



Region of Waterloo

Water and Wastewater Monitoring Report September 2022

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 September 21, 2022

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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 2022 Water and Wastewater Monitoring Report (2022 WWWMR) 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 2036. 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 2021 Water and Wastewater Monitoring Report

The changes from the 2021 WWWMR are as follows:

- Population and development data, including building permits issued, have been updated to December 31, 2021.
- Water consumption patterns and wastewater flows are a function of yearly weather fluctuations. In 2021, the annual precipitation was 1021.5mm, compared to the average of 916.3mm, with the majority of the precipitation falling in the second half

of the year. As a result, seasonal impacts at the wastewater treatment plants resulted in slightly higher than average flows at the wastewater treatment plants that are susceptible to inflow from rain events, but generally average flows at the majority of plants. For water, the average day water consumption was aligned with the 5-year average in 2021 for all water systems, with an average measured maximum week/day in the IUS and smaller systems. While the billing records show a redistribution of where the water demand occurred, the overall water demand was not significantly impacted by the COVID 19 pandemic.

- The commitment tables in Appendix D have been updated to reflect year-end 2021 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 % of the estimated capacity of major planned service capacity projects or 75 % 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 2021 over 50 % 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 approval of A Place to Grow: Growth Plan for the Greater Golden Horseshoe, the Region of Waterloo is now required to provide for a minimum of 50 % of all residential development within the built-up area by the time the next Municipal Comprehensive Review is approved and in effect, and for each year after. Until the next municipal comprehensive review is approved and in effect (currently underway), the current ROP minimum of 45 % will apply.

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 August 2022. The Regional population estimate reflects year-end 2021, 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 under coverage (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 2021, and then the population for each service area was forecast consistent with the Water and Wastewater Master Plans. 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.

The forecasted population included in Appendix D are consistent with Schedule 3 A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019) and incorporate the adopted Regional Official Plan Amendment No. 6 to the Regional Official Plan. Any changes to the forecasts in the adopted ROP amendment will be considered in future monitoring reports. In order to maintain a forecast of at least ten years, the forecast horizon for this report is 2036.

2.4 Development Data

Development data for each service area, shown in Appendix D, was updated in June 2022 with subdivision plan status current to year-end 2021. 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 2021. 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 PPUs 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 WWWMR, 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 analyzed 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 WWWMRs. 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 1994 WWWMR 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 2021 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 Water Supply Master Plan (WSMP) was completed in 2015 which addressed a declining trend in water demands experienced in recent years, and addressed new constraints on groundwater usage arising from the provincial Clean Water Act and the outcome of recent studies triggered by this new legislation.

The 2015 WSMP addressed the needs for water supply arising from future development, and supported 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 2021 WWWMR. For the IUS, the 2015 WSMP 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.

An update to the WSMP has been initiated in 2022 and will outline the long-term water supply strategy for the Region. Recommendations from the updated master plan will be incorporated into future publications of the annual WWWMR.

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 MECF 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 2021 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 (C of A). 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)

Item	Amount
IUS Sustainable Average System Capacity	193,000 (m ³ /d)
IUS Maximum System Capacity	250,000 (m ³ /d)
Max Week Projected Demand	170,888 (m ³ /d)
Commitments	22,146 (m ³ /d)
Remaining Capacity	56,966 (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 4151513

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 inter-connections improve the capability of distributing water between the five communities.

Measured average day flow for 2021 was 139,950 m³/d, an increase of approximately 1% from 2020. Maximum week water use in 2021 for the IUS is reported as 168,942 m³/d, which is a decrease of approximately 6% from maximum week use in 2020. Max week consumption in 2021 was slightly below the 5-year average. The peaking factor between average day and maximum week in 2021 was 1.21. The 5-year average for maximum week projected demand is 1,205,848 m³/d. Maximum week water use is largely dependent on weather conditions. Dry conditions can cause much higher than average maximum week water consumption and wetter than usual conditions can cause a significant drop in water use during the peak usage period (i.e. late spring/early summer) and result in much lower than average maximum week consumption. In 2021, some prolonged dry periods during the early summer months resulted in a higher than average peak factor and maximum week demand.

Using the five-year average maximum week per capita demand of 0.3148 m³/c/d there is capacity to service approximately 181,000 additional people in the IUS as of December 31, 2021.

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 70,344 people. A summary of these commitments can be found in Appendix D.

An update to the Water Supply Master Plan has been initiated in 2022 and will outline the long-term water supply strategy for the Region. Recommendations from the updated master plan will be incorporated into future publications of the annual WWWMR.

3.1.2 Baden - New Hamburg Water System

Item	Amount
Baden New Hamburg System Capacity	12,614 (m ³ /d)
Max Day Projected Demand	5,322 (m ³ /d)
Commitments	18 (m ³ /d)
Remaining Capacity	7,274 (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 2021 was measured at 5,003 m³/d which is down 13% from 2020. The five-year average max day projected demand is 5,322 m³/d.

Using the five-year average max day per capita demand of 0.3640 m³/c/d, there is capacity to service approximately 20,000 additional people in Baden-New Hamburg water system as of December 31, 2021.

3.1.3 Ayr Water System

Item	Amount
Ayr System Capacity	5,530 (m ³ /d)
Max Day Projected Demand	2,613 (m ³ /d)
Commitments	1,717 (m ³ /d)
Remaining Capacity	1,200 (m ³ /d)

The firm capacity rating of the Ayr Water System is 5,530 m³/d. The 2021 Maximum Day water use in Ayr was recorded at 2,740 m³/d, which is a 5% decrease from 2020. The five-year average max day projected demand is 2,613 m³/d.

A review of the higher than average per capita rates was conducted for the Ayr system. It was concluded that the higher per capita rates are related to water loss due to service leaks due to poor construction material and backfilling techniques. Since 2015, the Region has been making significant investments to reduce water loss in Ayr including, but not limited to, individual meter replacements, various leak detection technologies, and installation of District Metered Areas. It is anticipated that with continued efforts in service leak detection, district metering, and proactive water service replacements, that this rate will continue to decline until it stabilizes near the industry standard rate of approximately 15%. When planning for growth, it was determined that it is reasonable to use a 20% reduced per capita rate for commitments in the Ayr water system, and continue to monitor and assess the per capita rate to be used in future monitoring reports.

Using the 20% reduced five-year average max day per capita demand of 0.4379 m³/c/d, there is capacity to service approximately 2,740 additional people in the Ayr Water System as of December 31, 2021. The present firm capacity could service a population of approximately 12,600 people.

3.1.4 Wellesley Water System

Item	Amount
Wellesley System Capacity	3,000 (m ³ /d)
Max Day Projected Demand	1,056 (m ³ /d)
Commitments	5 (m ³ /d)
Remaining Capacity	1,939 (m ³ /d)

The water supply system has a firm capacity of 3,000 m³/d. The 2021 Maximum Day demand in Wellesley was measured as 1,012 m³/d, which is a 6% decrease from 2020. The five-year average max day projected demand is 1,056 m³/d.

Using the five-year average per max day capita demand of 0.2906 m³/c/d, there is capacity to service approximately 6,700 additional people in the Wellesley Water System as of December 31, 2021. The present system capacity could service a population of approximately 10,500 people.

3.1.5 St. Clements Water System

Item	Amount
St. Clements System Capacity	1,770 (m ³ /d)
Max Day Projected Demand	486 (m ³ /d)
Commitments	8 (m ³ /d)
Remaining Capacity	1,276 (m ³ /d)

The water treatment plant has a firm capacity of 1,770 m³/d. The 2021 Maximum Day Demand in St. Clements was measured as 495 m³/d, which is down approximately 13% from 2020. The five-year average max day projected demand is 486 m³/d.

Using the five-year average per max per capita demand of 0.3952 m³/c/d, there is capacity to service approximately 3,200 additional people in the St. Clements Water System as of December 31, 2021. The present system capacity could service a population of approximately 4,500 people.

3.2 Wastewater

3.2.1 Kitchener Wastewater Treatment Plant (KWWTP)

Item	Amount
KWWTP Rated Capacity	122,700 (m ³ /d)
Average Projected Flow	69,977 (m ³ /d)
Commitments	10,364 (m ³ /d)
Remaining Capacity	42,360 (m ³ /d)

The KWWTP has a rated capacity of 122,700 m³/d. Average flow in 2021 was recorded at 65,039 m³/d which is a decrease of less than 1% from 2020. The five year Average Projected Flow is 69,977 m³/d.

Using the five year average flow per capita flow of 0.2602 m³/c/d, there is capacity to service approximately 163,000 additional people in the Kitchener Wastewater Service Area as of December 31, 2021. The present system capacity could service a population of approximately 471,000 people.

3.2.2 Waterloo Wastewater Treatment Plant (WWWTP)

Item	Amount
WWWTP Rated Capacity	57,500 (m ³ /d)
Average Projected Flow	41,427 (m ³ /d)
Commitments	1,949 (m ³ /d)
Remaining Capacity	14,124 (m ³ /d)

The WWWWTP 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 2021 at the WWWWTP was recorded at 40,584 m³/d, which is up 6% from 2020. The five year Average Projected Flow is 41,427 m³/d.

Using the five-year average per capita flow of 0.2726 m³/c/d, there is capacity to service approximately 52,000 additional people in the Waterloo Wastewater Service Area as of December 31, 2021. The expected rated capacity of 57,500 m³/d could service a population of approximately 211,000 people.

The projected flows plus committed flows at the Waterloo WWTP is approximately 75% 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)

Item	Amount
GWWTP Rated Capacity	56,800 (m ³ /d)
Average Projected Flow	28,131 (m ³ /d)
Commitments	3,785 (m ³ /d)
Remaining Capacity	24,885 (m ³ /d)

The rated capacity of the GWWTP is 56,800 m³/d. Flow at the GWWTP was recorded at 26,117 m³/d in 2021 which is down 4% from 2020. The five-year Average Projected Flow is 28,131 m³/d.

Using the five-year average per capita flow of 0.3143 m³/c/d, there is capacity to service approximately 79,000 additional people in the Galt Wastewater Service Area as of December 31, 2021. The present rated capacity could service a population of approximately 181,000 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)

Item	Amount
PWWTP Rated Capacity	16,820 (m ³ /d)
Average Projected Flow	9,620 (m ³ /d)
Commitments*	2,105 (m ³ /d)
Remaining Capacity	5,095 (m ³ /d)

*Includes 465 m³/d for Boxwood

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.

Flow in 2021 at the PWWTP was recorded at 8,802 m³/d which is down 2% from 2020 flows. The five-year Average Projected Flow is 9,620 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 75% of the developable area has been occupied for at least a year at the end of 2021. Therefore, the reserve capacity has been reduced to 25% of the original amount, and a reserve of 465 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 five-year average per capita flow of 0.3928 m³/c/d, there is capacity to service approximately 13,000 additional people in the Preston Wastewater Service Area as of December 31, 2021. The present rated capacity could service a population of approximately 43,000 people.

3.2.5 Hespeler Wastewater Treatment Plant (HWWTP)

Item	Amount
HWWTP Rated Capacity	9,320 (m ³ /d)
Average Projected Flow	6,285 (m ³ /d)
Commitments	506 (m ³ /d)
Remaining Capacity	2,529 (m ³ /d)

The HWWTP has a rated capacity of 9,320 m³/d. Flow at the HWWTP was recorded at 5,962 m³/d for 2021, which is down about 2% from 2020. The 5-year Average Projected Flow is 6,285 m³/d.

Using the five-year average per capita flow of 0.2419 m³/c/d, there is capacity to service approximately 10,500 additional people in the Hespeler Wastewater Service Area as of December 31, 2021. The present rated capacity of 9,320 m³/d could service a population of approximately 38,000 people.

3.2.6 Elmira Wastewater Treatment Plant (EWWTP)

Item	Amount
EWWTP Rated Capacity	7,800 (m ³ /d)
Average Projected Flow	3,991 (m ³ /d)
Commitments	1,710 (m ³ /d)
Remaining Capacity	2,099 (m ³ /d)

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.

Flows in 2021 at the EWWTP were recorded at 3,532 m³/d which is down approximately 2% from 2020. The five-year Average Projected Flow is 3,991 m³/d.

Using the five-year average per capita flow of 0.3507 m³/c/d, there is capacity to service approximately 6,000 additional people in the Elmira Wastewater Service Area as of December 31, 2021. The present rated capacity of 7,800 m³/d could service a population of approximately 22,200 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)

Item	Amount
SJWWTP Rated Capacity	1,450 (m ³ /d)
Average Projected Flow	938 (m ³ /d)
Commitments	226 (m ³ /d)
Remaining Capacity	286 (m ³ /d)

The hydraulic capacity of the SJWWTP is 1,450 m³/d. Flows in 2021 were recorded at 883 m³/d which is up approximately 4% from 2020. The five-year Average Projected Flow is 938 m³/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 five-year average per capita flow of 0.4603 m³/c/d, there is capacity to service approximately 620 additional people in the St. Jacobs Wastewater Service Area as of December 31, 2021. The present rated capacity of 1,450 m³/d could service a population of approximately 3,200 people.

3.2.8 Baden/New Hamburg WWTP (BNHWWTP)

Item	Amount
BNHWWTP Rated Capacity	6,900 (m ³ /d)
Average Projected Flow	3,973 (m ³ /d)
Commitments	13 (m ³ /d)
Remaining Capacity	2,914 (m ³ /d)

The BNHWWTP has been recently upgraded and the rated operating capacity has been increased from 5,200 m³/d to 6,900 m³/d. The plant receives flows from Baden and New Hamburg. Flow in 2021 was recorded at 3,718 m³/d which is down less than 1% from 2020. The 5-year Average Projected Flow is 3,973 m³/d. I & I are the expected causes of varied flows from year to year.

Using the 5-year average per capita flow of 0.2741 m³/c/d, there is capacity to service approximately 10,600 additional people in the Baden/New Hamburg Wastewater Service Area as of December 31, 2021. The present rated capacity of 6,900 m³/d could service a population of approximately 25,000 people.

3.2.9 Ayr Wastewater Treatment Plant (AWWTP)

Item	Amount
AWWTP Rated Capacity	3,000 (m ³ /d)
Average Projected Flow	1,472 (m ³ /d)
Commitments	977 (m ³ /d)
Remaining Capacity	551 (m ³ /d)

The AWWTP has a rated capacity of 3,000 m³/d. Historically there was an agreement between the Township of North Dumfries and the Schneider's processing plant in Ayr that grants Schneider's the option of connecting to the municipal wastewater system. A flow of 154 m³/d had previously been included in the commitments to AWWTP. However, due to the plant's closure in 2013, this capacity is no longer required and the commitment of 154 m³/d has been eliminated. Flow at the AWWTP in 2021 was recorded at 1,571 m³/d which is up about 13% from 2019. The 5-year Average Projected Flow is 1,472 m³/d.

A significant groundwater leak into the sanitary collection system was observed in 2021.

Repairs were completed in the summer of 2022. It is estimated that the leak contributed approximately 430 m³/d, or 25% of the recorded flow. It is expected that the recorded flow at the plant will be reduced in future years based on the successful repair.

Using the 5-year average per capita flow of 0.2490 m³/c/d, there is capacity to service approximately 2,200 additional people in the Ayr Wastewater Service Area as of December 31, 2021. The present rated capacity of 3,000 m³/d could service a population of approximately 12,000 people.

3.2.10 Wellesley Wastewater Treatment (WEWWTP)

Item	Amount
WEWWTP Rated Capacity	1,100 (m ³ /d)
Average Projected Flow	886 (m ³ /d)
Commitments	3 (m ³ /d)
Remaining Capacity	210 (m ³ /d)

The WEWWTP has a rated capacity of 1,100 m³/d. Flow in 2021 at the WEWWTP was measured at 903 m³/d which is up 5% from the previous year. The 5-year Average Projected Flow is 886 m³/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 0.2424 m³/c/d, there is capacity to service approximately 870 additional people in the Wellesley Wastewater Service Area as of December 31, 2021. 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, Maryhill, Maryhill Village Heights in Woolwich. Water supply capacity was adequate to meet the actual maximum demands in all communities

supplied by a Regional system in 2021.

In 2011, the community of St. Agatha was connected to the IUS and the wells in St. Agatha were decommissioned.

In 2018 the community of West Montrose was connected to the Conestogo Plains system. In 2019, the combined Conestogo Plains and West Montrose system was connected to the IUS. In late 2021, the Conestogo Golf Course system was also connected to the IUS. In the 2022 WWWMR, these water systems are included in the reporting for the IUS.

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 with which the Region has an agreement or option to eventually operate. Should the Region assume ownership and operate this system, it will be reported on in the WWWMR.

4.0 Summary of Service Area Assessments

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

TABLE 1: REMAINING WATER AND WASTEWATER CAPACITY AS OF DECEMBER 31, 2021

	A	B	C	D = A - (B+C)	E	F = D / E * 1000	
	2021 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	170.89	22.15	56.97	0.3148	180,944
	BADEN-NEW HAMBURG	12.61	5.32	0.02	7.27	0.3640	19,983
	AYR WATER SYSTEM (H)	5.53	2.61	1.72	1.20	0.4379	2,741
	WELLESLEY	3.00	1.06	0.00	1.94	0.2906	6,673
	ST. CLEMENTS	1.77	0.49	0.01	1.28	0.3952	3,228

	A	B	C	D = A - (B+C)	E	F = D / E * 1000	
	2021 CAPACITY (1000 m ³ /d)	AVERAGE PROJECTED FLOW (1000 m ³ /d)	COMMITTED FLOW (1000 m ³ /d)	REMAINING CAPACITY (1000 m ³ /d)	AVERAGE FLOWS PER CAPITA (m ³ /d/c)	REMAINING CAPACITY (PEOPLE)	
WASTEWATER	KITCHENER WWTP	122.70	69.98	10.36	42.36	0.2602	162,803
	WATERLOO WWTP	57.50	41.43	1.95	14.12	0.2726	51,803
	GALT WWTP	56.80	28.13	3.78	24.88	0.3143	79,168
	PRESTON WWTP	16.82	9.62	2.10	5.09	0.3928	12,970
	HESPELER WWTP	9.32	6.28	0.51	2.53	0.2419	10,457
	ELMIRA WWTP	7.80	3.99	1.71	2.10	0.3507	5,986
	BADEN-NEW HAMBURG WWTP	6.90	3.97	0.01	2.91	0.2741	10,631
	AYR WWTP	3.00	1.47	0.98	0.55	0.2490	2,214
	ST. JACOBS WWTP	1.45	0.94	0.23	0.29	0.4603	622
	WELLESLEY WWTP	1.10	0.89	0.00	0.21	0.2424	868

TABLE 2: SMALL RURAL WATER SYSTEM SUMMARY AS OF DECEMBER 31, 2021

	A	B	C	D = A - B	E	F
	2021 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	-	-	-	-	-
	CONESTOGO PLAINS (G)	-	-	-	-	-
	MARY HILL	157	90	N/A	67	Case by Case
	MARY HILL VILLAGE HEIGHTS	820	209	N/A	611	Case by Case
	WEST MONTROSE (G)	-	-	-	-	-
WEL	HEIDELBERG	829	319	N/A	510	Case by Case
	LINWOOD	605	293	N/A	312	Case by Case
WIL	FOXBORO	527	161	N/A	366	Case by Case
	NEW DUNDEE	983	403	N/A	580	Case by Case
ND	ROSEVILLE	358	156	N/A	202	Case by Case
	BRANCHTON	130	73	N/A	57	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. New service requests in the small rural systems will be evaluated on a case by case basis.
 (G) Conestogo Golf Course, Conestogo Plains, and West Montrose are fully connected to the IUS and are no longer tracked in the small rural systems.
 (H) More information on apparent low remaining capacity in the Ayr Water System capacity can be found on Section 3.1.3 of the 2021 Water and Wastewater Monitoring Report.

TABLE 3: COMMITMENTS AS OF DECEMBER 31, 2021

	A			B	C = A x B			
	COMMITMENTS (PEOPLE)			MAX DAY / WEEK FLOWS PER CAPITA (m ³ /d/c)	COMMITMENTS (m ³ /d)			
	DGA	BUA	TOTAL		DGA	BUA	TOTAL	
WATER	INTEGRATED URBAN WATER SYSTEM	52,432	17,912	70,344	0.3148	16,507	5,639	22,146
	BADEN-NEW HAMBURG	13	37	50	0.3640	5	13	18
	AYR WATER SYSTEM	3,902	19	3,921	0.4379	1,709	8	1,717
	WELLESLEY	6	10	16	0.2906	2	3	5
	ST. CLEMENTS	20	0	20	0.3952	8	0	8

	A			B	C = A x B			
	COMMITMENTS (PEOPLE)			AVERAGE FLOWS PER CAPITA (m ³ /d/c)	COMMITMENTS (m ³ /d)			
	DGA	BUA	TOTAL		DGA	BUA	TOTAL	
WASTEWATER	KITCHENER WWTP	30,283	9,549	39,832	0.2602	7,879	2,485	10,364
	WATERLOO WWTP	2,572	4,578	7,150	0.2726	701	1,248	1,949
	GALT WWTP	8,406	3,634	12,040	0.3143	2,642	1,142	3,785
	PRESTON WWTP*	4,092	82	4,174	0.3928	2,072	32	2,105
	HESPELER WWTP	1,930	161	2,091	0.2419	467	39	506
	ELMIRA WWTP	4,860	16	4,876	0.3507	1,704	6	1,710
	BADEN-NEW HAMBURG WWTP	10	37	47	0.2741	3	10	13
	AYR WWTP	3,902	19	3,921	0.2490	972	5	976
	ST. JACOBS WWTP	490	0	490	0.4603	226	0	226
	WELLESLEY WWTP	6	10	16	0.2424	1	2	4

(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 465 m³/day for the Boxwood Industrial Subdivision

Appendix A

Glossary

Item	Information
Average Day	The volume of water used in a service area in the year divided by the number of days in the year.
Built-Up Area (BUA)	<p>The limits of the developed portions of the Urban Area and Township Urban Areas designations as defined by the Province in accordance with the provisions of the Growth Plan for the Greater Golden Horseshoe.</p> <p>Referred to as the “Built Boundary” in the Regional Official Plan.</p>
Commitments	<p>The population or flow expected from known development applications and building permit activity.</p> <p>Expressed as Population – the calculated population increase from known development applications which the Region has a legal commitment to servicing including:</p> <ul style="list-style-type: none">Dwelling units for which building permits have been issued but are not yet believed to be occupied, and not included in population estimates;Unbuilt dwelling units in Registered PlansUnits in Draft Approved Plans, except plans having a special clause in the draft agreement that specifically stipulates that draft approval does not constitute a legal commitment to either water or wastewater servicing. <p>Expressed as Flow – the calculated population from known development plans multiplied by the Per Capita Flow.</p>
Designated Greenfield Area (DGA)	The limits of the undeveloped portions of the Urban Area and Township Urban Areas designations as defined by the Province in accordance with the provisions of the Growth Plan for the Greater Golden Horseshoe.

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Item	Information
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	<p>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:</p> <ol style="list-style-type: none"> 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. <p>A useable water supply must as a minimum meet the MECP Standards for Drinking Water.</p>
Inflow and Infiltration (I&I)	<p>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:</p> <ol style="list-style-type: none"> 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.
MECP	Ministry of Environment Conservation and Parks. Formerly Ministry of Environment and Climate Change (MOECC), and formerly Ministry of the Environment (MOE).
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.

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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

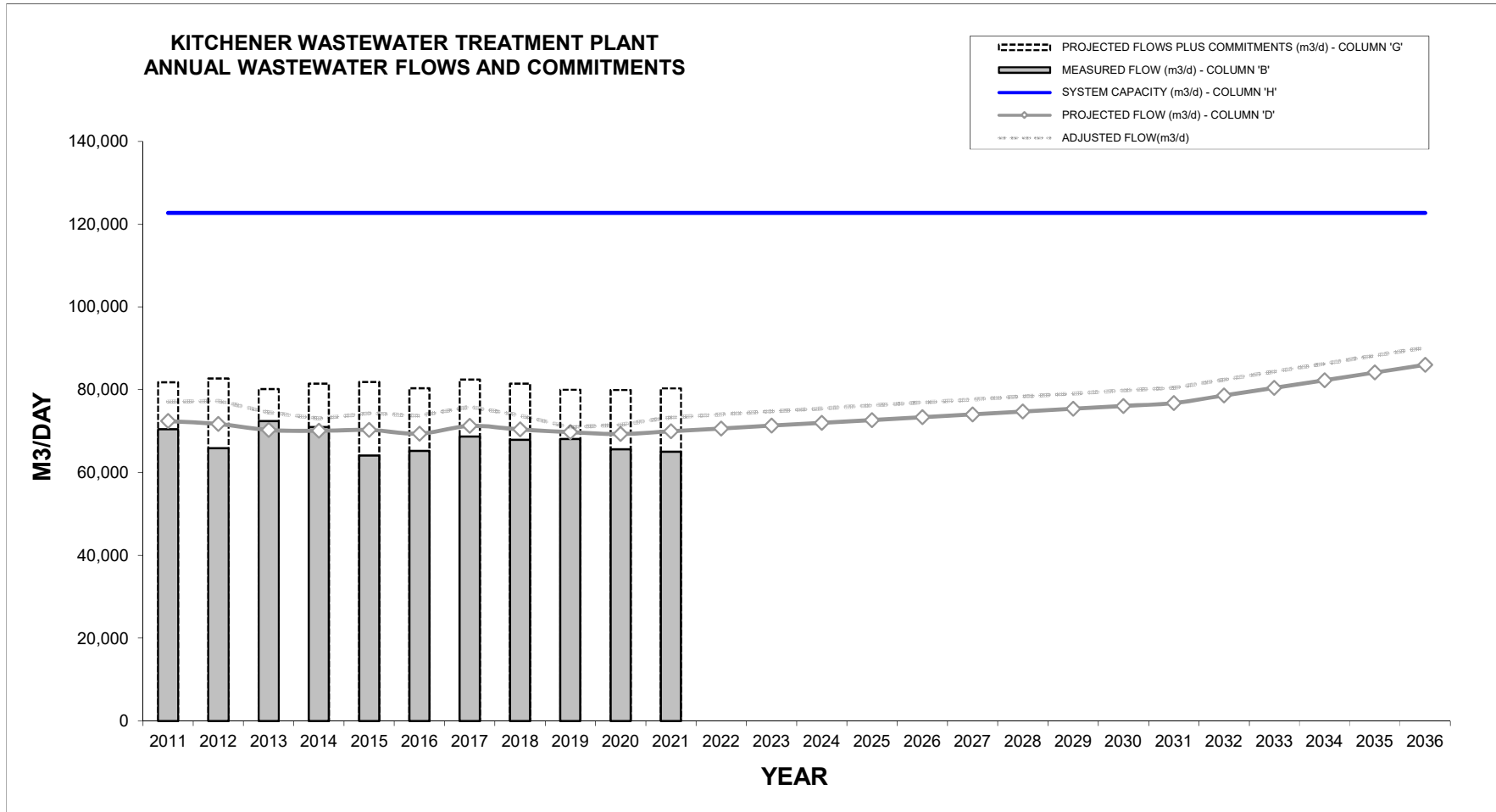
Wastewater Charts and Data

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				
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	258,675	68,080	0.2697	69,769	8,253	1,995	80,016	122,700	42,684	158,255
2020	260,556	65,604	0.2660	69,320	7,591	3,037	79,948	122,700	42,752	160,695
2021	268,944	65,039	0.2602	69,977	7,879	2,485	80,340	122,700	42,360	162,803
2022	271,560		0.2602	70,657				122,700		
2023	274,176		0.2602	71,338				122,700		
2024	276,793		0.2602	72,019				122,700		
2025	279,409		0.2602	72,699				122,700		
2026	282,025		0.2602	73,380				122,700		
2027	284,641		0.2602	74,061				122,700		
2028	287,257		0.2602	74,741				122,700		
2029	289,873		0.2602	75,422				122,700		
2030	292,489		0.2602	76,103				122,700		
2031	295,105		0.2602	76,783				122,700		
2032	302,205		0.2602	78,631				122,700		
2033	309,305		0.2602	80,478				122,700		
2034	316,406		0.2602	82,326				122,700		
2035	323,506		0.2602	84,173				122,700		
2036	330,606		0.2602	86,020				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)

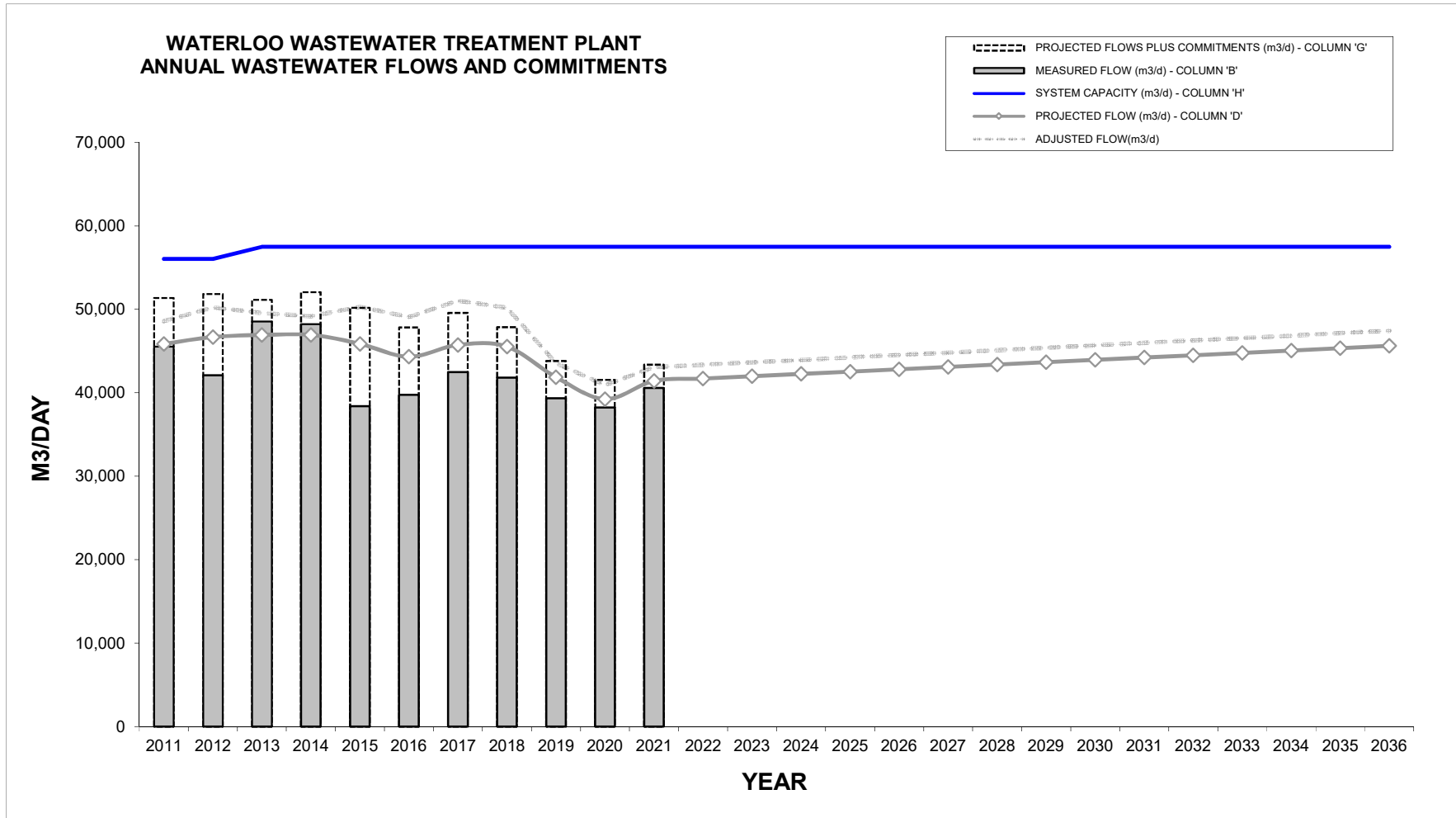


WATERLOO WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	150,283	39,331	0.2787	41,877	1,047	896	43,820	57,500	13,680	49,094
2020	141,902	38,242	0.2766	39,256	998	1,304	41,558	57,500	15,942	57,628
2021	151,945	40,584	0.2726	41,427	701	1,248	43,376	57,500	14,124	51,803
2022	152,974		0.2726	41,707				57,500		
2023	154,003		0.2726	41,988				57,500		
2024	155,033		0.2726	42,269				57,500		
2025	156,062		0.2726	42,549				57,500		
2026	157,091		0.2726	42,830				57,500		
2027	158,120		0.2726	43,110				57,500		
2028	159,150		0.2726	43,391				57,500		
2029	160,179		0.2726	43,672				57,500		
2030	161,209		0.2726	43,952				57,500		
2031	162,238		0.2726	44,233				57,500		
2032	163,267		0.2726	44,514				57,500		
2033	164,296		0.2726	44,794				57,500		
2034	165,326		0.2726	45,075				57,500		
2035	166,355		0.2726	45,355				57,500		
2036	167,384		0.2726	45,636				57,500		

*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)

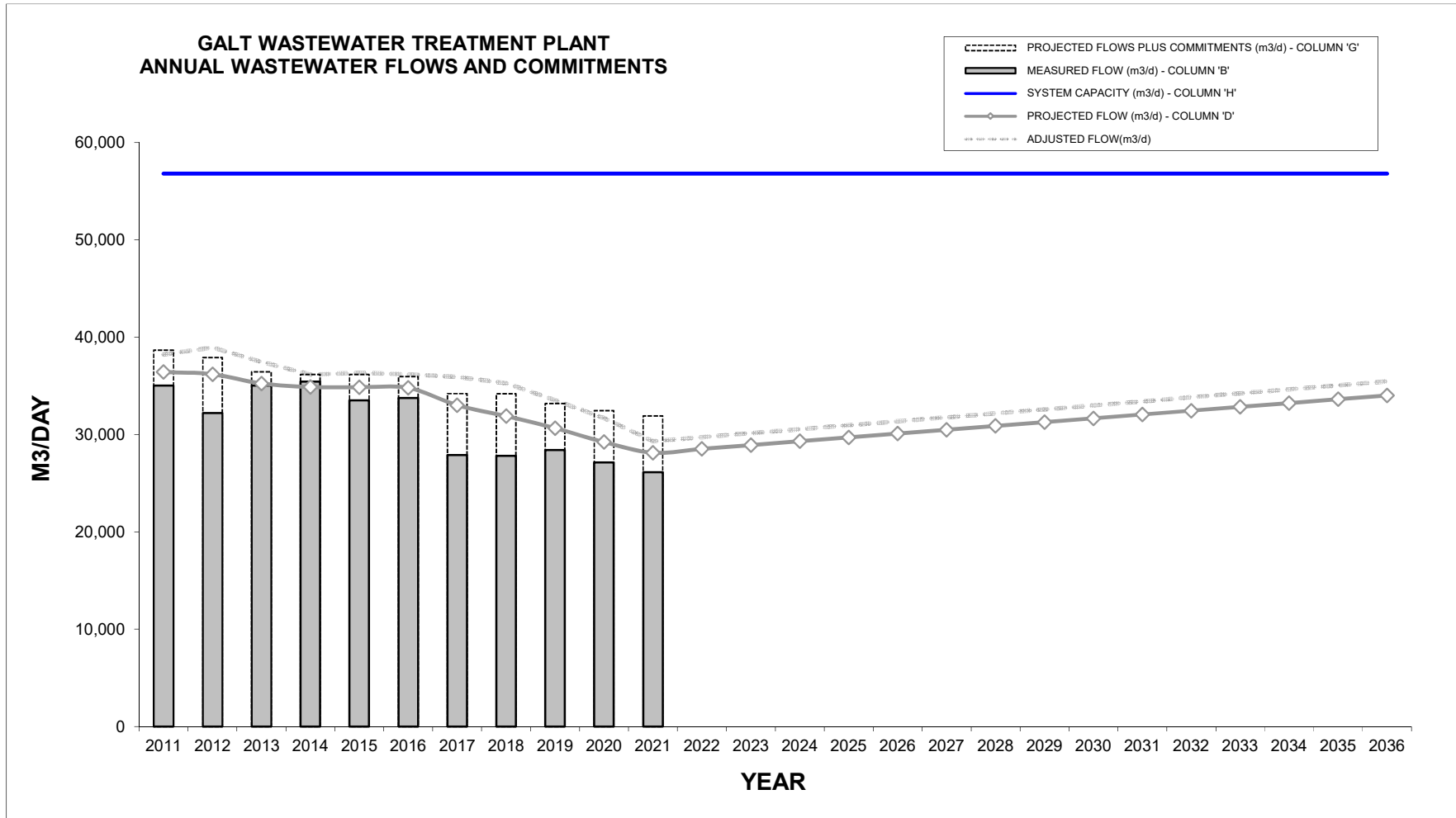


2022 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

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)			
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	87,814	28,396	0.3492	30,661	2,161	368	33,191	56,800	23,609	67,618
2020	87,748	27,124	0.3331	29,229	2,310	908	32,448	56,800	24,352	73,108
2021	89,493	26,117	0.3143	28,131	2,642	1,142	31,915	56,800	24,885	79,168
2022	90,744		0.3143	28,524				56,800		
2023	91,994		0.3143	28,917				56,800		
2024	93,245		0.3143	29,310				56,800		
2025	94,495		0.3143	29,703				56,800		
2026	95,746		0.3143	30,096				56,800		
2027	96,996		0.3143	30,489				56,800		
2028	98,247		0.3143	30,882				56,800		
2029	99,497		0.3143	31,275				56,800		
2030	100,748		0.3143	31,668				56,800		
2031	101,998		0.3143	32,061				56,800		
2032	103,249		0.3143	32,454				56,800		
2033	104,499		0.3143	32,847				56,800		
2034	105,750		0.3143	33,241				56,800		
2035	107,000		0.3143	33,634				56,800		
2036	108,251		0.3143	34,027				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)



2022 WATER AND WASTEWATER MONITORING REPORT

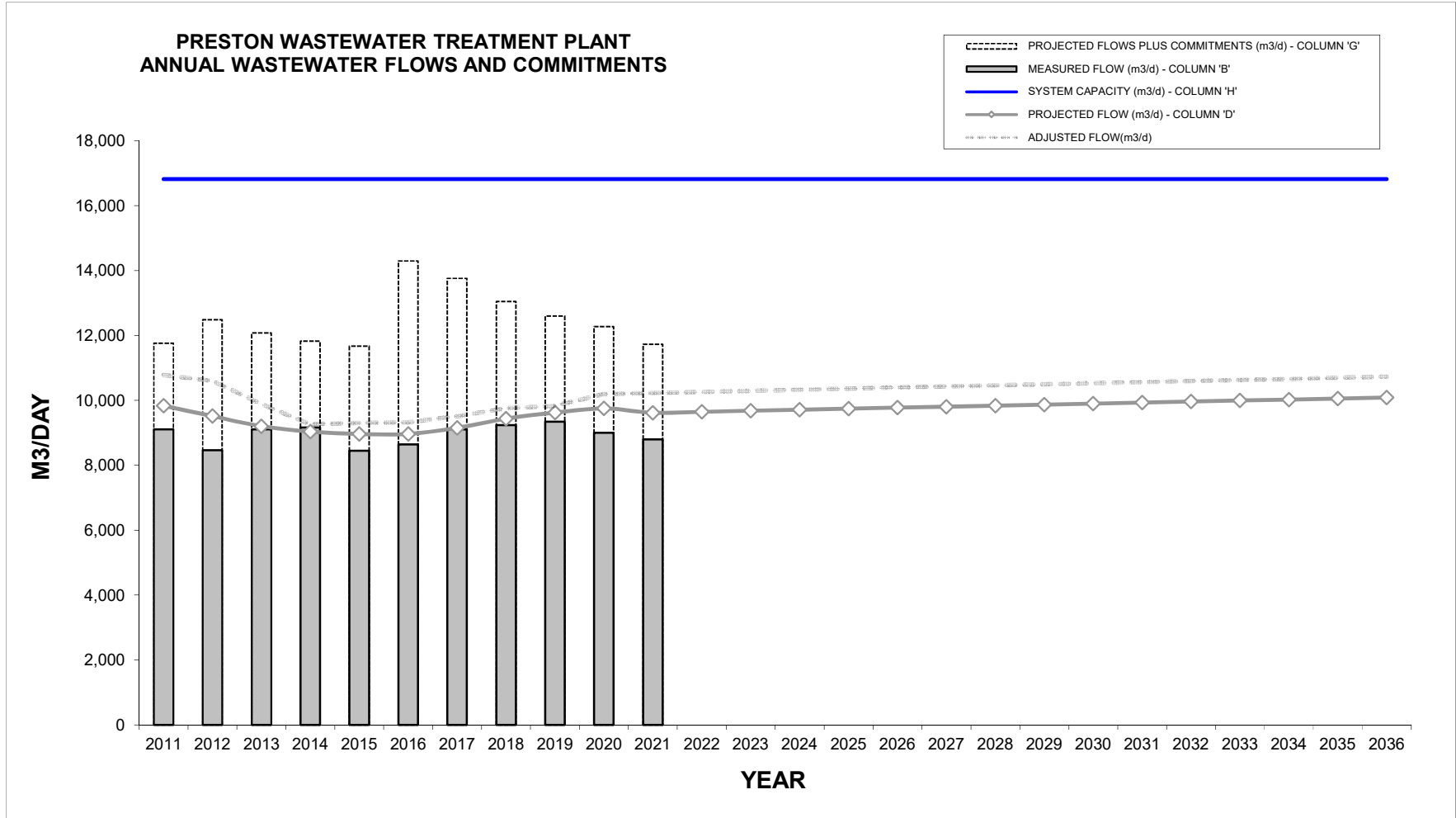
APPENDIX - B WASTEWATER TABLES AND CHARTS

PRESTON WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (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				
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	23,466	9,342	0.4101	9,624	2,863	116	12,603	16,820	4,217	10,283
2020	24,209	9,005	0.4030	9,755	2,472	50	12,278	16,820	4,542	11,273
2021	24,491	8,802	0.3928	9,620	2,072	32	11,725	16,820	5,095	12,970
2022	24,571		0.3928	9,652				16,820		
2023	24,651		0.3928	9,683				16,820		
2024	24,731		0.3928	9,715				16,820		
2025	24,811		0.3928	9,746				16,820		
2026	24,891		0.3928	9,778				16,820		
2027	24,971		0.3928	9,809				16,820		
2028	25,051		0.3928	9,841				16,820		
2029	25,132		0.3928	9,872				16,820		
2030	25,212		0.3928	9,904				16,820		
2031	25,292		0.3928	9,935				16,820		
2032	25,372		0.3928	9,967				16,820		
2033	25,452		0.3928	9,998				16,820		
2034	25,532		0.3928	10,029				16,820		
2035	25,612		0.3928	10,061				16,820		
2036	25,692		0.3928	10,092				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)

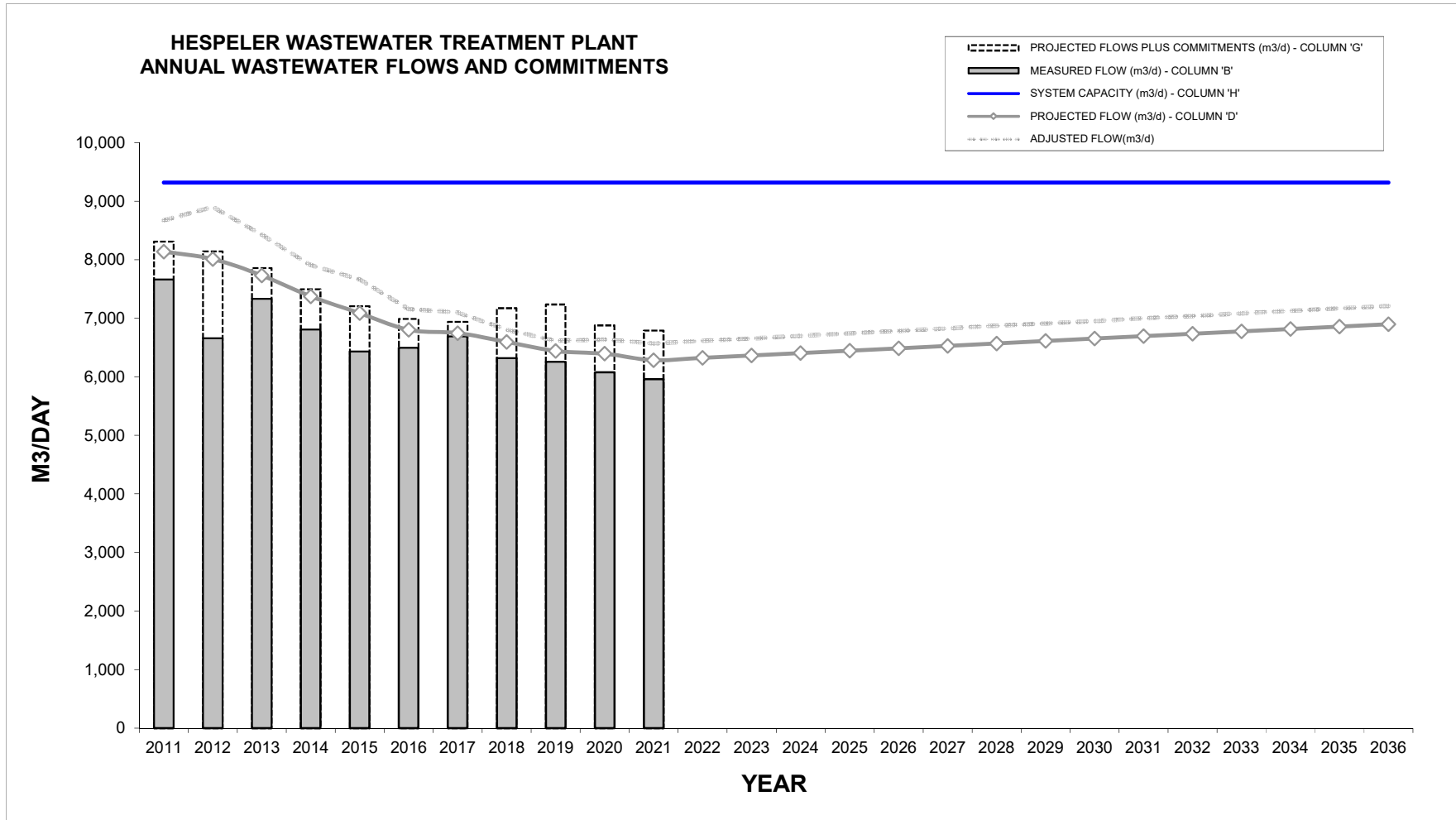


HESPELER WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

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				
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	25,821	6,259	0.2495	6,441	467	329	7,237	9,320	2,083	8,351
2020	25,970	6,077	0.2463	6,396	475	7	6,878	9,320	2,442	9,914
2021	25,984	5,962	0.2419	6,285	467	39	6,791	9,320	2,529	10,457
2022	26,153		0.2419	6,326				9,320		
2023	26,322		0.2419	6,367				9,320		
2024	26,492		0.2419	6,408				9,320		
2025	26,661		0.2419	6,449				9,320		
2026	26,830		0.2419	6,490				9,320		
2027	26,999		0.2419	6,531				9,320		
2028	27,169		0.2419	6,572				9,320		
2029	27,338		0.2419	6,613				9,320		
2030	27,508		0.2419	6,653				9,320		
2031	27,677		0.2419	6,694				9,320		
2032	27,846		0.2419	6,735				9,320		
2033	28,015		0.2419	6,776				9,320		
2034	28,185		0.2419	6,817				9,320		
2035	28,354		0.2419	6,858				9,320		
2036	28,523		0.2419	6,899				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)

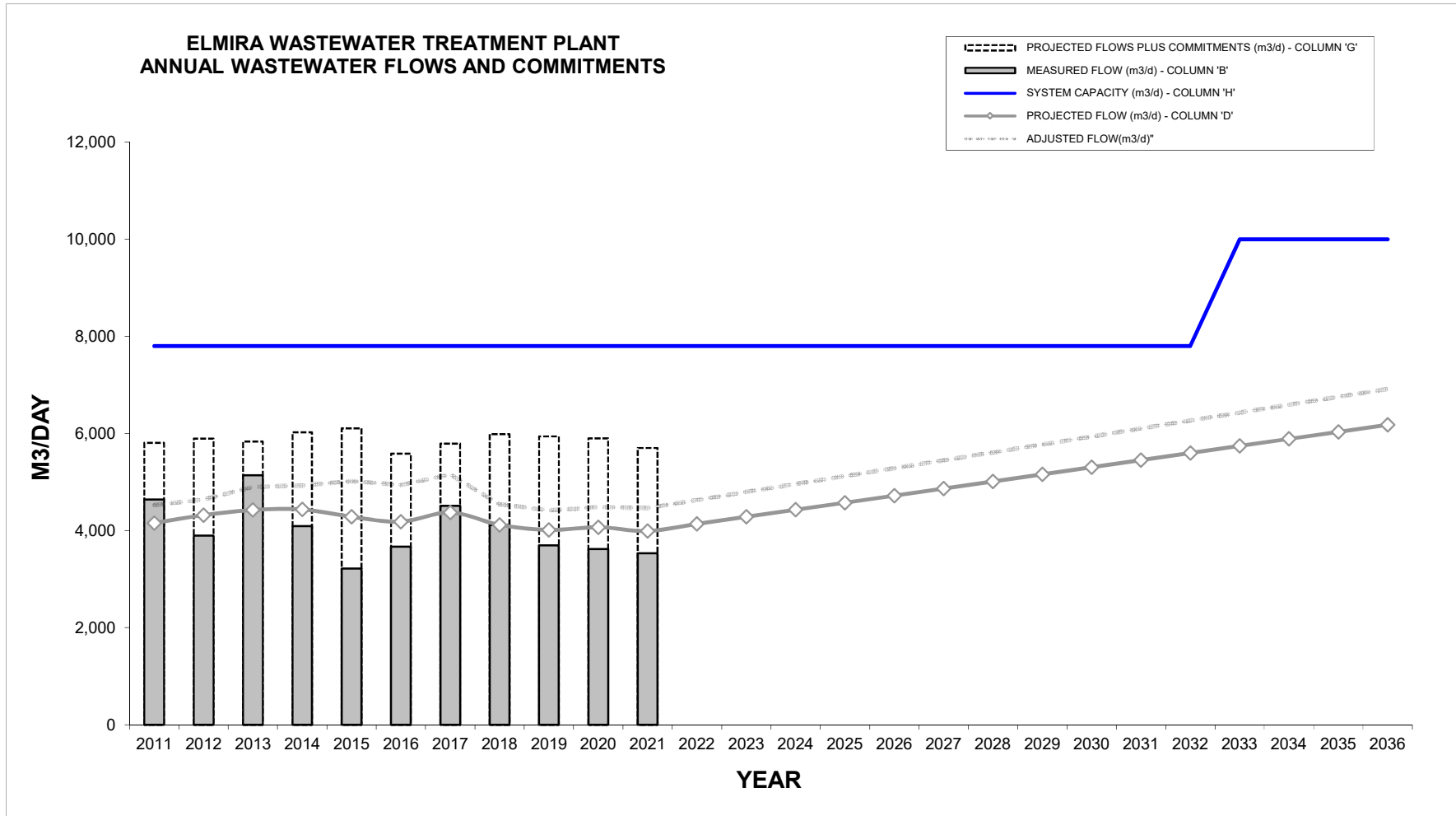


2022 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

ELMIRA WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	DGA	BUA				
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	11,171	3,697	0.3592	4,013	1,925	3	5,941	7,800	1,859	5,174
2020	11,338	3,619	0.3589	4,069	1,822	8	5,899	7,800	1,901	5,298
2021	11,379	3,532	0.3507	3,991	1,704	6	5,701	7,800	2,099	5,986
2022	11,795		0.3507	4,137				7,800		
2023	12,211		0.3507	4,283				7,800		
2024	12,628		0.3507	4,429				7,800		
2025	13,044		0.3507	4,575				7,800		
2026	13,460		0.3507	4,721				7,800		
2027	13,876		0.3507	4,867				7,800		
2028	14,293		0.3507	5,013				7,800		
2029	14,709		0.3507	5,159				7,800		
2030	15,126		0.3507	5,305				7,800		
2031	15,542		0.3507	5,451				7,800		
2032	15,958		0.3507	5,597				7,800		
2033	16,374		0.3507	5,743				10,000		
2034	16,791		0.3507	5,889				10,000		
2035	17,207		0.3507	6,035				10,000		
2036	17,623		0.3507	6,181				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)



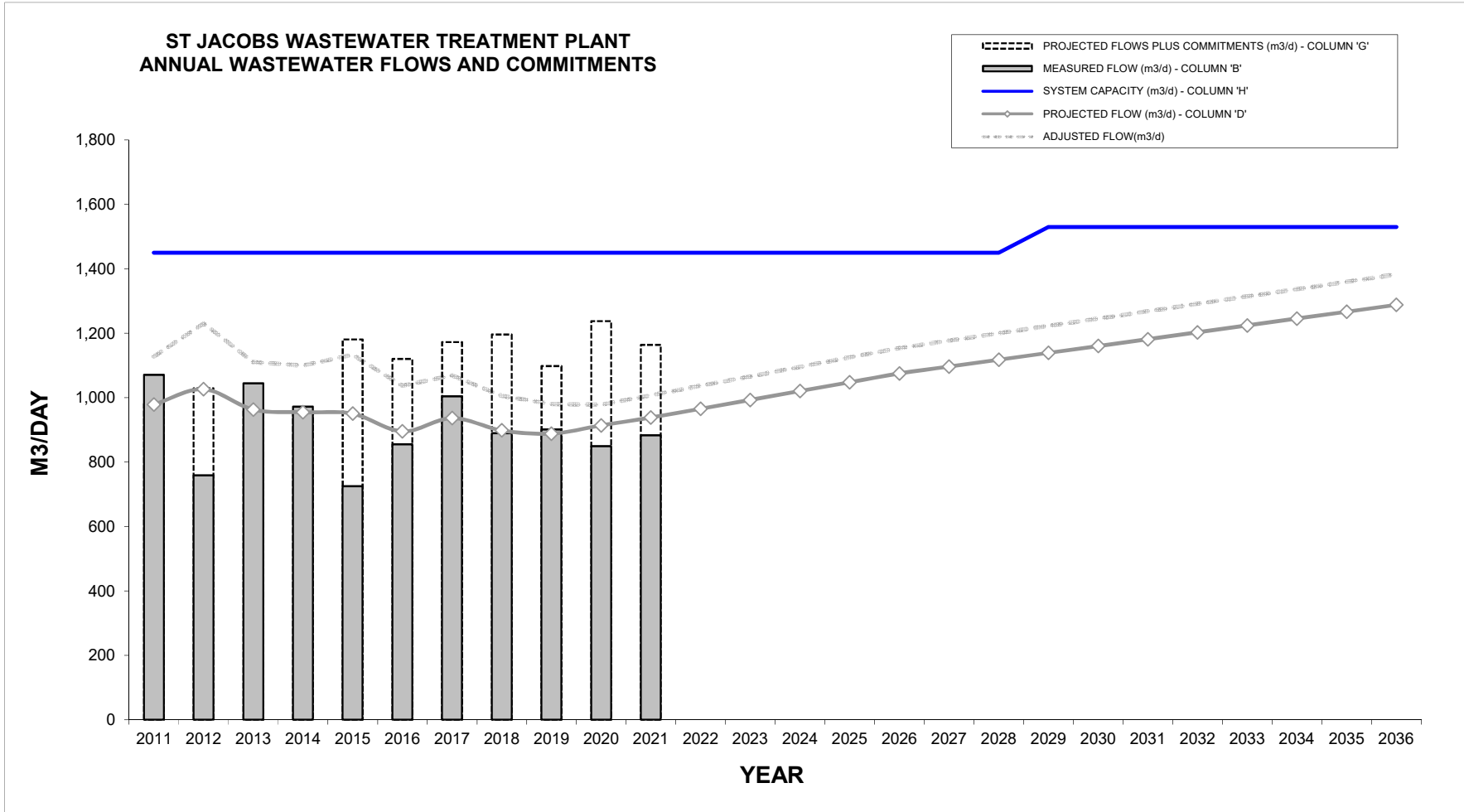
2022 WATER AND WASTEWATER MONITORING REPORT

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		PROJECTED FLOW (m ³ /d)	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)		DGA	BUA				
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	1,966	901	0.4518	888	210	0	1,098	1,450	352	779
2020	1,979	849	0.4618	914	324	0	1,238	1,450	212	460
2021	2,039	883	0.4603	938	226	0	1,164	1,450	286	622
2022	2,098		0.4603	966				1,450		
2023	2,158		0.4603	993				1,450		
2024	2,217		0.4603	1,020				1,450		
2025	2,277		0.4603	1,048				1,450		
2026	2,336		0.4603	1,075				1,450		
2027	2,382		0.4603	1,096				1,450		
2028	2,428		0.4603	1,118				1,450		
2029	2,475		0.4603	1,139				1,530		
2030	2,521		0.4603	1,160				1,530		
2031	2,567		0.4603	1,182				1,530		
2032	2,613		0.4603	1,203				1,530		
2033	2,660		0.4603	1,224				1,530		
2034	2,706		0.4603	1,246				1,530		
2035	2,753		0.4603	1,267				1,530		
2036	2,799		0.4603	1,288				1,530		

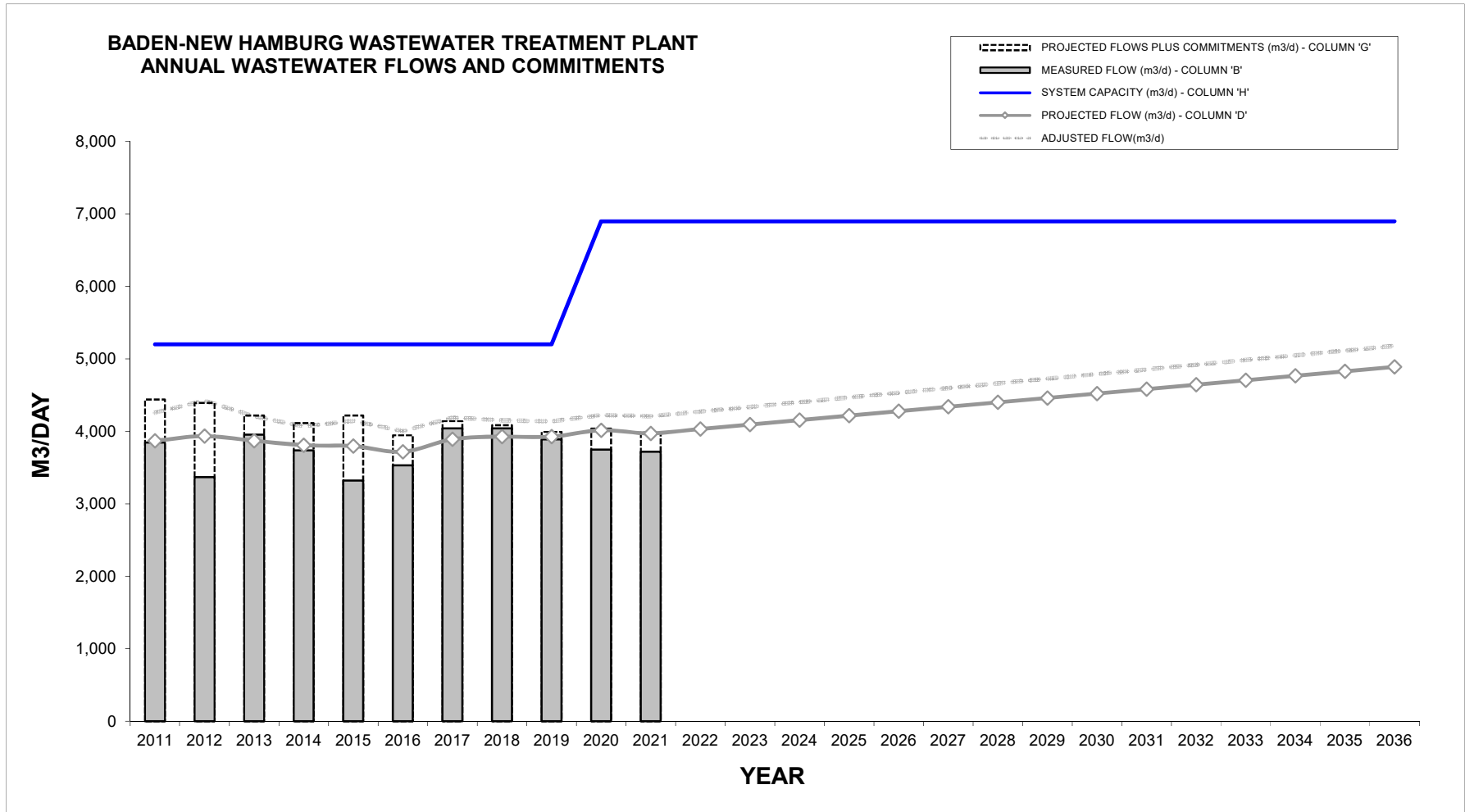
*Average of the previous five years. See Section 2.6 for further explanation of the Average Flow Per Capita Per Day in Column 'C'
 (F) Commitments in the Built-Up Area (BUA) before 2011 are grouped with commitments in the Designated Greenfield Area (DGA) in column (E)



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				
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	14,239	3,889	0.2758	3,927	41	25	3,993	5,200	1,207	4,376
2020	14,543	3,747	0.2761	4,016	12	11	4,039	6,900	2,861	10,361
2021	14,491	3,718	0.2741	3,973	3	10	3,986	6,900	2,914	10,631
2022	14,714		0.2741	4,034				6,900		
2023	14,937		0.2741	4,095				6,900		
2024	15,159		0.2741	4,156				6,900		
2025	15,382		0.2741	4,217				6,900		
2026	15,605		0.2741	4,278				6,900		
2027	15,828		0.2741	4,339				6,900		
2028	16,050		0.2741	4,400				6,900		
2029	16,273		0.2741	4,461				6,900		
2030	16,495		0.2741	4,522				6,900		
2031	16,718		0.2741	4,583				6,900		
2032	16,941		0.2741	4,644				6,900		
2033	17,164		0.2741	4,705				6,900		
2034	17,386		0.2741	4,766				6,900		
2035	17,609		0.2741	4,827				6,900		
2036	17,832		0.2741	4,889				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)

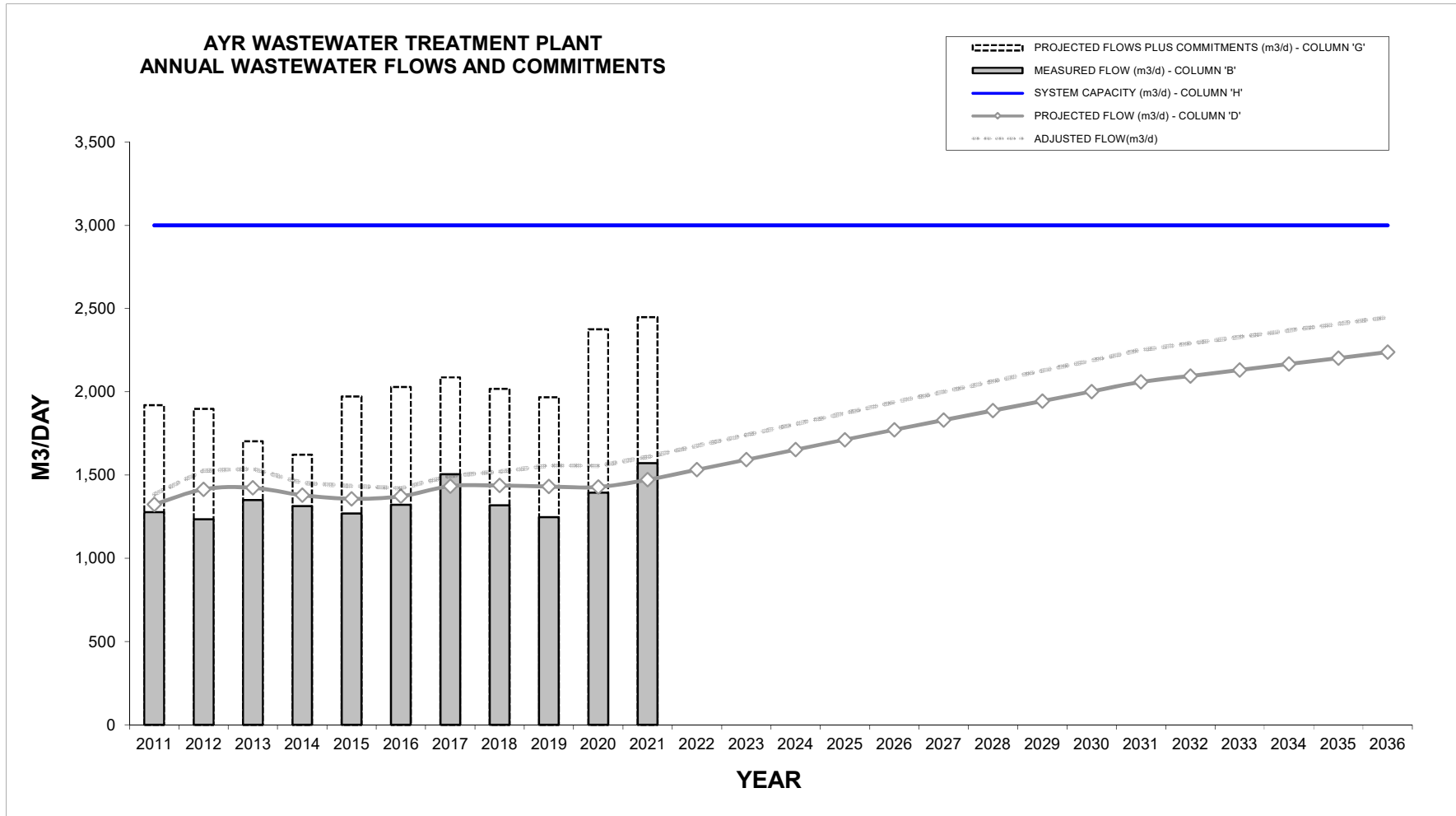


2022 WATER AND WASTEWATER MONITORING REPORT
APPENDIX - B WASTEWATER TABLES AND CHARTS

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 (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				
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	5,724	1,247	0.2500	1,431	512	25	1,968	3,000	1,032	4,129
2020	5,784	1,394	0.2470	1,428	935	12	2,376	3,000	624	2,528
2021	5,912	1,571	0.2490	1,472	972	5	2,449	3,000	551	2,214
2022	6,153		0.2490	1,532				3,000		
2023	6,395		0.2490	1,593				3,000		
2024	6,636		0.2490	1,653				3,000		
2025	6,878		0.2490	1,713				3,000		
2026	7,119		0.2490	1,773				3,000		
2027	7,349		0.2490	1,830				3,000		
2028	7,580		0.2490	1,888				3,000		
2029	7,810		0.2490	1,945				3,000		
2030	8,041		0.2490	2,002				3,000		
2031	8,271		0.2490	2,060				3,000		
2032	8,415		0.2490	2,096				3,000		
2033	8,559		0.2490	2,131				3,000		
2034	8,703		0.2490	2,167				3,000		
2035	8,847		0.2490	2,203				3,000		
2036	8,991		0.2490	2,239				3,000		

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

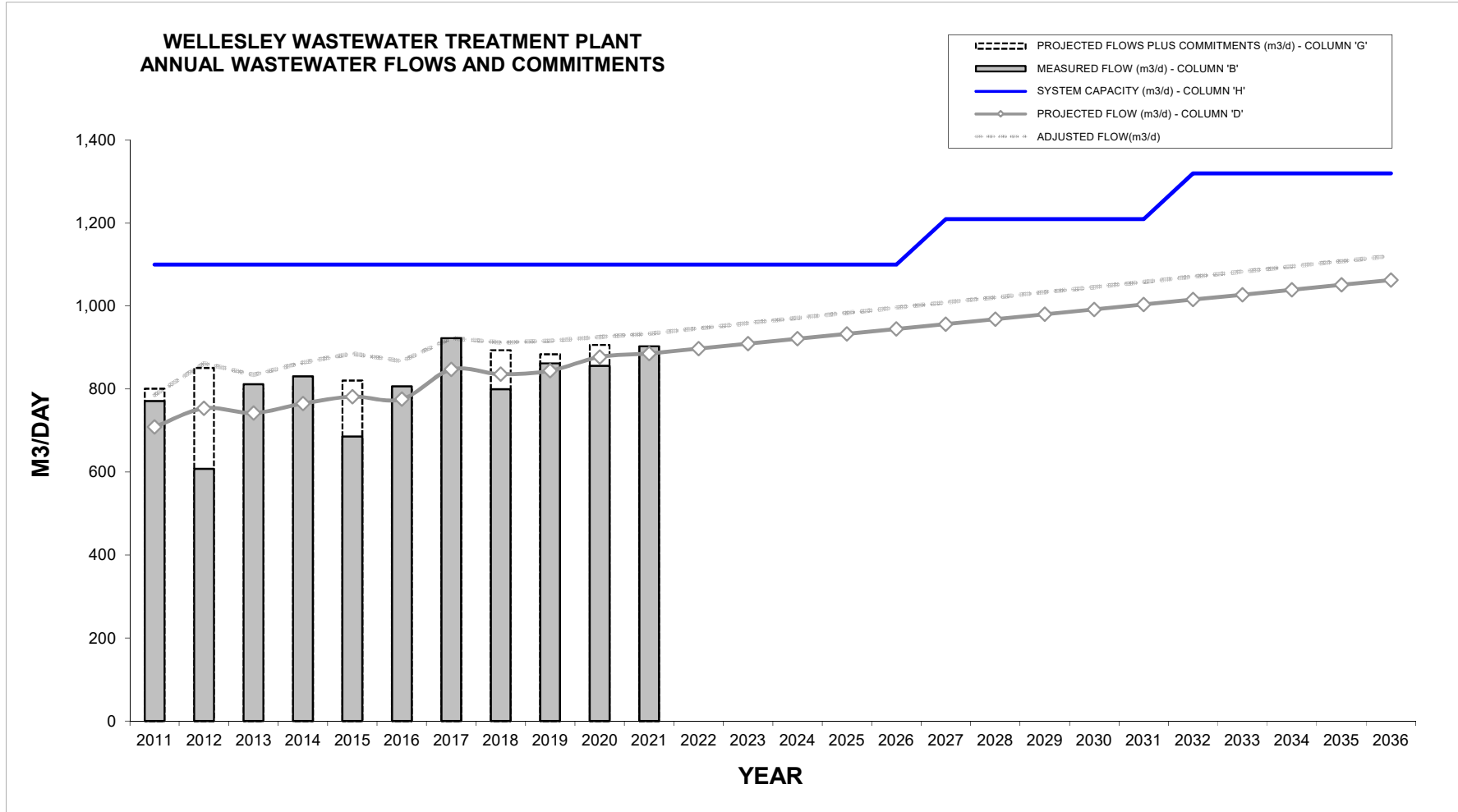


WELLESLEY WASTEWATER TREATMENT PLANT ANNUAL WASTEWATER FLOWS AND COMMITMENTS

YEAR	A	B	C*	D = A x C	E	F	G = D + E + F	H	I = H - G	J = I / C
	POP.	AVERAGE DAY			COMMITMENTS (m ³ /d)		PROJECTED FLOW PLUS COMMITMENTS (m ³ /d)	SYSTEM CAPACITY (m ³ /d)	REMAINING CAPACITY (m ³ /d)	REMAINING CAPACITY (People)
		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	DGA	BUA				
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	3,604	862	0.2343	844	38	2	884	1,100	216	922
2020	3,652	856	0.2403	877	27	2	906	1,100	194	806
2021	3,655	903	0.2424	886	1	2	890	1,100	210	868
2022	3,704		0.2424	898				1,100		
2023	3,753		0.2424	909				1,100		
2024	3,801		0.2424	921				1,100		
2025	3,850		0.2424	933				1,100		
2026	3,899		0.2424	945				1,100		
2027	3,948		0.2424	957				1,210		
2028	3,996		0.2424	969				1,210		
2029	4,045		0.2424	980				1,210		
2030	4,093		0.2424	992				1,210		
2031	4,142		0.2424	1,004				1,210		
2032	4,191		0.2424	1,016				1,320		
2033	4,240		0.2424	1,028				1,320		
2034	4,288		0.2424	1,039				1,320		
2035	4,337		0.2424	1,051				1,320		
2036	4,386		0.2424	1,063				1,320		

*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)



Appendix C

Water Charts and Data

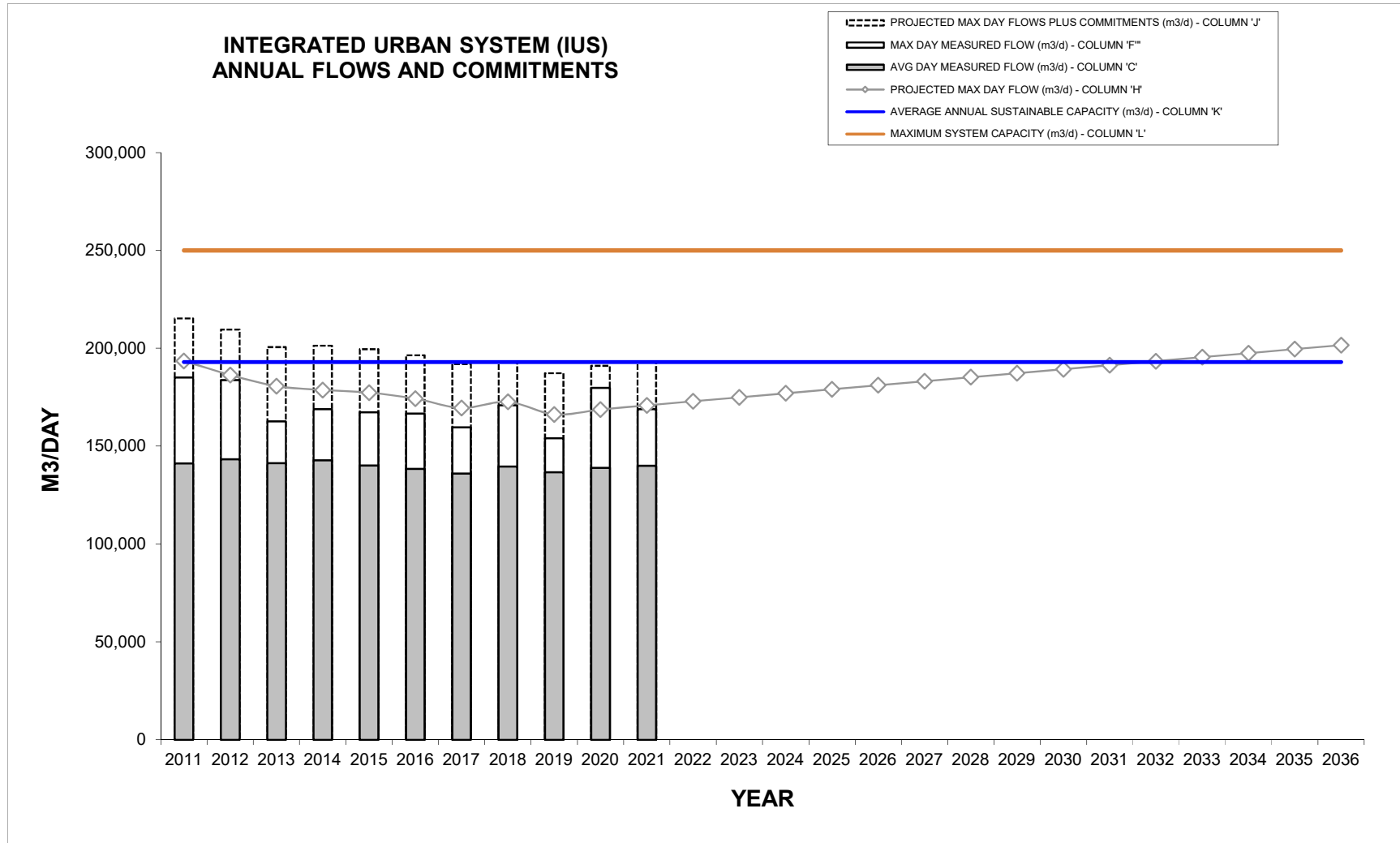
2022 WATER AND WASTEWATER MONITORING REPORT

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						
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	525,374	563,098	136,693	0.2545	143,293	154,104	0.3164	166,251	21,040	187,292	193,000	250,000	62,708	198,166				
2020	530,911	556,174	138,988	0.2508	139,516	179,724	0.3178	168,732	22,318	191,050	193,000	250,000	58,950	185,484				
2021	542,799	577,802	139,950	0.2470	142,730	168,942	0.3148	170,888	22,146	193,034	193,000	250,000	56,966	180,944				
2022	549,313	582,722		0.2470	143,946		0.3148	172,939			193,000	250,000						
2023	555,827	587,642		0.2470	145,161		0.3148	174,989			193,000	250,000						
2024	562,341	592,563		0.2470	146,377		0.3148	177,040			193,000	250,000						
2025	568,855	597,483		0.2470	147,592		0.3148	179,091			193,000	250,000						
2026	575,369	602,403		0.2470	148,807		0.3148	181,142			193,000	250,000						
2027	581,883	607,323		0.2470	150,023		0.3148	183,193			193,000	250,000						
2028	588,397	612,243		0.2470	151,238		0.3148	185,243			193,000	250,000						
2029	594,912	617,164		0.2470	152,454		0.3148	187,294			193,000	250,000						
2030	601,426	622,084		0.2470	153,669		0.3148	189,345			193,000	250,000						
2031	607,940	627,004		0.2470	154,885		0.3148	191,396			193,000	250,000						
2032	614,454	634,049		0.2470	156,625		0.3148	193,447			193,000	250,000						
2033	620,968	641,093		0.2470	158,365		0.3148	195,498			193,000	250,000						
2034	627,482	648,138		0.2470	160,105		0.3148	197,548			193,000	250,000						
2035	633,996	655,182		0.2470	161,845		0.3148	199,599			193,000	250,000						
2036	640,510	662,227		0.2470	163,585		0.3148	201,650			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'



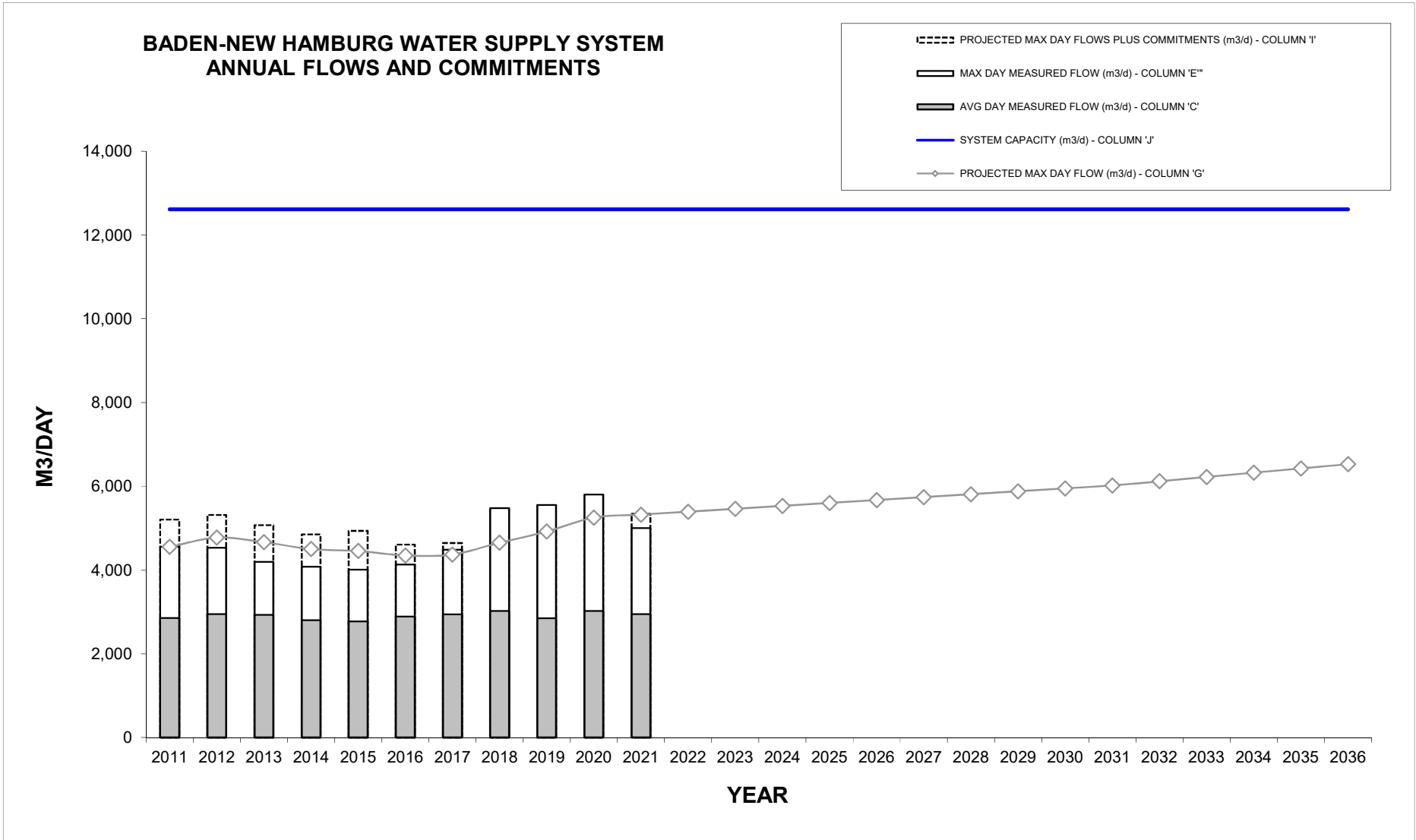
2022 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

BADEN-NEW HAMBURG WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C* AVERAGE DAY		D = A x C PROJECTED FLOW (m ³ /d)	E MAXIMUM DAY			F* AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	G = A x F PROJECTED FLOW (m ³ /d)	H COMMITMENTS (m ³ /d)	I = G + H PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	J SYSTEM CAPACITY (m ³ /d)	K = J - I REMAINING CAPACITY (m ³ /d)	L = K / F REMAINING CAPACITY (People)
			AVERAGE DAY			MAXIMUM DAY									
			AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)							
2011	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	14,554	2,848	0.2077	3,023	5,554	0.3380	4,920	81	5,001	12,614	7,613	22,521			
2020	14,736	3,019	0.2069	3,049	5,804	0.3565	5,253	30	5,283	12,614	7,331	20,562			
2021	14,622	2,946	0.2046	2,991	5,003	0.3640	5,322	18	5,340	12,614	7,274	19,983			
2022	14,813		0.2046	3,031		0.3640	5,392			12,614					
2023	15,005		0.2046	3,070		0.3640	5,462			12,614					
2024	15,196		0.2046	3,109		0.3640	5,531			12,614					
2025	15,388		0.2046	3,148		0.3640	5,601			12,614					
2026	15,579		0.2046	3,187		0.3640	5,671			12,614					
2027	15,771		0.2046	3,226		0.3640	5,740			12,614					
2028	15,962		0.2046	3,266		0.3640	5,810			12,614					
2029	16,154		0.2046	3,305		0.3640	5,880			12,614					
2030	16,345		0.2046	3,344		0.3640	5,950			12,614					
2031	16,537		0.2046	3,383		0.3640	6,019			12,614					
2032	16,817		0.2046	3,440		0.3640	6,121			12,614					
2033	17,097		0.2046	3,498		0.3640	6,223			12,614					
2034	17,376		0.2046	3,555		0.3640	6,325			12,614					
2035	17,656		0.2046	3,612		0.3640	6,427			12,614					
2036	17,936		0.2046	3,669		0.3640	6,529			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'



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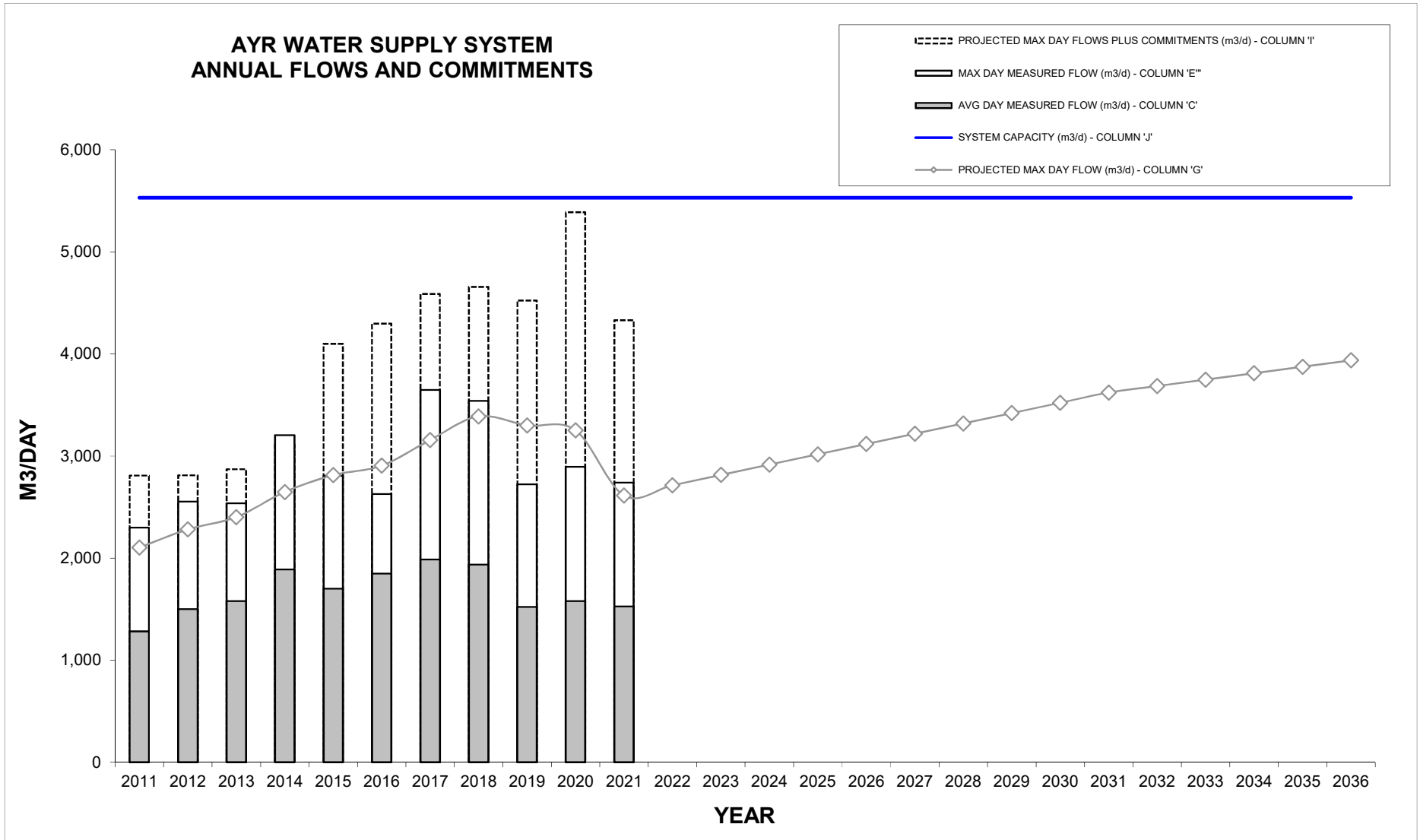
APPENDIX - C WATER TABLES AND CHARTS

AYR WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C*		D = A x C PROJECTED FLOW (m ³ /d)	E			F* AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	G = A x F PROJECTED FLOW (m ³ /d)	H COMMITMENTS (m ³ /d)	I = G + H PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	J SYSTEM CAPACITY (m ³ /d)	K = J - I REMAINING CAPACITY (m ³ /d)	L = K / F REMAINING CAPACITY (People)
			AVERAGE DAY			MAXIMUM DAY									
			AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)							
2011	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	5,781	1,522	0.3354	1,939	2,722	0.5707	3,299	1,225	4,524	5,530	1,006	1,763			
2020	5,841	1,578	0.3210	1,875	2,895	0.5568	3,252	2,136	5,388	5,530	142	255			
2021	5,966	1,526	0.3009	1,795	2,740	0.4379	2,613	1,717	4,330	5,530	1,200	2,741			
2022	6,197		0.3009	1,865		0.4379	2,714			5,530					
2023	6,427		0.3009	1,934		0.4379	2,815			5,530					
2024	6,658		0.3009	2,004		0.4379	2,916			5,530					
2025	6,888		0.3009	2,073		0.4379	3,017			5,530					
2026	7,119		0.3009	2,142		0.4379	3,118			5,530					
2027	7,349		0.3009	2,212		0.4379	3,218			5,530					
2028	7,580		0.3009	2,281		0.4379	3,319			5,530					
2029	7,810		0.3009	2,350		0.4379	3,420			5,530					
2030	8,041		0.3009	2,420		0.4379	3,521			5,530					
2031	8,271		0.3009	2,489		0.4379	3,622			5,530					
2032	8,415		0.3009	2,532		0.4379	3,685			5,530					
2033	8,559		0.3009	2,576		0.4379	3,748			5,530					
2034	8,703		0.3009	2,619		0.4379	3,811			5,530					
2035	8,847		0.3009	2,662		0.4379	3,874			5,530					
2036	8,991		0.3009	2,706		0.4379	3,937			5,530					

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

Ayr Maximum Day Per Capita rate is reduced by 20% for growth projects as outlined in the Ayr Water Supply System - Per Capiat Rate Reviw Memo (docs#3862478)



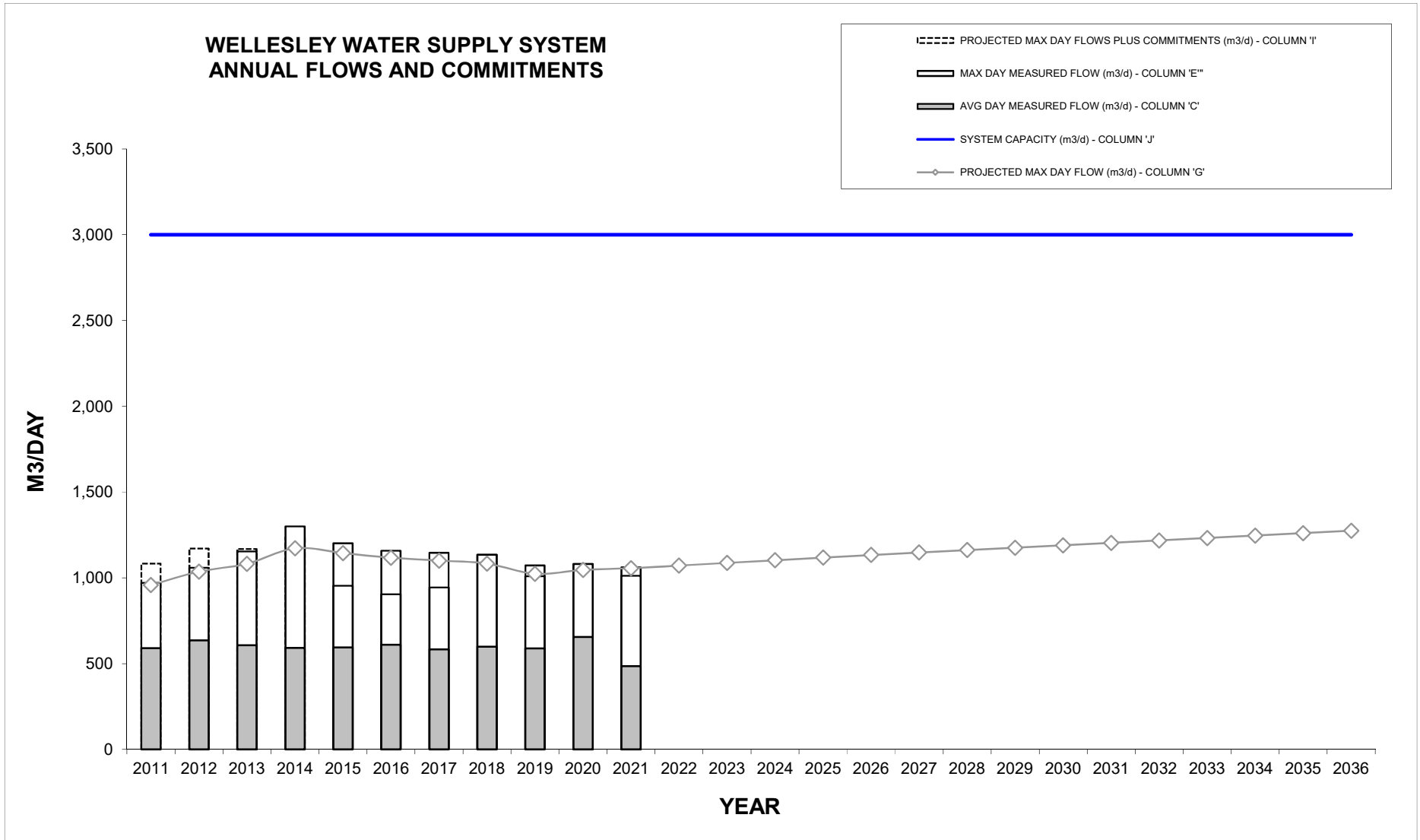
2022 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

WELLESLEY WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C*		D = A x C PROJECTED FLOW (m ³ /d)	E			F* AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	G = A x F PROJECTED FLOW (m ³ /d)	H COMMITMENTS (m ³ /d)	I = G + H PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	J SYSTEM CAPACITY (m ³ /d)	K = J - I REMAINING CAPACITY (m ³ /d)	L = K / F REMAINING CAPACITY (People)
			AVERAGE DAY			MAXIMUM DAY									
			AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)		MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)							
2011	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	3,580	589	0.1722	617	1,008	0.2859	1,024	48	1,072	3,000	1,928	6,743			
2020	3,629	655	0.1727	627	1,079	0.2882	1,046	35	1,081	3,000	1,919	6,660			
2021	3,633	485	0.1635	594	1,012	0.2906	1,056	5	1,061	3,000	1,939	6,673			
2022	3,686		0.1635	603		0.2906	1,071			3,000					
2023	3,739		0.1635	611		0.2906	1,087			3,000					
2024	3,793		0.1635	620		0.2906	1,102			3,000					
2025	3,846		0.1635	629		0.2906	1,118			3,000					
2026	3,899		0.1635	637		0.2906	1,133			3,000					
2027	3,948		0.1635	645		0.2906	1,147			3,000					
2028	3,996		0.1635	653		0.2906	1,161			3,000					
2029	4,045		0.1635	661		0.2906	1,176			3,000					
2030	4,093		0.1635	669		0.2906	1,190			3,000					
2031	4,142		0.1635	677		0.2906	1,204			3,000					
2032	4,191		0.1635	685		0.2906	1,218			3,000					
2033	4,240		0.1635	693		0.2906	1,232			3,000					
2034	4,288		0.1635	701		0.2906	1,246			3,000					
2035	4,337		0.1635	709		0.2906	1,261			3,000					
2036	4,386		0.1635	717		0.2906	1,275			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'



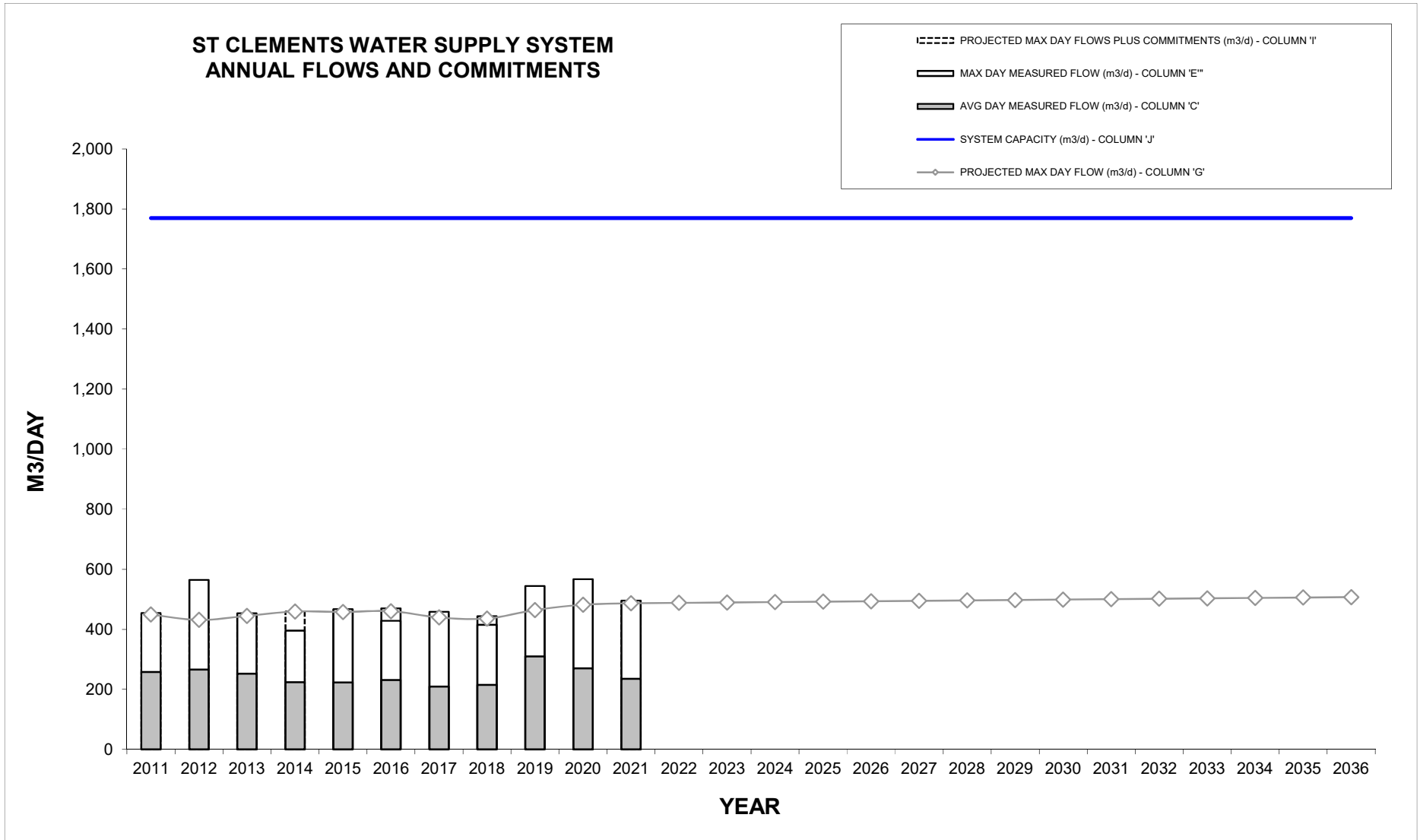
2022 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

ST CLEMENTS WATER SUPPLY SYSTEM ANNUAL FLOWS AND COMMITMENTS

YEAR	A POP.	B MEASURED FLOW (m ³ /d)	C* AVERAGE DAY		D = A x C PROJECTED FLOW (m ³ /d)	E MAXIMUM DAY			H COMMITMENTS (m ³ /d)	I = G + H PROJECTED MAX DAY FLOWS PLUS COMMITMENTS (m ³ /d)	J SYSTEM CAPACITY (m ³ /d)	K = J - I REMAINING CAPACITY (m ³ /d)	L = K / F REMAINING CAPACITY (People)
			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)					
			G = A x F										
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	1,263	310	0.1887	238	544	0.3674	464	7	471	1,770	1,299	3,535	
2020	1,258	270	0.1961	247	567	0.3830	482	9	491	1,770	1,279	3,341	
2021	1,231	235	0.1974	243	495	0.3952	486	8	494	1,770	1,276	3,228	
2022	1,234		0.1974	244		0.3952	488			1,770			
2023	1,238		0.1974	244		0.3952	489			1,770			
2024	1,241		0.1974	245		0.3952	491			1,770			
2025	1,245		0.1974	246		0.3952	492			1,770			
2026	1,248		0.1974	246		0.3952	493			1,770			
2027	1,252		0.1974	247		0.3952	495			1,770			
2028	1,255		0.1974	248		0.3952	496			1,770			
2029	1,259		0.1974	249		0.3952	497			1,770			
2030	1,262		0.1974	249		0.3952	499			1,770			
2031	1,266		0.1974	250		0.3952	500			1,770			
2032	1,269		0.1974	251		0.3952	502			1,770			
2033	1,273		0.1974	251		0.3952	503			1,770			
2034	1,276		0.1974	252		0.3952	504			1,770			
2035	1,280		0.1974	253		0.3952	506			1,770			
2036	1,283		0.1974	253		0.3952	507			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'



2022 WATER AND WASTEWATER MONITORING REPORT

APPENDIX - C WATER TABLES AND CHARTS

CONESTOGO GOLF COURSE WATER SUPPLY SYSTEM ANNUAL FLOWS

	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
YEAR	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)			
Conestogo Golf Course System is now connected to the Integrated Urban System. Flows and population are included in the IUS.										

CONESTOGO PLAINS WATER SUPPLY SYSTEM ANNUAL FLOWS

	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
YEAR	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 DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
Conestogo Plains System is now connected to the Integrated Urban System. Flows and population are included in the IUS.										

MARY HILL WATER SUPPLY SYSTEM ANNUAL FLOWS

	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
YEAR	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 DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER DAY (m ³ /c/d)	PROJECTED FLOW (m ³ /d)			
2017	141	64	0.4338	61	88	0.7248	102	157	55	-
2018	141	62	0.4329	61	88	0.7066	100	157	57	-
2019	141	58	0.4318	61	88	0.6703	95	157	62	-
2020	140	57	0.4216	59	99	0.6659	93	157	64	-
2021	137	54	0.4213	58	97	0.6575	90	157	67	-

WOOLWICH WATER SUPPLY SYSTEMS

MARY HILL VILLAGE HEIGHTS WATER SUPPLY SYSTEM ANNUAL FLOWS

	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
YEAR	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)			
2017	143	32	0.2384	34	138	0.8316	119	820	701	-
2018	169	35	0.2225	38	210	0.8860	150	820	670	-
2019	169	34	0.2197	37	159	0.9660	163	820	657	-
2020	191	46	0.2235	43	153	0.9543	182	820	638	-
2021	208	61	0.2332	49	222	1.0034	209	820	611	-

WEST MONTROSE WATER SUPPLY SYSTEM ANNUAL FLOWS

	A	B	C	D = A x C	E	F = E / A	G = A x F	H	I = H - G	J = I / F
YEAR	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)			
West Montrose System is now connected to the Integrated Urban System. Flows and population are included in the IUS.										

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)					
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	-		
2019	1,010	140	0.1372	139	298	0.3021	305	829	524	-		
2020	1,005	142	0.1375	138	343	0.3155	317	829	512	-		
2021	986	154	0.1401	138	300	0.3234	319	829	510	-		

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)					
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	781	146	0.2445	191	249	0.3760	294	605	311	-		
2020	773	161	0.2417	187	263	0.3679	284	605	321	-		
2021	760	208	0.2447	186	359	0.3851	293	605	312	-		

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)					
2017	410	100	0.2351	96	180	0.3566	146	527	381	-		
2018	410	97	0.2371	97	164	0.3760	154	527	373	-		
2019	410	98	0.2374	97	222	0.4229	173	527	354	-		
2020	403	91	0.2341	94	144	0.4301	173	527	354	-		
2021	397	93	0.2359	94	115	0.4055	161	527	366	-		

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)					
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	1,056	171	0.1791	189	312	0.3402	359	983	624	-		
2020	1,056	220	0.1859	196	509	0.3648	385	983	598	-		
2021	1,039	239	0.1927	200	477	0.3877	403	983	580	-		

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)					
2017	290	72	0.2456	71	125	0.5553	161	358	197	-		
2018	290	75	0.2430	70	168	0.5484	159	358	199	-		
2019	290	76	0.2478	72	152	0.5525	160	358	198	-		
2020	290	92	0.2622	76	185	0.5848	170	358	188	-		
2021	288	67	0.2638	76	154	0.5414	156	358	202	-		

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)					
2017	121	25	0.2868	35	71	0.7374	89	130	41	-		
2018	121	25	0.2626	32	68	0.6916	84	130	46	-		
2019	121	23	0.2352	28	63	0.6539	79	130	51	-		
2020	121	31	0.2283	28	106	0.6764	82	130	48	-		
2021	119	26	0.2156	26	64	0.6167	73	130	57	-		

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	2015	2016	2017	2018	2019	2020	2021	2026	2031	2036
Galt	84,612	84,752	85,369	86,716	87,814	87,748	89,493	95,746	101,998	108,251
Preston	20,245	21,051	21,469	22,517	23,466	24,209	24,491	24,891	25,292	25,692
Hespeler	25,561	25,604	25,699	25,991	25,821	25,970	25,984	26,830	27,677	28,523
Kitchener*	239,585	244,464	248,481	253,621	258,675	260,556	268,944	282,025	299,105	330,606
Waterloo*	137,368	141,574	145,381	153,271	150,283	141,902	151,945	157,091	162,238	167,384
Ayr	5,087	5,086	5,339	5,524	5,724	5,784	5,912	7,119	8,271	8,991
Baden/New Hamburg*	13,245	13,469	13,657	14,043	14,239	14,543	14,491	15,605	16,718	17,832
Wellesley*	3,354	3,456	3,495	3,523	3,604	3,652	3,655	3,899	4,142	4,386
St. Jacobs	1,935	1,935	1,930	1,933	1,966	1,979	2,104	2,336	2,567	2,799
Elmira	10,191	10,439	10,788	10,962	11,171	11,338	11,379	13,460	15,542	17,623

Water Service Area	2015	2016	2017	2018	2019	2020	2021	2026	2031	2036
Integrated Urban System	523,089	533,294	542,750	559,025	563,098	556,174	577,802	602,403	627,004	662,227
Baden/New Hamburg*	13,560	13,783	13,974	14,361	14,554	14,736	14,622	15,579	16,537	17,936
Ayr*	5,104	5,132	5,391	5,577	5,781	5,841	5,966	7,119	8,271	8,991
Wellesley*	3,332	3,433	3,472	3,499	3,580	3,629	3,633	3,899	4,142	4,386
St. Clements	1,255	1,261	1,267	1,267	1,263	1,258	1,231	1,248	1,266	1,283
Village Heights	142	143	143	169	179	191	208	191	175	158
Maryhill	142	141	141	141	141	140	137	139	141	142
Conestoga Plains **	362	361	361	361	360	358	0	0	0	0
New Dundee	1,066	1,049	1,049	1,056	1,057	1,056	1,039	1,104	1,170	1,235

MID-YEAR POPULATION BY WATER SERVICE AREA

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

Water Service Area	2015	2016	2017	2018	2019	2020	2021	2026	2031	2036
Integrated Urban System	501,862	511,287	519,307	529,729	525,374	530,911	542,799	575,369	607,940	640,510

YEAR-END POPULATION - SMALL WASTEWATER SYSTEMS

Wastewater Service Area	Total Population						
	2015	2016	2017	2018	2019	2020	2021
Heidelberg	262	261	261	261	260	258	253
Foxboro	413	410	410	410	406	403	397
Conestoga Golf Course	249	247	247	256	256	254	246

YEAR-END POPULATION - SMALL WATER SYSTEMS

Water Service Area	Total Population						
	2015	2016	2017	2018	2019	2020	2021
Heidelberg	1,023	1,013	1,013	1,013	1,010	1,005	986
Linwood	782	775	781	781	776	773	760
West Montrose **	212	206	206	206	205	204	-
Branchton Meadows	119	121	121	121	120	120	119
Conestoga Golf Course **	477	473	473	482	481	478	-
Roseville	293	290	290	290	290	289	288
Foxboro	413	410	410	410	406	403	397

TABLE D-2

2021 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	2,361	1,273	3,634
Preston	82	0	82
Hespeler	161	0	161
Kitchener	9,211	338	9,549
Waterloo	4,455	123	4,578
Ayr	16	0	19
Baden/New Hamburg	37	0	37
Wellesley	10	0	10
St. Jacobs	0	0	0
Elmira	13	3	16

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision	TOTAL
Integrated Urban System	16,175	1,737	17,912
Baden/New Hamburg	37	0	37
Ayr	19	0	19
Wellesley	10	0	10
St. Clements ***	0	0	0
Village Heights	0	0	0
Maryhill	0	0	0
Conestoga Plains	0	0	0
New Dundee	0	0	0

TABLE D-3

2021 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	392	8,014	8,406
Preston	338	3,754	4,092
Hespeler	113	1,817	1,930
Kitchener	12,934	17,348	30,283
Waterloo	1,612	961	2,572
Ayr	346	3,556	3,902
Baden/New Hamburg	10	0	13
Wellesley	6	0	6
St. Jacobs	26	464	490
Elmira	616	4,243	4,860

Water Service Area	Population in Unbuilt / Unoccupied Registered Plans	Population in Draft Approved Plans of Subdivision	TOTAL
Integrated Urban System	15,831	36,601	52,432
Baden/New Hamburg	13	0	13
Ayr	346	3,556	3,902
Wellesley	6	0	6
St. Clements **	20	0	20
Village Heights	52	0	52
Maryhill	0	0	0
Conestoga Plains	0	0	0
New Dundee	7	0	7

* Forecasted population has been adjusted to align with the ROP review forecasted population figures where possible.

** The Conestoga Golf Course, Conestoga Plains and West Montrose Water Service Areas were incorporated into the Integrated Urban System in 2021. Existing and committed population for these areas is included in the IUS as of 2021.

** The St. Clements Water Service Area is not within either the Built Up Area or the Designated Greenfield Area;

Appendix E

Sample Calculations

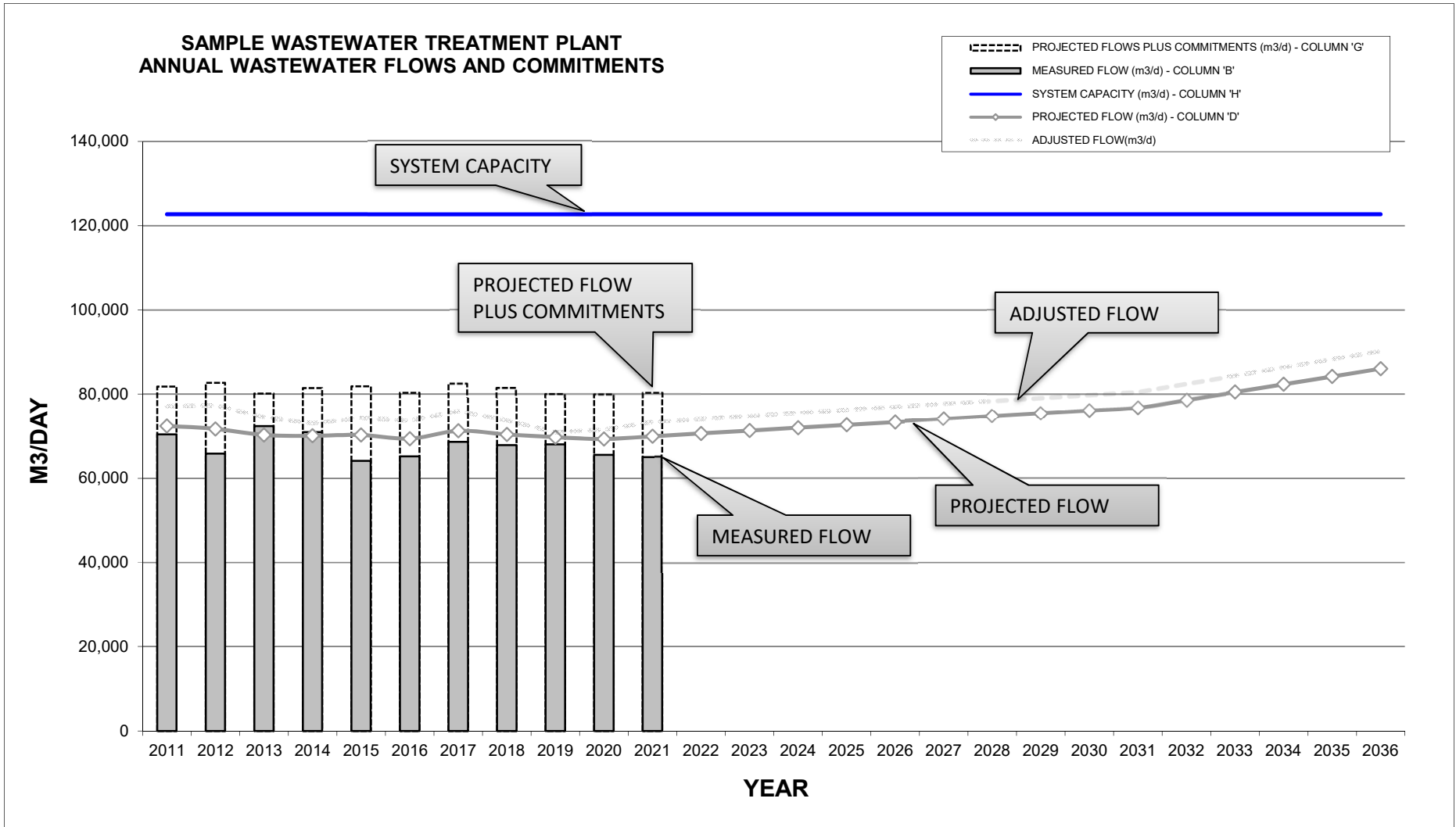
2022 WATER AND WASTEWATER MONITORING REPORT
WASTEWATER SAMPLE CALCULATIONS

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				
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	B18	C18	=A18 x C18	E18	F18	=D18 + E18 + F18	122,700	=H18 - G18	=I18 / C18
2019	A19	B19	C19	=A19 x C19	E19	F19	=D19 + E19 + F19	122,700	=H19 - G19	=I19 / C19
2020	A20	B20	C20	=A20 x C20	E20	F20	=D20 + E20 + F20	122,700	=H20 - G20	=I20 / C20
2021	A21	B21	C21	=A21 x C21	E21	F21	=D21 + E21 + F21	122,700	=H21 - G21	=I21 / C21
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		
2032	A32		C32	=A32 x C32				122,700		
2033	A33		C33	=A33 x C33				122,700		
2034	A34		C34	=A34 x C34				122,700		
2035	A35		C35	=A35 x C35				122,700		
2036	A36		C36	=A36 x C36				122,700		

Refer To Section 2.6 For More Information

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



2022 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.	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)
			MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)	MEASURED FLOW (m ³ /d)	AVERAGE FLOW PER CAPITA PER DAY (m ³ /cd)	PROJECTED FLOW (m ³ /d)					
2011	A11	B11	Refer to Section 2.5 For More Information	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	=H19 + I19	K19	=K19 - J19	=L19 / G19
2020	A20	B20		D20	=B20 x D20	F20	G20	=A20 x G20	I20	=H20 + I20	K20	=K20 - J20	=L20 / G20
2021	A21	B21		D21	=B21 x D21	F21	G21	=A21 x G21	I21	=H21 + I21	K21	=K21 - J21	=L21 / G21
2022	A22	B22		D22	=B22 x D22		G22	=A22 x G22			K22		
2023	A23	B23		D23	=B23 x D23		G23	=A23 x G23			K23		
2024	A24	B24		D24	=B24 x D24		G24	=A24 x G24			K24		
2025	A25	B25		D25	=B25 x D25		G25	=A25 x G25			K25		
2026	A26	B26		D26	=B26 x D26		G26	=A26 x G26			K26		
2027	A27	B27	D27	=B27 x D27		G27	=A27 x G27			K27			
2028	A28	B28	D28	=B28 x D28		G28	=A28 x G28			K28			
2029	A29	B29	D29	=B29 x D29		G29	=A29 x G29			K29			
2030	A30	B30	D30	=B30 x D30		G30	=A30 x G30			K30			
2031	A31	B31	D31	=B31 x D31		G31	=A31 x G31			K31			
2032	A32	B32	D32	=B32 x D32		G32	=A32 x G32			K32			
2033	A33	B33	D33	=B33 x D33		G33	=A33 x G33			K33			
2034	A34	B34	D34	=B34 x D34		G34	=A34 x G34			K34			
2035	A35	B35	D35	=B35 x D35		G35	=A35 x G35			K35			
2036	A36	B36	D36	=B36 x D36		G36	=A36 x G36			K36			

*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'

