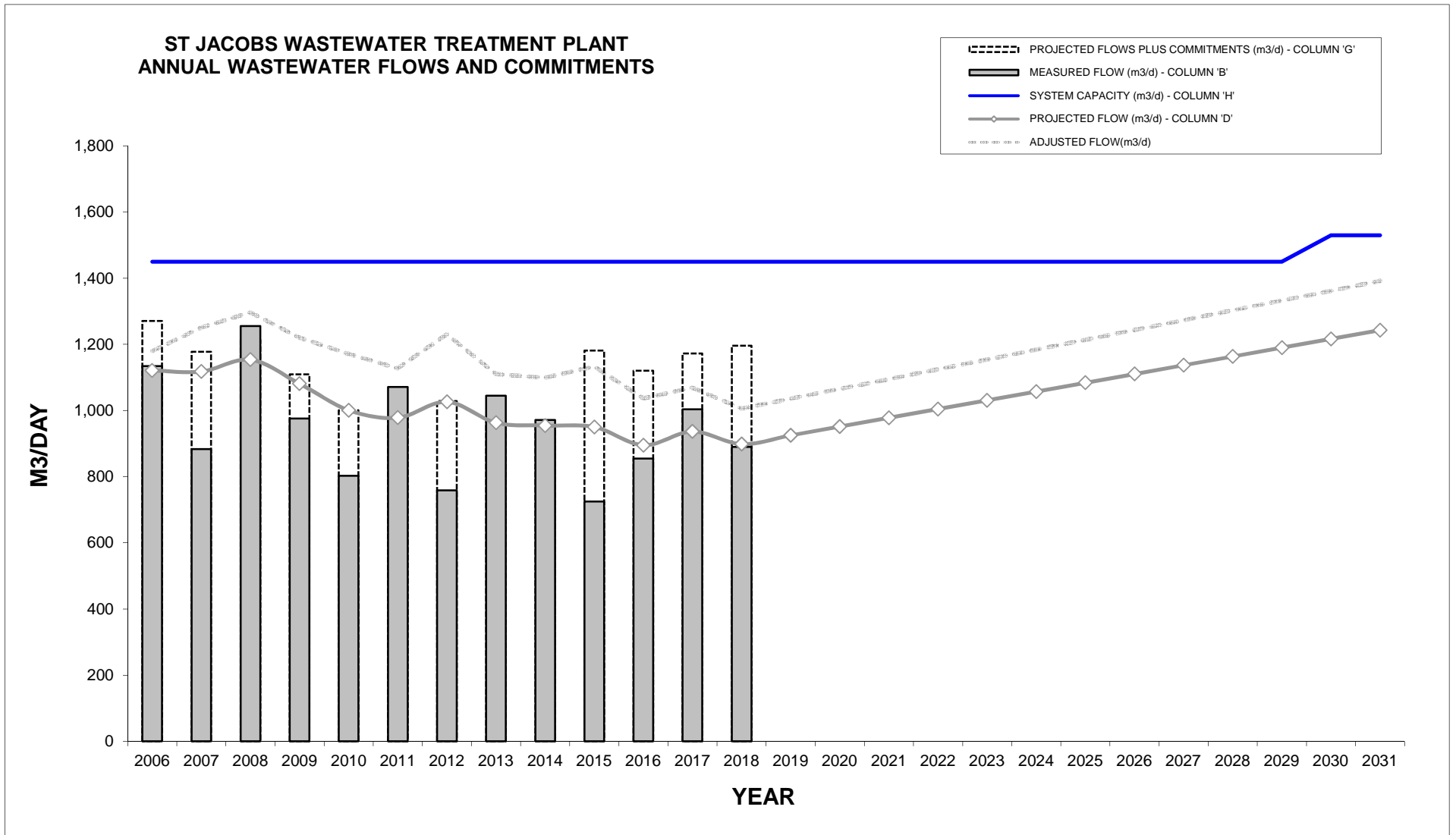
APPENDIX - B WASTEWATER TABLES AND CHARTS

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				
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	1,930	1,004	0.4852	936	236	0	1,173	1,450	277	571
2018	1,933	890	0.4648	898	297	0	1,196	1,450	254	547
2019	1,990		0.4648	925				1,450		
2020	2,047		0.4648	951				1,450		
2021	2,104		0.4648	978				1,450		
2022	2,161		0.4648	1,004				1,450		
2023	2,218		0.4648	1,031				1,450		
2024	2,275		0.4648	1,057				1,450		
2025	2,332		0.4648	1,084				1,450		
2026	2,389		0.4648	1,110				1,450		
2027	2,446		0.4648	1,137				1,450		
2028	2,503		0.4648	1,163				1,450		
2029	2,560		0.4648	1,190				1,450		
2030	2,617		0.4648	1,216				1,530		
2031	2,674		0.4648	1,243				1,530		

*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)

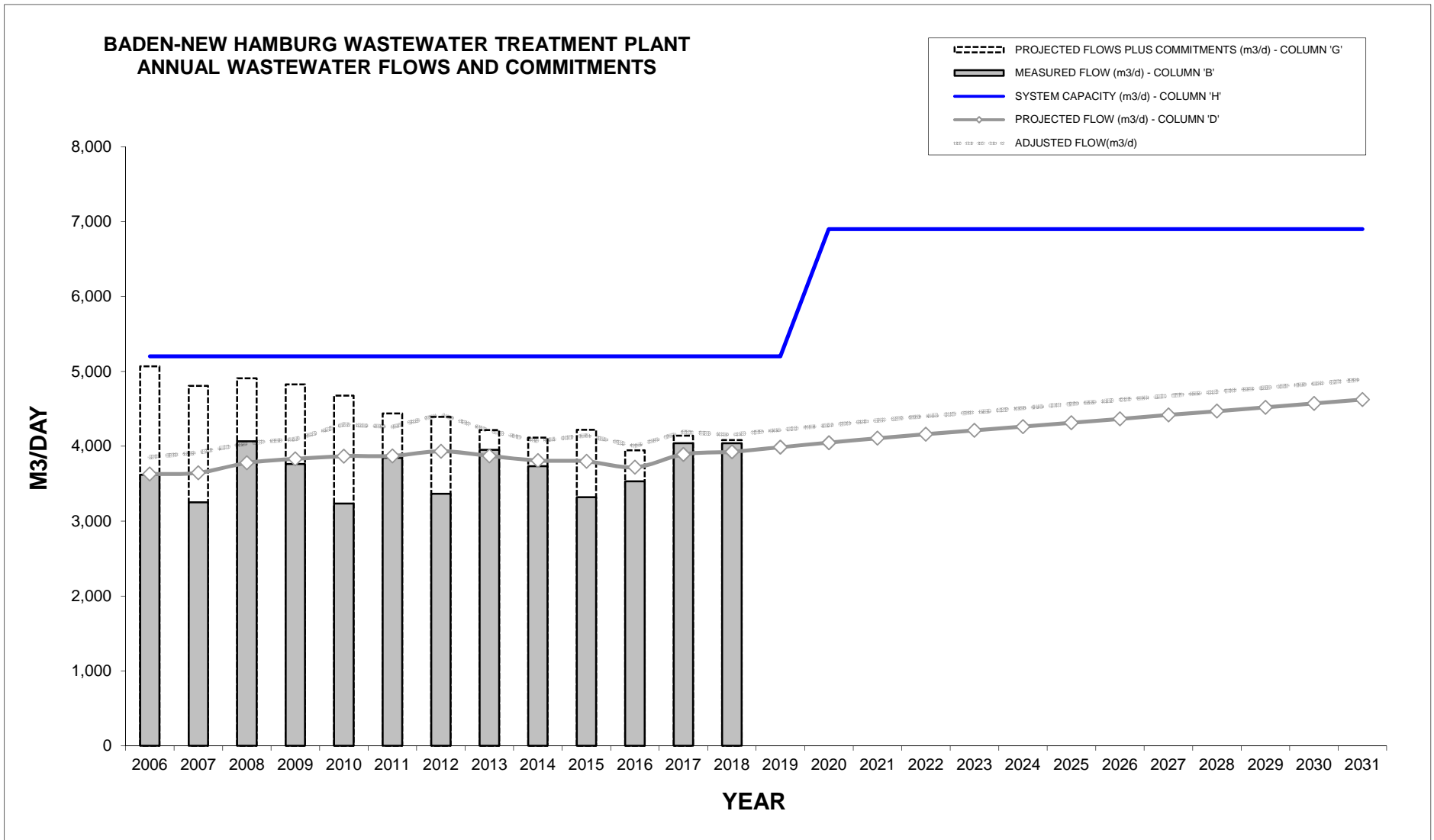


BADEN-NEW HAMBURG WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	13,657	4,039	0.2849	3,891	238	11	4,140	5,200	1,060	3,720
2018	14,043	4,039	0.2796	3,926	135	23	4,084	5,200	1,116	3,990
2019	14,261		0.2796	3,987				5,200		
2020	14,478		0.2796	4,048				6,900		
2021	14,696		0.2796	4,108				6,900		
2022	14,880		0.2796	4,160				6,900		
2023	15,064		0.2796	4,211				6,900		
2024	15,248		0.2796	4,263				6,900		
2025	15,432		0.2796	4,314				6,900		
2026	15,616		0.2796	4,366				6,900		
2027	15,800		0.2796	4,417				6,900		
2028	15,984		0.2796	4,469				6,900		
2029	16,169		0.2796	4,520				6,900		
2030	16,353		0.2796	4,572				6,900		
2031	16,537		0.2796	4,623				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)



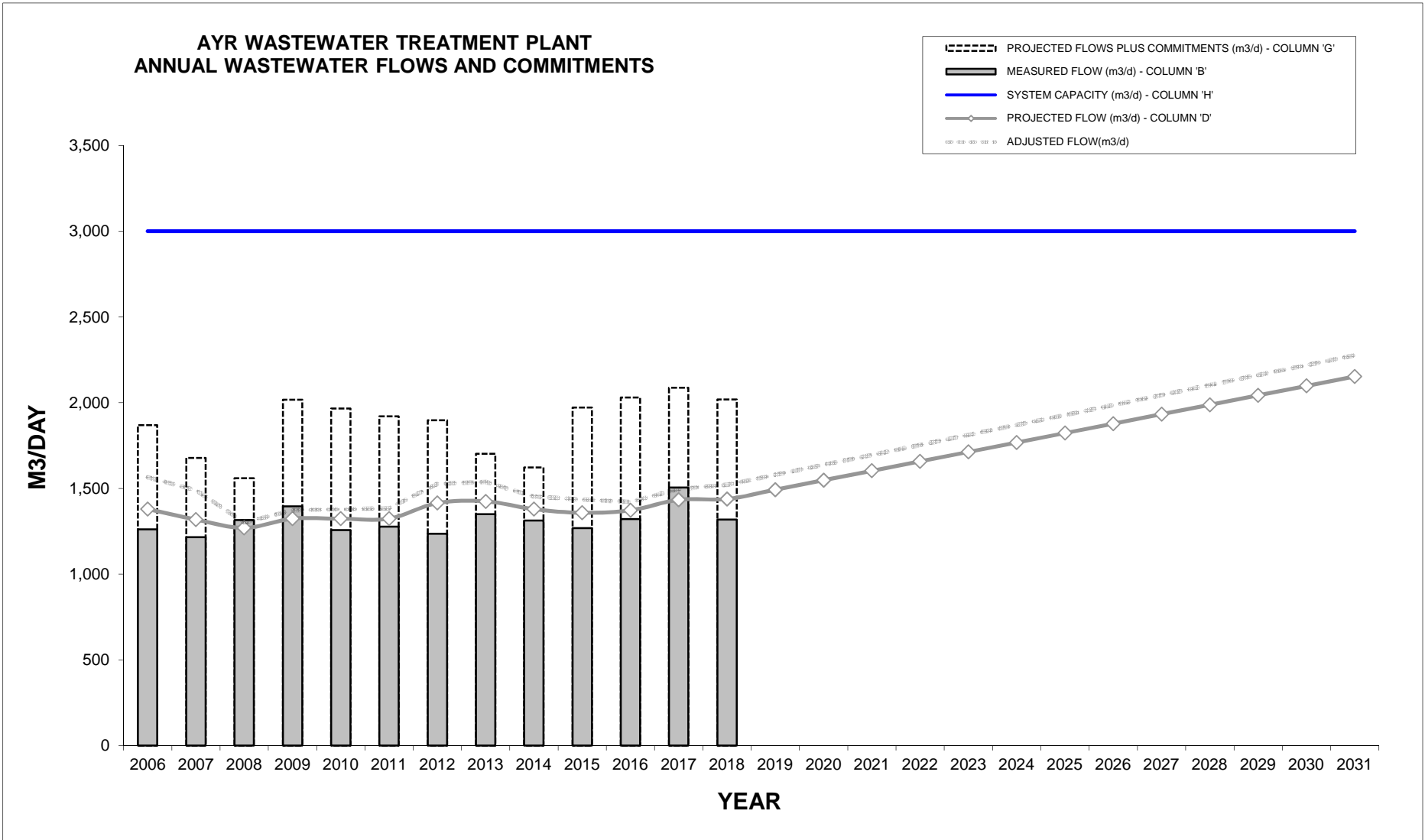
2019 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

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				
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	5,339	1,505	0.2685	1,434	631	23	2,087	3,000	913	3,400
2018	5,524	1,319	0.2603	1,438	553	28	2,018	3,000	982	3,771
2019	5,735		0.2603	1,493				3,000		
2020	5,947		0.2603	1,548				3,000		
2021	6,158		0.2603	1,603				3,000		
2022	6,369		0.2603	1,658				3,000		
2023	6,580		0.2603	1,713				3,000		
2024	6,792		0.2603	1,768				3,000		
2025	7,003		0.2603	1,823				3,000		
2026	7,214		0.2603	1,878				3,000		
2027	7,425		0.2603	1,933				3,000		
2028	7,637		0.2603	1,988				3,000		
2029	7,848		0.2603	2,043				3,000		
2030	8,060		0.2603	2,098				3,000		
2031	8,271		0.2603	2,153				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)

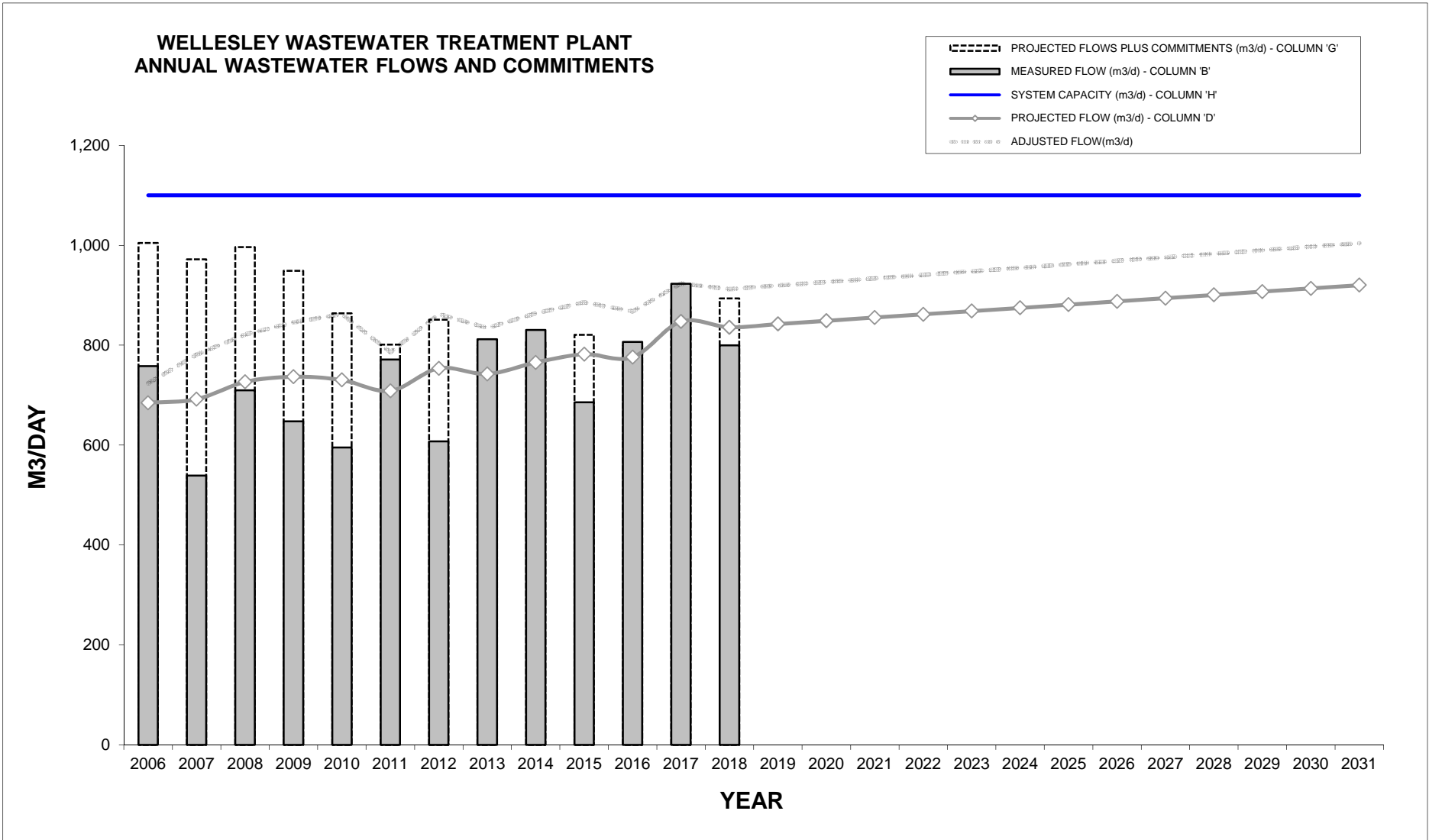


2019 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

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				
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	3,495	923	0.2424	847	26	3	877	1,100	223	921
2018	3,523	800	0.2373	836	56	2	894	1,100	206	869
2019	3,550		0.2373	842				1,100		
2020	3,578		0.2373	849				1,100		
2021	3,605		0.2373	855				1,100		
2022	3,632		0.2373	862				1,100		
2023	3,659		0.2373	868				1,100		
2024	3,687		0.2373	875				1,100		
2025	3,714		0.2373	881				1,100		
2026	3,741		0.2373	888				1,100		
2027	3,768		0.2373	894				1,100		
2028	3,796		0.2373	901				1,100		
2029	3,823		0.2373	907				1,100		
2030	3,851		0.2373	914				1,100		
2031	3,878		0.2373	920				1,100		

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



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APPENDIX C

Water Charts and Data

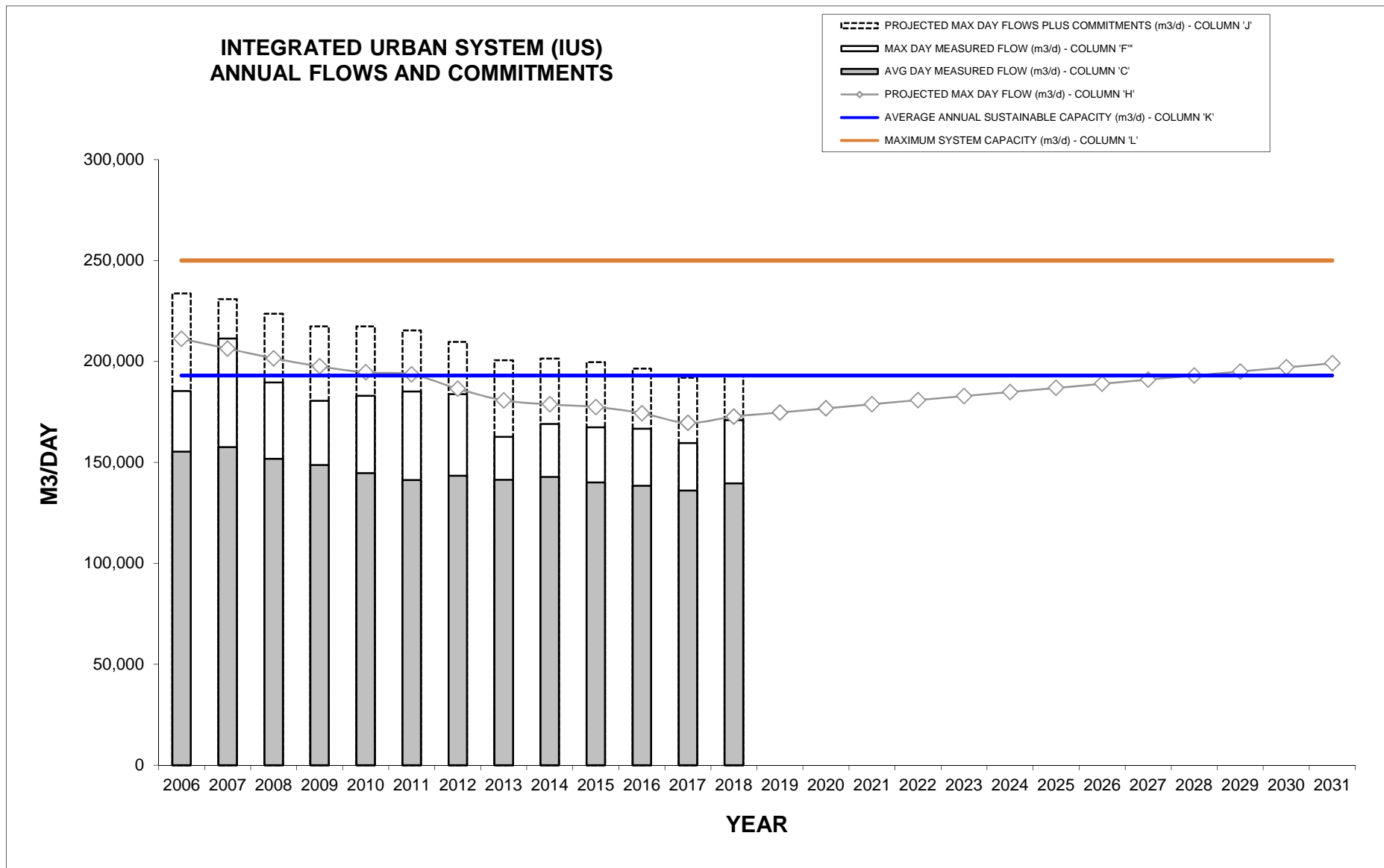
2019 WATER AND WASTEWATER MONITORING REPORT

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		
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	542,750	136,025	0.2664	144,611	159,602	0.3276	169,540	22,377	191,916	193,000	250,000	58,084	177,298
2018	529,729	559,025	139,550	0.2611	145,969	170,916	0.3260	172,666	20,306	192,971	193,000	250,000	57,029	174,961
2019	535,962	564,254		0.2611	147,334		0.3260	174,697			193,000	250,000		
2020	542,194	569,483		0.2611	148,700		0.3260	176,729			193,000	250,000		
2021	548,427	574,712		0.2611	150,065		0.3260	178,760			193,000	250,000		
2022	554,660	579,941		0.2611	151,431		0.3260	180,792			193,000	250,000		
2023	560,893	585,170		0.2611	152,796		0.3260	182,823			193,000	250,000		
2024	567,125	590,400		0.2611	154,161		0.3260	184,855			193,000	250,000		
2025	573,358	595,629		0.2611	155,527		0.3260	186,887			193,000	250,000		
2026	579,591	600,858		0.2611	156,892		0.3260	188,918			193,000	250,000		
2027	585,824	600,858		0.2611	156,892		0.3260	190,950			193,000	250,000		
2028	592,056	600,858		0.2611	156,892		0.3260	192,981			193,000	250,000		
2029	598,289	600,858		0.2611	156,892		0.3260	195,013			193,000	250,000		
2030	604,521	600,858		0.2611	156,892		0.3260	197,044			193,000	250,000		
2031	610,754	600,858		0.2611	156,892		0.3260	199,076			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'



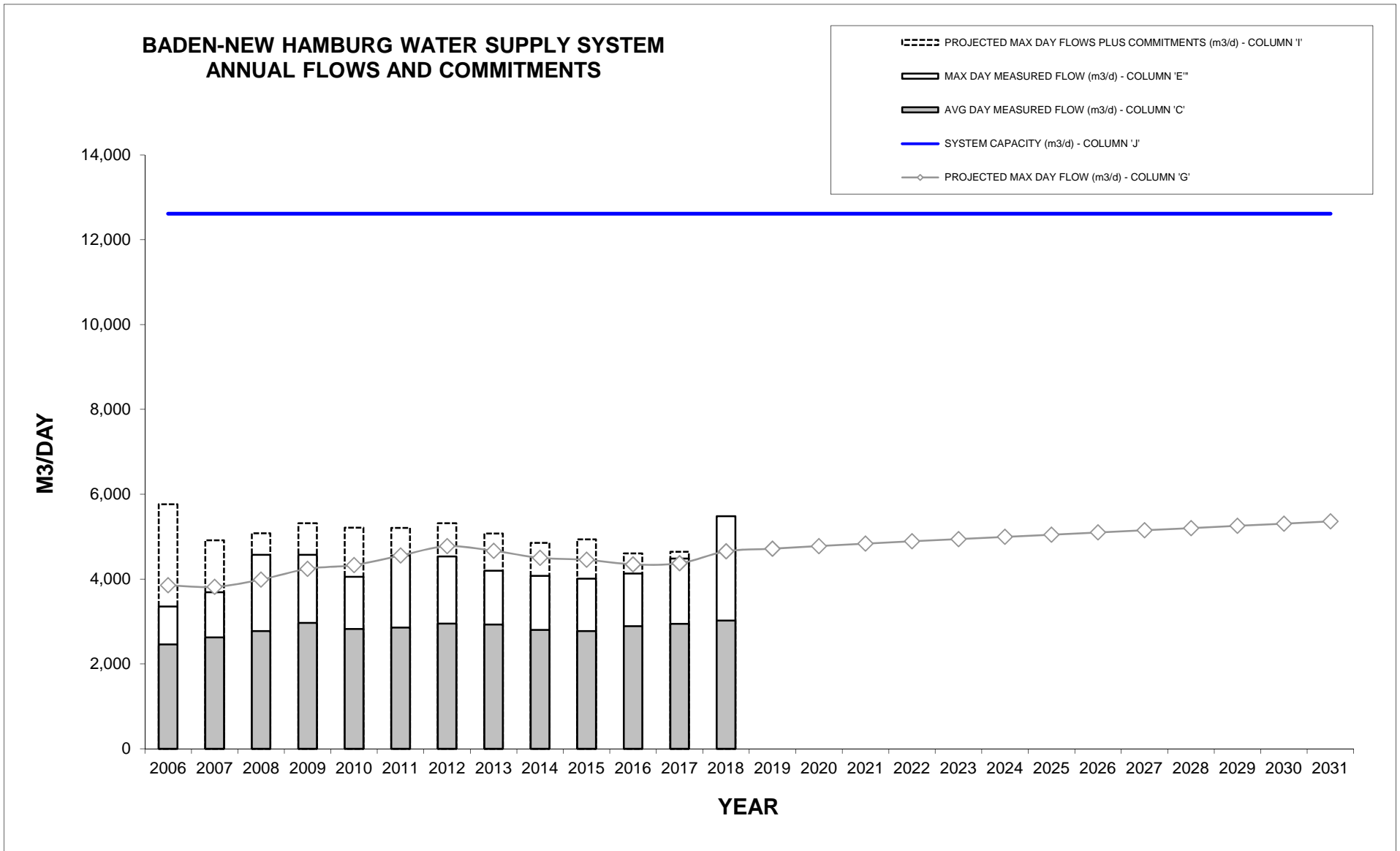
2019 WATER AND WASTEWATER MONITORING REPORT

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)					
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	13,974	2,943	0.2148	3,001	4,482	0.3128	4,372	273	4,645	12,614	7,969	25,473
2018	14,361	3,020	0.2114	3,035	5,480	0.3240	4,653	101	4,754	12,614	7,860	24,257
2019	14,551		0.2114	3,076		0.3240	4,715			12,614		
2020	14,740		0.2114	3,116		0.3240	4,776			12,614		
2021	14,930		0.2114	3,156		0.3240	4,837			12,614		
2022	15,091		0.2114	3,190		0.3240	4,890			12,614		
2023	15,252		0.2114	3,224		0.3240	4,942			12,614		
2024	15,412		0.2114	3,258		0.3240	4,994			12,614		
2025	15,573		0.2114	3,292		0.3240	5,046			12,614		
2026	15,734		0.2114	3,326		0.3240	5,098			12,614		
2027	15,895		0.2114	3,360		0.3240	5,150			12,614		
2028	16,055		0.2114	3,394		0.3240	5,202			12,614		
2029	16,216		0.2114	3,427		0.3240	5,254			12,614		
2030	16,376		0.2114	3,461		0.3240	5,306			12,614		
2031	16,537		0.2114	3,495		0.3240	5,358			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'



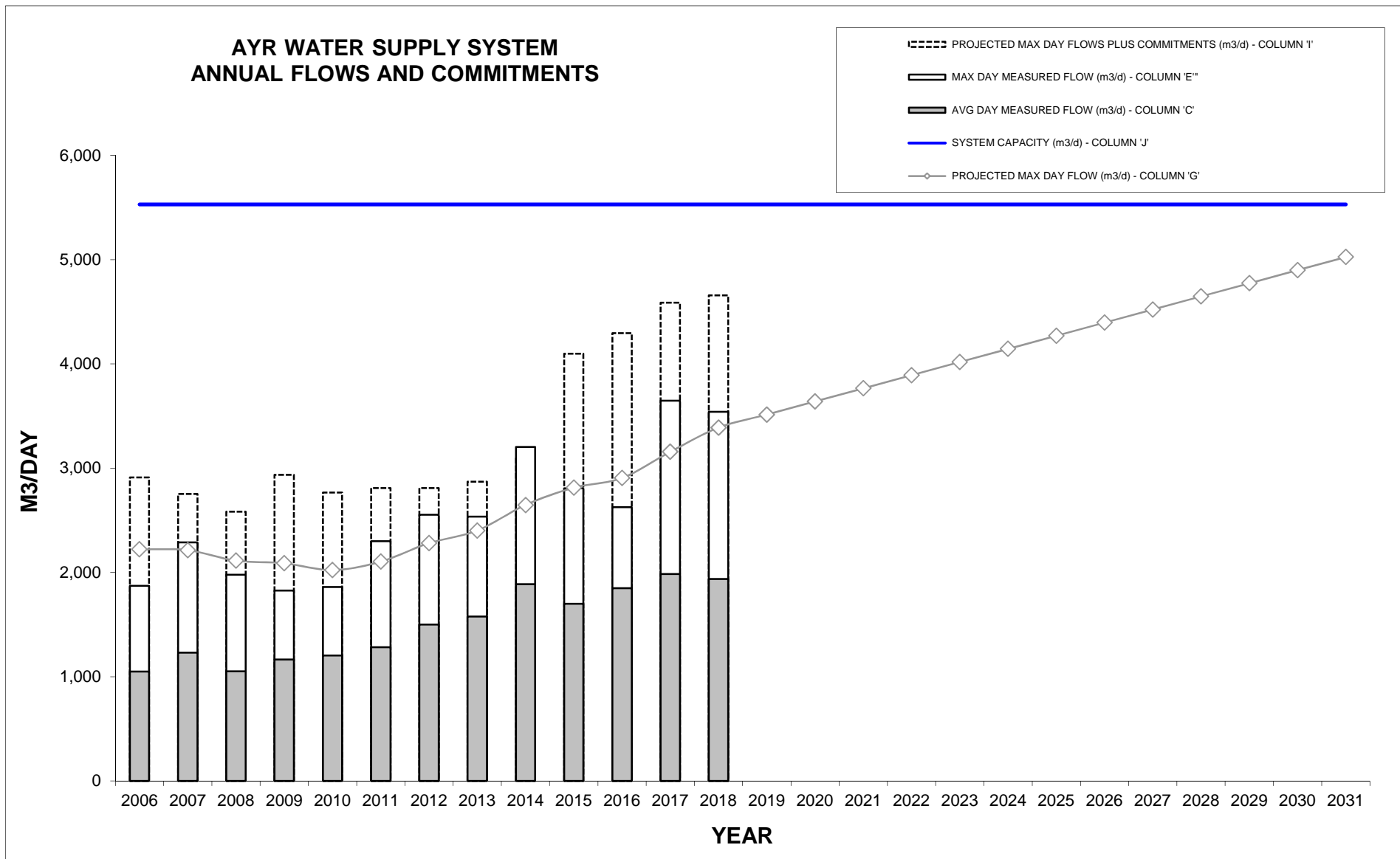
2019 WATER AND WASTEWATER MONITORING REPORT

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)					
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	5,391	1,985	0.3558	1,918	3,647	0.5856	3,157	1,430	4,587	5,530	943	1,611
2018	5,577	1,937	0.3600	2,008	3,540	0.6076	3,389	1,269	4,657	5,530	873	1,436
2019	5,784		0.3600	2,082		0.6076	3,514			5,530		
2020	5,991		0.3600	2,157		0.6076	3,640			5,530		
2021	6,198		0.3600	2,231		0.6076	3,766			5,530		
2022	6,405		0.3600	2,306		0.6076	3,892			5,530		
2023	6,613		0.3600	2,380		0.6076	4,018			5,530		
2024	6,820		0.3600	2,455		0.6076	4,144			5,530		
2025	7,028		0.3600	2,530		0.6076	4,270			5,530		
2026	7,235		0.3600	2,604		0.6076	4,396			5,530		
2027	7,442		0.3600	2,679		0.6076	4,522			5,530		
2028	7,649		0.3600	2,754		0.6076	4,648			5,530		
2029	7,857		0.3600	2,828		0.6076	4,774			5,530		
2030	8,064		0.3600	2,903		0.6076	4,900			5,530		
2031	8,271		0.3600	2,977		0.6076	5,026			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'



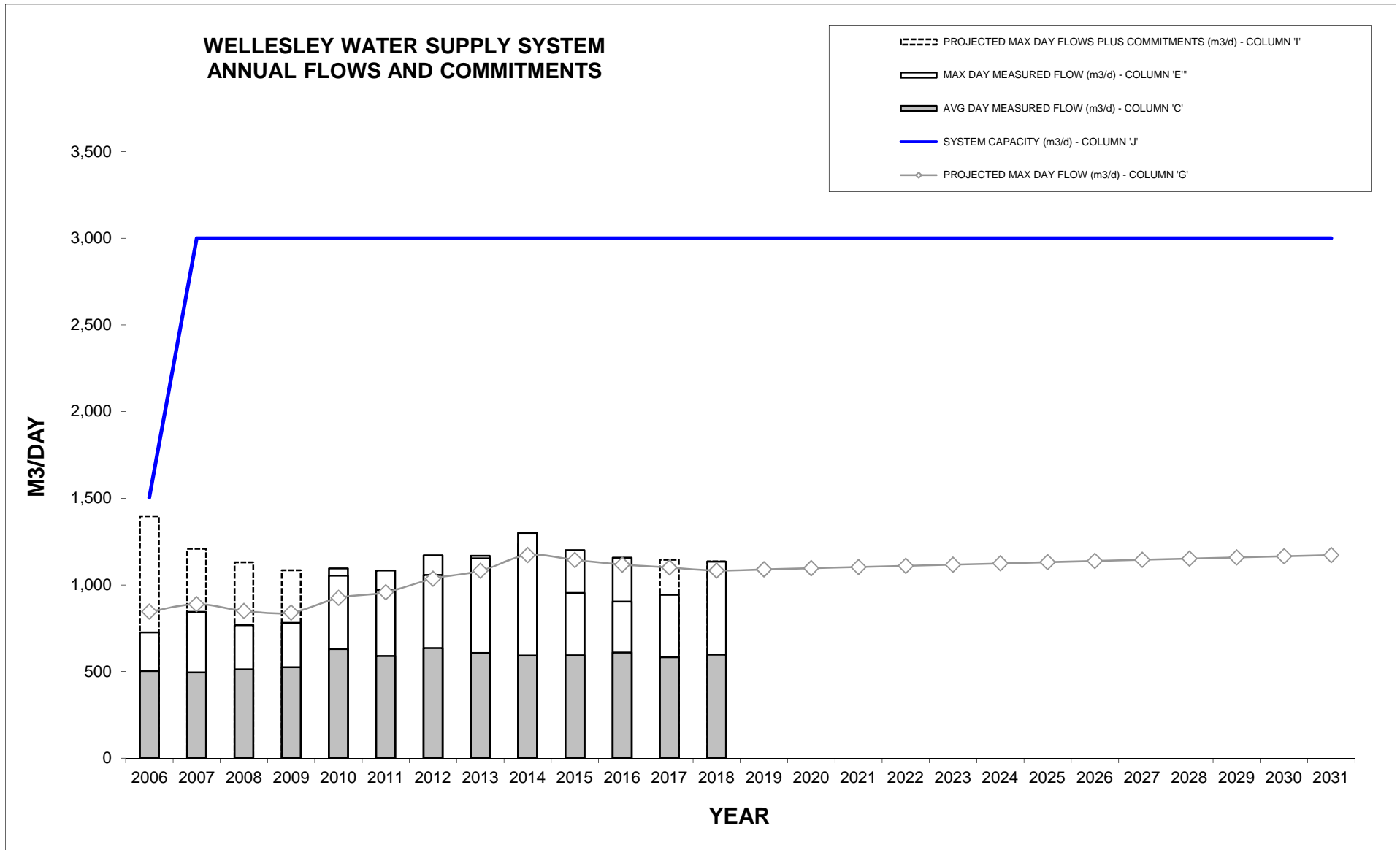
2019 WATER AND WASTEWATER MONITORING REPORT

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)					
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	3,472	583	0.1795	623	943	0.3169	1,100	45	1,146	3,000	1,854	5,852
2018	3,499	598	0.1757	615	1,134	0.3095	1,083	52	1,135	3,000	1,865	6,024
2019	3,521		0.1757	619		0.3095	1,090			3,000		
2020	3,543		0.1757	623		0.3095	1,097			3,000		
2021	3,565		0.1757	626		0.3095	1,103			3,000		
2022	3,587		0.1757	630		0.3095	1,110			3,000		
2023	3,609		0.1757	634		0.3095	1,117			3,000		
2024	3,632		0.1757	638		0.3095	1,124			3,000		
2025	3,654		0.1757	642		0.3095	1,131			3,000		
2026	3,676		0.1757	646		0.3095	1,138			3,000		
2027	3,698		0.1757	650		0.3095	1,145			3,000		
2028	3,720		0.1757	654		0.3095	1,152			3,000		
2029	3,743		0.1757	658		0.3095	1,158			3,000		
2030	3,765		0.1757	662		0.3095	1,165			3,000		
2031	3,787		0.1757	665		0.3095	1,172			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'



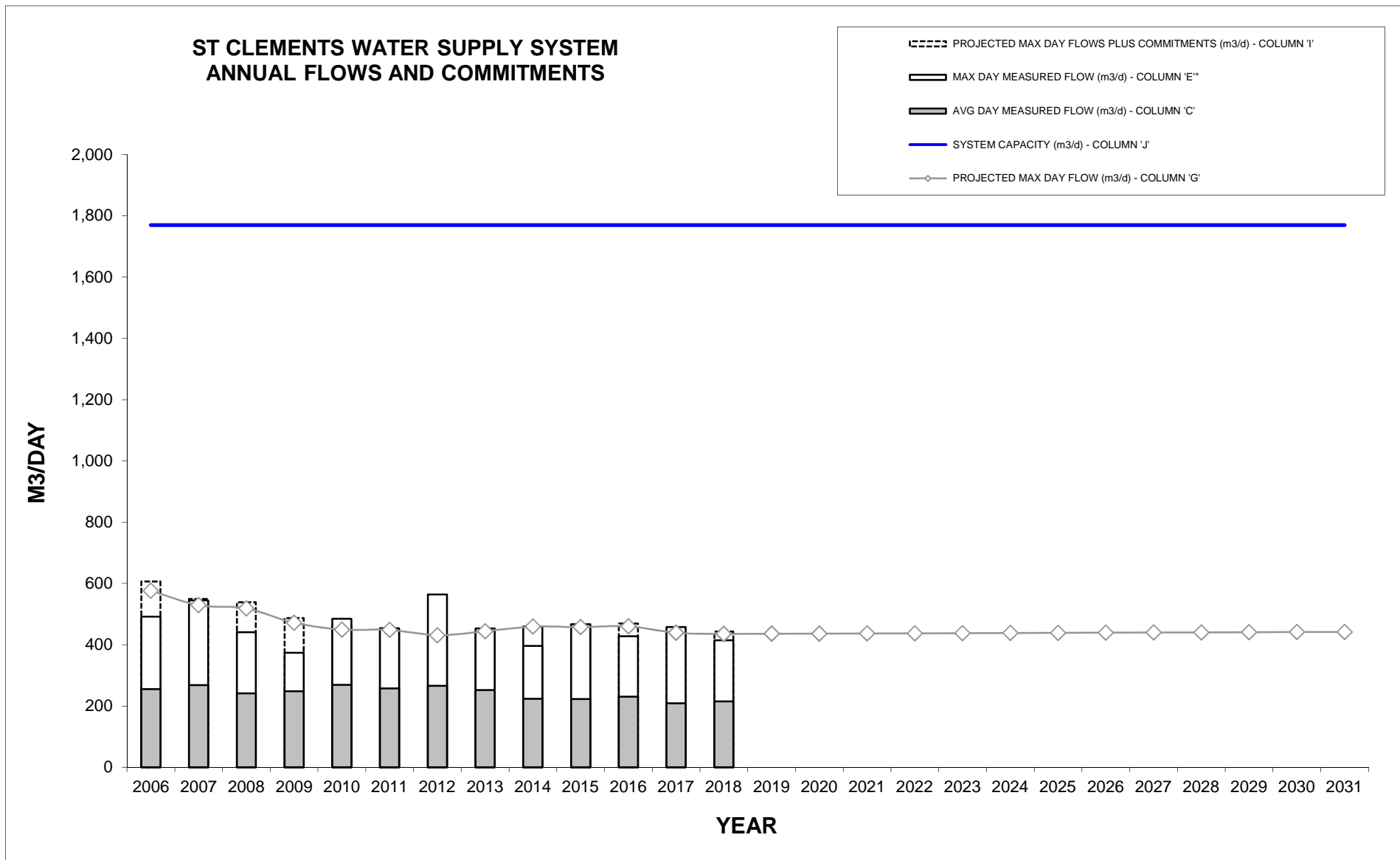
2019 WATER AND WASTEWATER MONITORING REPORT

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)					
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	1,255	209	0.1809	227	458	0.3500	439	9	448	1,770	1,322	3,776
2018	1,267	215	0.1749	222	415	0.3438	436	8	443	1,770	1,327	3,859
2019	1,268		0.1749	222		0.3438	436			1,770		
2020	1,270		0.1749	222		0.3438	436			1,770		
2021	1,271		0.1749	222		0.3438	437			1,770		
2022	1,272		0.1749	223		0.3438	437			1,770		
2023	1,274		0.1749	223		0.3438	438			1,770		
2024	1,275		0.1749	223		0.3438	438			1,770		
2025	1,277		0.1749	223		0.3438	439			1,770		
2026	1,278		0.1749	224		0.3438	439			1,770		
2027	1,280		0.1749	224		0.3438	440			1,770		
2028	1,281		0.1749	224		0.3438	440			1,770		
2029	1,283		0.1749	224		0.3438	441			1,770		
2030	1,284		0.1749	225		0.3438	442			1,770		
2031	1,286		0.1749	225		0.3438	442			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'



2019 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)			
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	-
2017	473	147	0.3137	148	344	0.8639	409	601	192	-
2018	482	151	0.3148	152	475	0.8775	423	601	178	-

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)			
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	-
2017	361	84	0.2137	77	266	0.5860	212	786	574	-
2018	361	148	0.2555	92	308	0.6466	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)			
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	-
2017	141	64	0.4338	61	88	0.7248	102	157	55	-
2018	141	62	0.4329	61	88	0.7066	100	157	57	-

WOOLWICH WATER SUPPLY SYSTEMS

2019 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)			
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	-
2017	143	32	0.2384	34	138	0.8316	119	820	701	-
2018	169	35	0.2225	38	210	0.8860	150	820	670	-

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)			
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	206	21	0.2108	43	96	0.5752	118	238	120	-
2018	206	10	0.1803	37	68	0.5438	112	238	126	-

WOOLWICH WATER SUPPLY SYSTEMS

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)			
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	-
2017	1,013	132	0.1414	143	310	0.2808	284	829	545	-
2018	1,013	136	0.1388	141	375	0.3036	308	829	521	-

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)			
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	781	246	0.2361	184	350	0.3541	277	605	328	-
2018	781	187	0.2450	191	270	0.3685	288	605	317	-

2019 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)			
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	-
2017	410	100	0.2351	96	180	0.3566	146	527	381	-
2018	410	97	0.2371	97	164	0.3760	154	527	373	-

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)			
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	1,049	197	0.1849	194	362	0.3731	391	983	592	-
2018	1,056	185	0.1854	196	377	0.3626	383	983	600	-

2019 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)			
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	-
2017	290	72	0.2456	71	125	0.5553	161	358	197	-
2018	290	75	0.2456	71	168	0.5553	161	358	197	-

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)			
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	-
2017	121	25	0.2868	35	71	0.7374	89	130	41	-
2018	121	25	0.2868	35	68	0.7374	89	130	41	-

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	2013	2014	2015	2016	2017	2018	2021	2026	2031
Galt S.A	83,610	84,267	84,612	84,752	85,369	86,716	90,531	96,890	103,249
Preston S.A	20,298	20,401	20,245	21,051	21,469	22,517	23,103	24,079	25,056
Hespeler S.A	25,397	25,568	25,561	25,604	25,699	25,991	26,242	26,659	27,077
Kitchener S.A	232,557	236,704	239,585	244,464	248,481	253,621	262,296	276,753	291,211
Waterloo S.A	132,925	135,142	137,368	141,574	145,381	153,271	155,163	158,316	161,469
Ayr S.A	4,872	4,982	5,087	5,086	5,339	5,524	6,158	7,214	8,271
Baden/New Hamburg S.A	12,689	12,963	13,245	13,469	13,657	14,043	14,696	15,616	16,537
Wellesley S.A	3,232	3,307	3,354	3,456	3,495	3,523	3,605	3,741	3,878
St. Jacobs S.A	1,873	1,878	1,935	1,935	1,930	1,933	2,104	2,389	2,674
Elmira S.A	9,911	10,011	10,191	10,439	10,788	10,962	12,186	14,227	16,268

Water Service Area	2013	2014	2015	2016	2017	2018	2021	2026	2031
Integrated Urban System	510,184	517,580	523,089	533,294	542,750	559,025	574,712	600,858	627,004
Baden/New Hamburg S.A	12,999	13,274	13,560	13,783	13,974	14,361	14,930	15,734	16,537
Ayr S.A	4,878	4,988	5,104	5,132	5,391	5,577	6,198	7,235	8,271
Wellesley S.A	3,213	3,286	3,332	3,433	3,472	3,499	3,565	3,676	3,787
St. Clements S.A	1,258	1,259	1,255	1,261	1,267	1,267	1,271	1,278	1,286

MID-YEAR POPULATION BY WATER SERVICE AREA

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

Water Service Area	2013	2014	2015	2016	2017	2018	2021	2026	2031
Integrated Urban System	491,229	497,561	501,862	511,287	519,307	529,729	548,427	579,591	610,754

YEAR-END POPULATION - SMALL WASTEWATER SYSTEMS

Wastewater Service Area	Total Population					
	2013	2014	2015	2016	2017	2018
Foxboro	417	415	413	410	410	410
Heidelberg	263	263	262	261	261	261
Conestoga Golf Course	252	250	249	247	247	256

YEAR-END POPULATION - SMALL WATER SYSTEMS

Water Service Area	Total Population					
	2013	2014	2015	2016	2017	2018
Heidelberg	1,039	1,031	1,023	1,013	1,013	1,013
Village Heights	139	140	142	143	143	169
Maryhill	143	143	142	141	141	141
Linwood	794	787	782	775	781	781
West Montrose	224	218	212	206	206	206
Branchton Meadows	115	117	119	121	121	121
Conestoga Plains	364	363	362	361	361	361
Conestoga Golf Course	479	476	477	473	473	482
Roseville	297	295	293	290	290	290
New Dundee	1,098	1,082	1,066	1,049	1,049	1,056
Foxboro	417	415	413	410	410	410

TABLE D-2

2018 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.	690	94	784
Preston S.A.	0	0	0
Hespeler S.A.	632	1,621	2,253
Kitchener S.A.	2,229	409	2,637
Waterloo S.A.	1,210	174	1,384
Ayr S.A.	58	49	107
Baden/New Hamburg S.A.	84	0	84
Wellesley S.A.	7	0	7
St. Jacobs S.A.	0	0	0
Elmira S.A.	466	3	469

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Integrated Urban System S.A.	7,133	2,301	9,434
Baden/New Hamburg S.A.	28	0	28
Ayr S.A.	10	0	10
Wellesley S.A.	10	0	10
St. Clements S.A**	0	0	0

TABLE D-3

2018 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.	794	4,665	5,458
Preston S.A.	2,638	3,754	6,391
Hespeler S.A.	6	0	6
Kitchener S.A.	12,243	24,988	37,231
Waterloo S.A.	3,806	2,650	6,456
Ayr S.A.	77	2,047	2,124
Baden/New Hamburg S.A.	483	0	483
Wellesley S.A.	182	55	237
St. Jacobs S.A.	176	464	640
Elmira S.A.	1,361	3,142	4,502

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision *	TOTAL
Integrated Urban System S.A.	13,155	39,707	52,863
Baden/New Hamburg S.A.	285	0	285
Ayr S.A.	31	2,047	2,078
Wellesley S.A.	103	55	159
St. Clements S.A**	23	0	23

** 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.

APPENDIX E

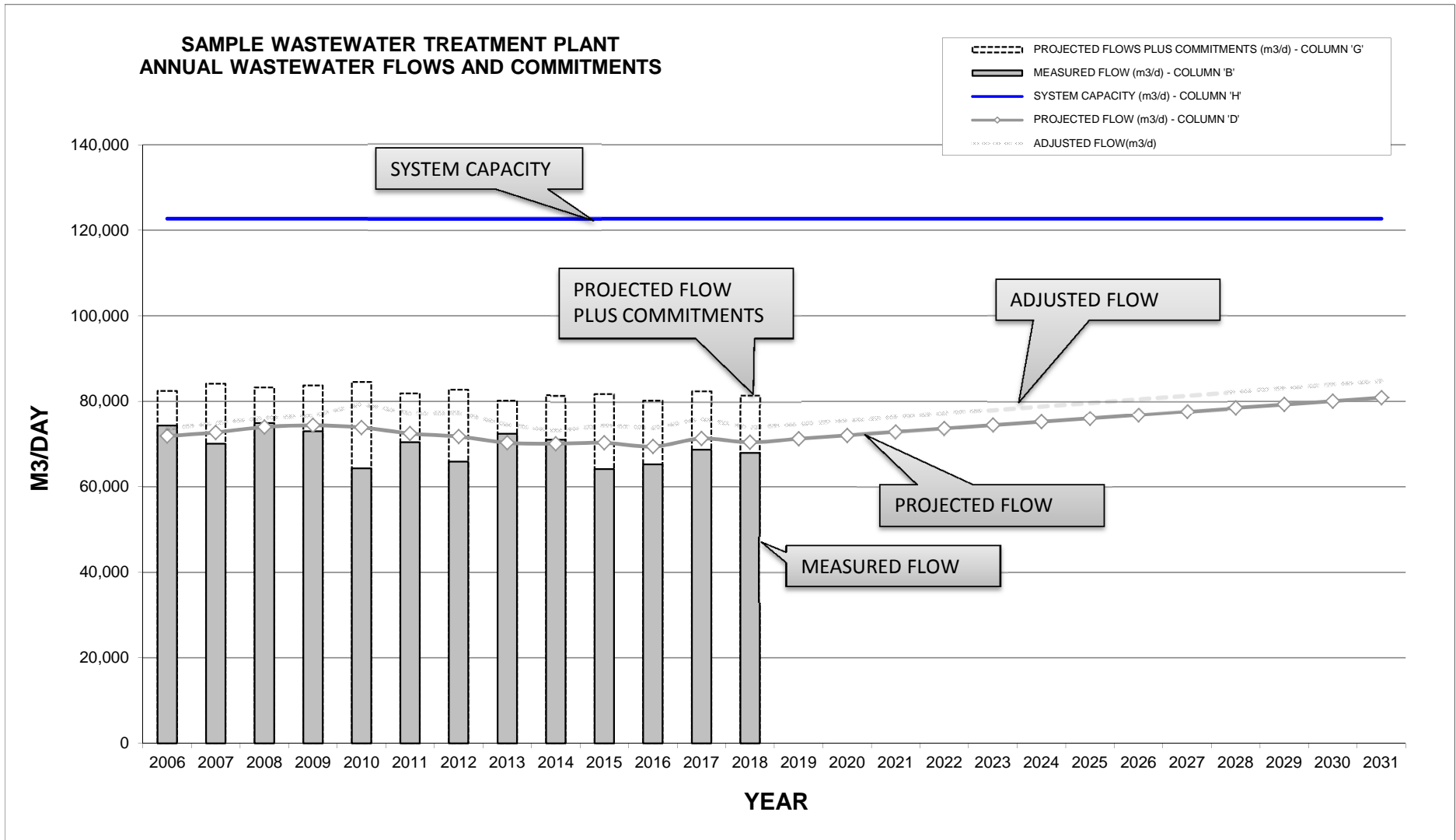
Sample Calculations

2019 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				
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	=D16 + E16 + F16	122,700	=H16 - G16	=I16 / C16
2017	A17	B17	C17	=A17 x C17	E17	F17	=D17 + E17 + F17	122,700	=H17 - G17	=I17 / C17
2018	A18		C18	=A18 x C18	E18	F18	=D18 + E18 + F18	122,700	=H18 - G18	=I18 / C18
2019	A19		C19	=A19 x C19				122,700		
2020	A20	Refer To Section 2.6 For More Information	C20	=A20 x C20				122,700		
2021	A21		C21	=A21 x C21				122,700		
2022	A22		C22	=A22 x C22				122,700		
2023	A23		C23	=A23 x C23				122,700		
2024	A24		C24	=A24 x C24				122,700		
2025	A25		C25	=A25 x C25				122,700		
2026	A26		C26	=A26 x C26				122,700		
2027	A27		C27	=A27 x C27				122,700		
2028	A28		C28	=A28 x C28				122,700		
2029	A29		C29	=A29 x C29				122,700		
2030	A30		C30	=A30 x C30				122,700		
2031	A31	C31	=A31 x C31				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)



2019 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)						
2006	A6	B6	C6	D6	=B6 x D6	F6	G6	=A6 x G6	I6	=H6 + I6	K6	=K6 - J6	=L6 / G6	
2007	A7	B7	C7	D7	=B7 x D7	F7	G7	=A7 x G7	I7	=H7 + I7	K7	=K7 - J7	=L7 / G7	
2008	A8	B8	C8	D8	=B8 x D8	F8	G8	=A8 x G8	I8	=H8 + I8	K8	=K8 - J8	=L8 / G8	
2009	A9	B9	Refer to Section 2.5 For More Information	D9	=B9 x D9	F9	G9	=A9 x G9	I9	=H9 + I9	K9	=K9 - J9	=L9 / G9	
2010	A10	B10		D10	=B10 x D10	F10	G10	=A10 x G10	I10	=H10 + I10	K10	=K10 - J10	=L10 / G10	
2011	A11	B11		D11	=B11 x D11	F11	G11	=A11 x G11	I11	=H11 + I11	K11	=K11 - J11	=L11 / G11	
2012	A12	B12		D12	=B12 x D12	F12	G12	=A12 x G12	I12	=H12 + I12	K12	=K12 - J12	=L12 / G12	
2013	A13	B13		D13	=B13 x D13	F13	G13	=A13 x G13	I13	=H13 + I13	K13	=K13 - J13	=L13 / G13	
2014	A14	B14		D14	=B14 x D14	F14	G14	=A14 x G14	I14	=H14 + I14	K14	=K14 - J14	=L14 / G14	
2015	A15	B15		D15	=B15 x D15	F15	G15	=A15 x G15	I15	=H15 + I15	K15	=K15 - J15	=L15 / G15	
2016	A16	B16		D16	=B16 x D16	F16	G16	=A16 x G16	I16	=H16 + I16	K16	=K16 - J16	=L16 / G16	
2017	A17	B17		D17	=B17 x D17	F17	G17	=A17 x G17	I17	=H17 + I17	K17	=K17 - J17	=L17 / G17	
2018	A18	B18		D18	=B18 x D18	F18	G18	=A18 x G18	I18	=H18 + I18	K18	=K18 - J18	=L18 / G18	
2019	A19	B19	D19	=B19 x D19	F19	G19	=A19 x G19	I19		K19				
2020	A20	B20	D20	=B20 x D20	F20	G20	=A20 x G20	I20		K20				
2021	A21	B21	D21	=B21 x D21	F21	G21	=A21 x G21	I21		K21				
2022	A22	B22	D22	=B22 x D22	F22	G22	=A22 x G22	I22		K22				
2023	A23	B23	D23	=B23 x D23	F23	G23	=A23 x G23	I23		K23				
2024	A24	B24	D24	=B24 x D24	F24	G24	=A24 x G24	I24		K24				
2025	A25	B25	D25	=B25 x D25	F25	G25	=A25 x G25	I25		K25				
2026	A26	B26	D26	=B26 x D26	F26	G26	=A26 x G26	I26		K26				
2027	A27	B27	D27	=B27 x D27	F27	G27	=A27 x G27	I27		K27				
2028	A28	B28	D28	=B28 x D28	F28	G28	=A28 x G28	I28		K28				
2029	A29	B29	D29	=B29 x D29	F29	G29	=A29 x G29	I29		K29				
2030	A30	B30	D30	=B30 x D30	F30	G30	=A30 x G30	I30		K30				
2031	A31	B31	D31	=B31 x D31	F31	G31	=A31 x G31	I31		K31				

*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'

