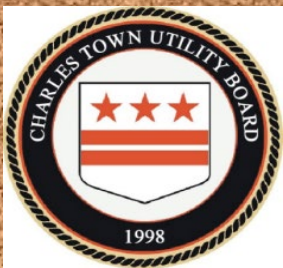




# SEWER STRATEGIC PLAN

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2024-2027



**CHARLES TOWN UTILITY BOARD**

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Charles Town, West Virginia 25414

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Charles Town Utility Board (CTUB)  
Sewer Strategic Plan  
2024-2027

Adopted:

May 8, 2024

**BOARD OF DIRECTORS**

John Nissel, **Chairman**, City of Charles Town City Manager

Keith D. Pierson, **Vice Chairman**, City of Ranson Mayor, City of Ranson Representative

Thomas Stocks, **Treasurer**, City of Charles Town Representative

Jeff Whitten, City of Charles Town Representative

Heidi Parker, Jefferson County Representative

**CTUB MANAGEMENT**

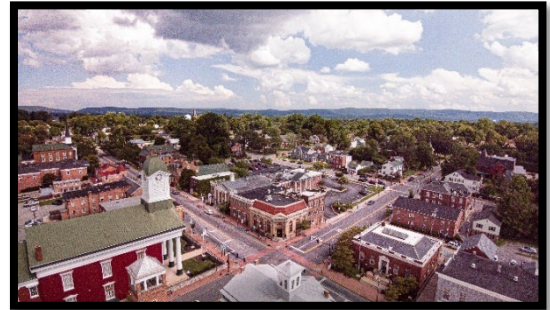
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## EXECUTIVE SUMMARY

### Purpose

The purpose of this Sewer Strategic Plan (SSP) is to document the Charles Town Utility Board's (CTUB) existing wastewater collection and treatment system to establish a plan for conveyance of all wastewater that will be generated within the region to the CTUB wastewater treatment plants during current and future periods of growth. The plan will evaluate future improvements needed and implementation strategies both physically and financially. Another major purpose of this SSP is the identification of wastewater peak flows and the evaluation of the capacity of the existing collection and conveyance system to convey these peak flows without backups of wastewater into homes and businesses and without sanitary sewer overflows. The City of Charles Town, by and through CTUB first published a SSP in 2007. The most recent revision to the SSP was approved by CTUB on April 28, 2021. Pursuant to a resolution for a tri-annual SSP update, the current revision serves as the required April 2024 update. The SSP is adopted by the CTUB Board of Directors. Upon adoption, development of actions to implement the SSP can begin. The SSP provides an overall high-level direction to prioritize resources and achieve future success.



Since the adoption of the last SSP, CTUB, through the City of Charles Town, has successfully equalized the sewer rates between the City of Charles Town sewer system, the City of Ranson Sewer System and the Jefferson County Public Service District subsequent to the utility consolidation efforts that occurred on July 1, 2018 and January 1, 2019, respectively. The equalization of rates took place almost 5 years earlier than anticipated. The wastewater treatment and collection systems of the consolidated regional utility are reviewed herein. Significant growth has occurred since the last plan and will be steadily monitored to ensure that appropriate measures are taken to address future capital improvements, operation and maintenance as well as capacity needs. Growth projections are included in this SSP, and will be, in part, considered in determining the timing of those future capital improvements. Communication with local planning and zoning authorities to acquire accurate growth projections is essential for successful monitoring of growth. This plan details the growth within the system based on growth projections provided by the local planning and zoning agencies.

### Scope

The principal issues examined as part of this revision to the SSP include the following:

- Customer satisfaction and public education
- Analyze growth scenarios and develop plant and collection system expansion needs.
- Evaluate the existing wastewater collection system and treatment process in relation to future flows, loads and discharge standards.
- Assess system improvement needs, including capital costs and O&M requirements.
- Develop timeframes associated with necessary system improvements to encompass the plants and collection system.
- Update planning for future sewerage facilities to serve existing and expanded service area.

## Plan Updates

CTUB has committed to updating this document on a tri-annual basis. Adjustments to the SSP are based on the condition and performance of the overall system, updated construction data and new information regarding growth. Previously published SSP's serve as guidance to achieve accuracy in planning and to enhance the development of current and historical data. The accuracy of the planning process continues to be enhanced through the development of current data and historical data captured in previous SSP's. CTUB makes every effort to involve customers, officials and stakeholders in this process.

Tri-annual updating is expected to proceed in accordance with the following schedule:

- February      New data, information, and comments solicited from stakeholders
- March          Plan updated.
- April           Board of Directors review DRAFT SSP
- May             Draft Plan issued for comments
- May/June      Plan revised, adopted and published

## Project Planning

This SSP serves as a framework for decision making outlining the specific goals, strategies and objectives for the purpose of planning for future capital improvements based on a 10-year planning period from 2024 to the year 2034. Since the last SSP was adopted, CTUB has initiated the Renewal and Replacement project detailed in the prior SSP. CTUB awarded the project to Alvarez Contractors, Inc. in September 2022 for the construction of the Renewal and Replacement Project at the Charles Town Wastewater Plant. The project will replace critical equipment and aging infrastructure which will allow CTUB operations staff to be more efficient and have additional controls over the operation of the wastewater plant. There are also numerous collection system projects that are currently designed or in design that will address improved efficiencies and upgrade or decommission pump stations to reduce operation and maintenance costs. Based on analysis of available information the following recommendations outline projected near and long-term improvements:

- **Charles Town Wastewater plant**
  - Completion of Renewal and Replacement project
    - Expected to be completed by December 2024.
  - Sand Filters
    - Assessment of Sand Filters (completed December 2023).
    - Implementation of sand filter assessment and successful operation.
  - Future - Expansion of CTWWTP from 1.75 MGD
  - Water Treatment Plant Forcemain Tie-in Project
- **Tuscowilla Wastewater Treatment Plant (TWWTP)**
  - Assessment and possible installation of secondary MBR's.
  - Future – Expansion from 500,000 gpd and/or alternatives analysis
- **Completion of the 2022 Collection System Project (formerly JCPSD Flowing Spring project)**
- **Collection system projects:**
  - George/North/Liberty/Charles Gravity replacement
  - 6<sup>th</sup> Avenue/Reymann Gravity replacement
  - Mountaineer Pump Station Rehabilitation
  - Wilt's Mobile Home Park Pump Station Decommissioning
  - Belvedere Farm Pump Station Decommissioning

## Project Recommendations

Critical infrastructure upgrades will be detailed in this SPP. This will include a review of completed projects and future capital improvements. Since the last version of the SSP several key projects have started construction and others are moving through the design phase. In addition to the system wide improvements, it is necessary to begin planning and engineering for expansion of the CTWWTP in the next 10 years.

## Financial

The projected costs associated with the projects outlined above are detailed in this plan. CTUB recently completed the full rate equalization in January 2024. This was a significant accomplishment almost 5 years ahead of schedule. As part of the rate equalization process, CTUB completed a Class Cost of Service Study to assess rates for all customer classes. CTUB will continue to review this every 3 to 5 years to ensure rates are fair, equitable and consistent with the cost of service. CTUB continues to pursue a strategy for funding upgrades, and expansions in a manner that will minimize the burden to the current and future ratepayers. The Board intends to fund the costs for the renewal and replacement project and the facility expansions through conventional rate impacts, payment of prior bonds and Capacity Improvement Fees (CIFs). The CTWWTP and TWWTP Phase 2 Upgrade to 1.0 MGD will require separate funding strategies in a future SSP publication. If the current sewer tariff rates and fees are insufficient to generate funds prior to the next phase of expansion, the City will need to consider funding options for future expansion.

## INTRODUCTION

### Background

The Mission of the Charles Town Utility Board (CTUB) is to provide reliable water and sewer services that protect public health and the environment with financial accountability, regional stewardship, and superior customer service. Specific goals and key areas of focus are:

**Customer Service** – Provide efficient and effective level of service to meet customer and stakeholder expectations.

**Environmental Stewardship** – Take advantage of opportunities to invest in energy efficiency, renewable energy, water and sustainable practices that protect the environment. Meet all applicable regulatory notification and reporting requirements.

**Infrastructure Maintenance** – Properly manage, operate and maintain all parts of the wastewater collection system and provide best service in a cost-effective manner to the customer.

**Financial Stability** – Manage the CTUB finances to support the Utility needs and maintain reasonable sewer rates.

**Workforce Planning and Development** – Provide team-oriented workforce that is fully trained, fairly compensated, and accountable with clearly defined career paths for the evolving work environment.

**Operational Optimization** – Improve functions that support the administrative, financial, technical and field activities and provide the best service to the customer.

CTUB is a combined water and sewer utility that provides sanitary sewerage collection and treatment services for approximately 8,900 sewer customers comprising residential, commercial, industrial and public authority entities within the municipalities of the City of Charles Town, the City of Ranson as well as the surrounding areas within Jefferson County. The County has a population of just under 60,000 and encompasses 212 square miles.

CTUB has a five (5) member Board of Directors that meets twice monthly to consider issues of substance for Utility operations, making recommendations to the Utility Manager regarding infrastructure management, finances and other policy questions. Subsequent to the Utility consolidation, the Board of Directors has representation from the City of Ranson and Jefferson County (including a voting member and non-voting County Commission liaison). The Board of Directors are appointed by the Mayor and Council of the City of Charles Town and serve staggered four-year terms. In addition to the appointment of the Board of Directors, the City of Charles Town is responsible for the following as it pertains to CTUB:

- 1) Retains ownership of the assets of the system
- 2) Authorization of all changes in rates and charges for the water and sewer system
- 3) Issuance of bonds, notes and other debt obligations secured by the gross revenues of the system
- 4) Approval of capital projects for the water and sewer system which are not in the “normal course of business”; and
- 5) Approval of real property condemnations for the System.

CTUB has 31 full-time employees, 2 part-time employees and a sewer operating budget of roughly \$6 million annually. Infrastructure assets include three (3) wastewater treatment plants, 125 miles (over 100 miles of gravity and over 25 miles of force main) and 43 pump stations. CTUB has the ability to treat flows interchangeably between the CTWWTP and TWWTP facilities through the Huntfield Transfer Pump stations.

CTUB is a locally rate regulated utility with ultimate oversight by the West Virginia Public Service Commission (WVPSC). CTUB follows the Title 150 Legislature Rule Series 5 which is the rule for the Government of Sewer Utilities established by the WVPSC. Additionally, CTUB has Sewer Specifications and a Developer policy that define requirements for new development and additions/modifications to the sewer system.

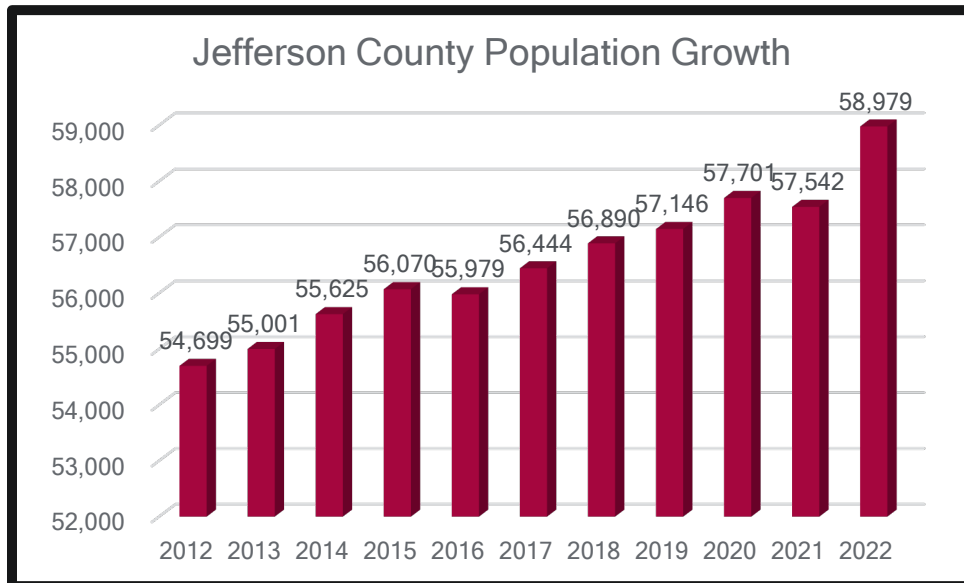
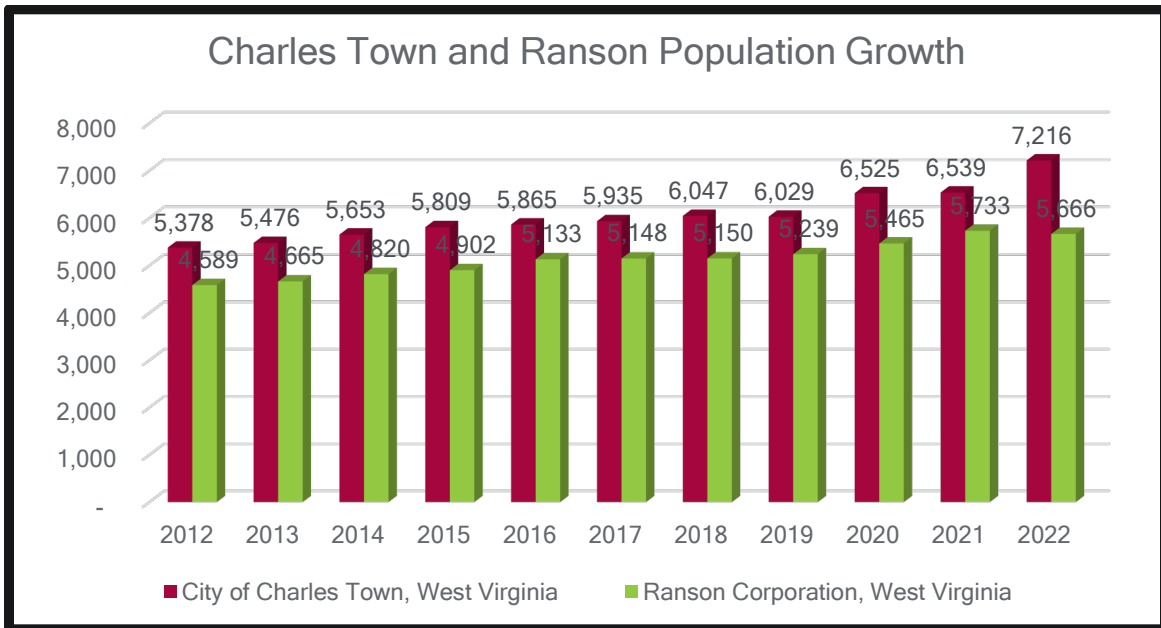
### Facilities Plan Summary

The period used for planning efforts for the Renewal and Replacement projects and 2021 collection system projects are based on a 10-year planning period. This period is the basis for evaluating population growth, estimating treatment capacity requirements, operational needs and evaluating treatment process alternatives. The overall planning period extends from 2024 to 2034 which includes short-term and long-term planning objectives. CTUB has completed the first steps in establishing a sewer-modeling efforts to assist with development of updated capacity improvement fees requirements and capital improvement projects for the next 15 years. Any capital projects identified in the sewer master plan will be included in future SSP's.

## EXISTING CONDITIONS

### Regional Growth and Service Area

The City of Charles Town, City of Ranson and Jefferson County have continued to experience consistent growth since the issuance of the last SSP. As demonstrated in the charts below, the growth rates in the region have maintained a steady 1% growth increase on an annual basis:



Reference: Annual Estimates of the Resident Population for Incorporated Places in West Virginia: April 1, 2020 to July 1, 2022 (SUB-IP-EST2022-POP). Source: U.S. Census Bureau, Population Division, Release Date: May 2020.

The City of Charles Town, City of Ranson and the Jefferson County Department of Planning, Zoning and Engineering have provided information regarding permits obtained since the issuance of the last SSP. Table 1.1 illustrates the past three years of residential and commercial development data. This historical data shows that an average of 490 residential units were built per year which is significantly up from the average of 129 residential units built per year from the prior reporting period (2018 to 2020).

<b>Table 1.1 - Development Growth Trend 2021-2023</b>					
<b>Region</b>	<b>Subdivision</b>	<b>Type</b>	<b>Building Permit Connections</b>		
			<b>2021</b>	<b>2022</b>	<b>2023</b>
County	Aspen Greens	Residential	0	12	26
County	Beallair	Residential	16	22	16
County	Walnut Grove	Residential	1	1	2
County	Burr Park	Commercial	4	5	2
County	Cambridge	Residential	4	3	1
County	Woodland MHP	Residential	0	0	2
County	Tuscawilla	Residential	1	0	0
County	Kings Crossing	Residential	0	0	27
County	Magnolia Springs	Residential	116	88	71
Charles Town	CT Limits	Commercial	0	1	0
Charles Town	CT Limits	Residential	5	16	18
Charles Town	Washington Landing	Residential	61	26	25
Charles Town	Tate Manor	Residential	29	34	17
Charles Town	Huntfield	Residential	0	43	84
Charles Town	Norborne Glebe	Residential	1	115	155
Ranson	Ranson Limits	Commercial	0	0	2
Ranson	Ranson Limits	Residential	2	5	3
Ranson	President's Pointe	Residential	6	28	106
Ranson	Shenandoah Springs	Residential	0	28	61
Ranson	Briar Run	Residential	4	0	0
Ranson	Huntwell West	Residential	0	0	26
Ranson	Potomac Marketplace	Commercial	0	0	2
Ranson	Jefferson Crossing	Residential	37	43	84
<b>Total Residential Building Permits</b>			<b>283</b>	<b>464</b>	<b>724</b>
<b>Total Commercial Building Permits</b>			<b>4</b>	<b>6</b>	<b>6</b>

## Future Development Projections

In addition to the historical information that was provided, future development forecasts were obtained from the City of Charles Town, City of Ranson and Jefferson County Department of Planning Zoning and Engineering that will be monitored to determine necessary improvements to the sewer system. For the purposes of these future projections an average annual build-out of 30 units per year for larger subdivisions/developments is being used for those developments that have surpassed the Concept Plan stage. For those developments that have not entered the design phase but may still come to fruition, a projection of an average built-out of 20 units per year is being used. These averages are based on the most recent historical trends of building within the County. These projections may vary depending on various economic factors such as growth and development trends. Details of the projections are presented in Table 1.2 and known historical data has been utilized for future volumetric capacity forecasting. A full copy of the Development Forecast is included in Appendix A. Refer to Exhibit 1-2 in Appendix C for the location of projected developments.

The housing market in the region has experienced tremendous growth over the past three years and continues in an upward trend with several large housing developments currently under construction. Commercial growth has also seen significant upward trends since the development of the last SSP.

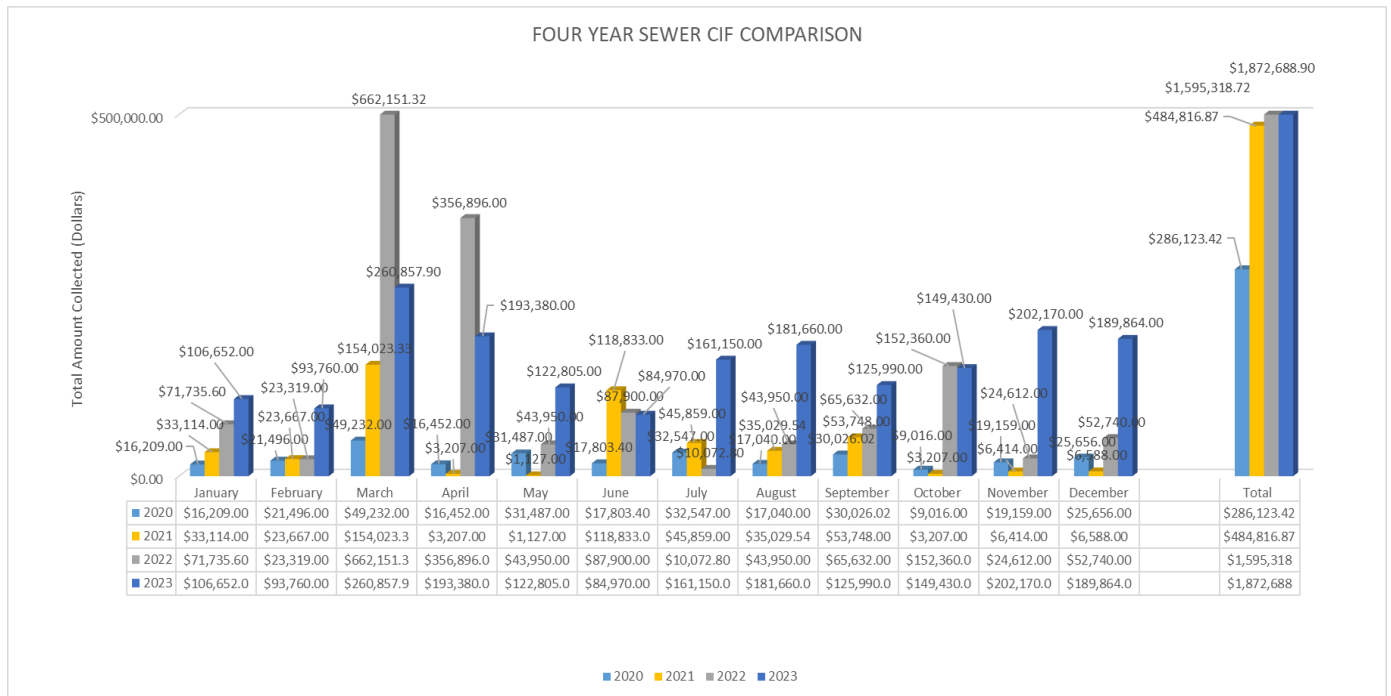
		Table 1.2 - CTUB Sewer Strategic Plan 2024 Development Forecast																			
	Development	Total Design EDUs	Total Built as of 2024	20 year forecast to be built	Total Flow	Beyond 20 year forecast	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Years 11-20	TOTAL @ Year 20	TOTAL REMAINING		
							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034-2043				
1	Aspen Green	203	85	118	30,450	0	30	30	30	28	0	0	0	0	0	0	0	118	0		
2	Beallair	372	176	196	55,800	0	30	30	30	30	30	30	16	0	0	0	0	196	0		
3	Blackford Village/Tackley Mill	500	0	500	75,000	0	0	0	0	0	0	0	0	20	20	20	200	260	240		
4	Briar Run	164	126	38	24,600	0	30	8	0	0	0	0	0	0	0	0	0	38	0		
5	Burr Industrial Park & Bardane	200	178	22	30,000	0	3	3	3	3	3	3	3	1	0	0	0	22	0		
6	Cambridge	134	92	42	20,100	0	3	3	3	3	3	3	3	3	3	3	12	42	0		
7	Cantor Hollow	124	0	124	18,600	0	0	0	30	30	30	34	0	0	0	0	0	124	0		
8	Charles Town Infill	250	38	212	37,500	112	5	5	5	5	5	5	5	5	5	5	50	100	112		
9	Clayhill Farm	300	0	300	45,000	0	0	0	0	0	0	20	20	20	20	20	200	300	0		
10	Country Club Commons	8	0	8	1,200	0	0	0	1	1	1	1	1	1	1	1	0	8	0		
11	Fairview	450	0	450	67,500	0	0	0	30	30	30	30	30	30	30	30	210	450	0		
12	Harvest Hills	392	6	386	58,800	166	0	0	0	0	0	0	0	0	0	0	200	220	166		
13	Huntfield	3,200	554	2,646	480,000	2,046	30	30	30	30	30	30	30	30	30	30	300	600	2046		
14	Huntwell West	350	26	324	52,500	0	30	30	30	30	30	30	30	30	30	30	24	324	0		
15	Jefferson Orchards	888	0	888	133,200	688	0	0	0	0	0	0	0	0	0	0	200	200	688		
16	Kable Townhomes	22	0	22	3,300	0	0	22	0	0	0	0	0	0	0	0	0	22	0		
17	King's Crossing	404	58	346	60,600	0	30	30	30	30	30	30	30	30	30	30	46	346	0		
18	Locust Knoll	300	0	300	45,000	0	0	0	20	20	20	20	20	20	20	20	140	300	0		
19	Magnolia Springs	300	259	41	45,000	0	41	0	0	0	0	0	0	0	0	0	0	41	0		
20	Norborne Glebe	1,050	626	424	157,500	0	30	30	30	30	30	30	30	30	30	30	124	424	0		
21	Old Town Ranson - Infill	250	10	240	37,500	90	10	10	10	10	10	10	10	10	10	10	50	150	90		
22	Orchard Springs	270	0	270	40,500	0	0	30	30	30	30	30	30	30	30	30	0	270	0		
23	Potomac Marketplace	54	2	52	8,100	0	5	5	5	5	5	5	5	5	5	5	2	52	0		
24	President's Pointe	1,100	233	867	165,000	267	30	30	30	30	30	30	30	30	30	30	300	600	267		
25	Prospect Place	170	0	170	25,500	0	0	0	0	0	9	9	25	25	25	25	52	170	0		
26	Ranson Gateway / Boulevard	1,175	0	1,175	176,250	815	0	0	20	20	20	20	20	20	20	20	200	360	815		
27	Ranson Heights	428	0	428	64,200	0	30	30	30	30	30	30	30	30	30	30	128	428	0		
28	Red Clover Meadows (formerly Lloyd Property)	258	0	258	38,700	0	30	30	30	30	30	30	30	30	18	0	0	258	0		
29	Shenandoah Springs	705	285	420	105,750	0	30	30	30	30	30	30	30	30	30	30	120	420	0		
30	Spring Hill	588	0	588	88,200	48	0	0	30	30	30	30	30	30	30	30	300	540	48		
31	Stonecrest	320	0	320	48,000	0	30	30	30	30	30	30	30	30	30	30	20	320	0		
32	Stone Spring (formerly Fritts Property)	328	0	328	49,200	0	30	30	30	30	30	30	30	30	30	30	28	328	0		
33	Washington Landing	274	204	70	41,100	0	70	0	0	0	0	0	0	0	0	0	0	70	0		
34	Windmill Crossing	150	146	4	22,500	0	1	1	1	1	0	0	0	0	0	0	0	4	0		
35	Lakeland Place	464	0	464	69,600	0	0	0	30	30	30	30	30	30	30	30	224	464	0		
36	Shoemaker Property	300	0	300	45,000	0	0	0	30	30	30	30	30	30	30	30	60	300	0		
37	WVU Medical	500	0	500	75,000	50	0	0	0	0	0	30	30	30	30	30	300	450	50		
38	Hillside	150	0	150	22,500	0	0	30	30	30	30	30	0	0	0	0	0	150	0		
39	Vinton Property	300	0	300	45,000	0	0	0	30	30	30	30	30	30	30	30	60	300	0		
<b>Total Projected Development</b>		<b>16,145</b>	<b>3,104</b>	<b>14,291</b>	<b>2,541,750</b>	<b>4,232</b>	<b>528</b>	<b>447</b>	<b>548</b>	<b>546</b>	<b>526</b>	<b>550</b>	<b>518</b>	<b>520</b>	<b>507</b>	<b>509</b>	<b>3,130</b>	<b>8,569</b>	<b>4,472</b>		

### Capacity Improvement and Development Fees

Capacity Improvement fees (CIF's) are one-time charges assessed against new wastewater customers or developers/builders to recover a proportional share of capital costs incurred to provide capacity for the new utility customers. CTUB completed a CIF study that was completed in December 2021 which set the Sewer CIF at \$2,930.00 per equivalent dwelling unit (or per single family home).

A high-level assessment with this study provides the Board with assurance that the CIF fee remains consistent with the CIF study based on changes incorporated in this document. Additional projects will be considered to ensure that the CIF remains in alignment. The Board intends to evaluate the CIF every 3 years.

The following is chart depicts a four-year comparison of sewer capacity fees collected:



## WASTEWATER TREATMENT

### Description of Existing Treatment Systems

CTUB operates three wastewater plants: the Charles Town Wastewater Treatment Plant (CTWWTP), the Tuscowilla Wastewater Treatment Plant (TWWTP) and the Deerfield Sewer Treatment Plant. These wastewater facilities are designed to process the wastewater collected throughout the community and return the treated water to the environment. The treat methods included a number of physical and biological processes designed to provide optimal conditions for nutrient removal. CTUB is regulated by the West Virginia Department of Environmental Protection (WVDEP) through the U.S. Environmental Protection Agency (EPA).

### Charles Town Wastewater Treatment Plant (CTWWTP)

The CTWWTP is located on WV route 115 in Charles Town. The facility is a Sequencing Batch Reactor (SBR) treatment facility which operates as an Intermittent Cycle Extended Aeration System (ICEAS) and has a hydraulic capacity of 1.75 million gallons per day (MGD). Wastewater treatment components include one (1) coarse bar screen and compactor, one (1) grit removal system with a washer/compactor, one wet well with three (3) submersible pumps, an influent distribution box, three (3) SBR process trains operated in parallel with chemical addition for phosphorus removal, one (1) post SBR equalization tank, six (6) denitrification filters operated in parallel (currently bypassed) with chemical addition for phosphorus removal and carbon addition for denitrification, one (1) ultraviolet (UV) disinfection system and a utility water system (currently not in use). The solids handling consists of three (3) aerobic digesters operated in parallel, one (1) 573,000-gallon aerobic digester (currently not in use), one (1) sludge transfer pump, one (1) belt filter press with conveyor and one (1) lime silo with one (1) dry feed system and screw auger. The belt filter solids are land applied on farms permitted by the WV DEP.

The Charles Town facility originally consisted of primary treatment, activated sludge tanks, secondary settling basins, disinfection by chlorination, aerobic sludge digestion and sand drying beds. The plant was expanded in 1987 to include a third aeration basin and settling basin. Additionally, the plant added an open-channel Ultraviolet Disinfection (UV) unit and a belt filter press with the associated structures. The sand drying beds were removed as part of this expansion.



The plant was upgraded in 2001 and converted the SBR to an ICEAS process. The current influent pump station, headworks building and blower building were also constructed as part of this upgrade. The 573,000-gallon aerobic digester tank was added to the facility during an upgrade in 2005. The digester tank was built to provide additional sludge processing time and increased storage capacity in an effort to produce higher quality solids. Additionally, denitrification filters were installed at the facility in 2016, which included chemical addition facilities for a coagulant for phosphorus precipitation and carbon for denitrification.

The CTWWTP accepts non-domestic wastewater from the Charles Town Water Plant. The Utility Board currently hauls approximately 6,000-9,000 gallons per week of non-domestic liquid water treatment facility sludge from their existing plant to the CTWWTP digester for processing and thickening. This sludge which is 2-6% solids, consists primarily of river laden material such as sand and dirt along with an aluminum-based coagulant from the sedimentation basins and conventional sand filters. The contents are generally rich in total organic carbon (TOC) from the river source and are difficult to press with the existing Ashbrook belt filter press. The filtrate from the press is returned back to the headworks. The maximum daily permitted volume is 10,000 gallons. The designated NPDES discharge is Outlet No. 001.

The water treatment plant sludge requires a significant amount of polymer addition and adds to the total amount of generated dry tons. It also increases the amount of lime needed for raising the solids pH content. CTUB is currently pursuing alternative options to treat and dispose of the water treatment facility sludge through a connection to an adjacent developments sanitary sewer system. This connection is expected to be complete in 2024. This will eliminate the expense and treatment issues with the current method of hauling the sludge to the wastewater treatment facility.

The CTWWTP operates under the West Virginia NPDES No. WV0022349. The current permit, reissued on August 23, 2021, expires on June 30, 2026.

The CTWWTP is permitted for an annual average flow of 1.75 million gallons per day (MGD). Additionally, if the facility discharges 90% (1.58 MGD) or more of its permitted flow over 3 consecutive months, a Plan of Action must be submitted to the WVDEP to demonstrate how to address the capacity of the facility. The maximum monthly average flow during the period of 2021 through 2023 was 1.22 MG.

This facility serves a population equivalent of approximately 17,500 persons in the City of Charles Town, the City of Ranson and the surrounding areas of Jefferson County and discharges treated wastewater through Outlet No. 001 to Evitts Run, approximately 4.5 miles from its mouth, of the Shenandoah River of the Potomac River.

### CTWWTP Flows and Loading

Historical flow and loading data have been compiled and analyzed for the system. This data provides the basis for projecting future flows and loadings to better understand the timing when a capacity restriction may occur at one of the treatment processes and thus must be addressed in order to provide adequate capacity to serve future growth. Table 1.3 summarize the historical and current values for flow for the CTWWTP.

TABLE 1.3: CTWWTP PLANT FLOWS 2021-2023								
2021			2022			2023		
	Total (MG)	AVERAGE (MG)		Total (MG)	AVERAGE (MG)		Total (MG)	AVERAGE (MG)
JANUARY	35.83	1.22	JANUARY	37.25	1.20	JANUARY	36.55	1.21
FEBRUARY	32.98	1.18	FEBRUARY	33.8	1.21	FEBRUARY	28.96	1.03
MARCH	36.39	1.17	MARCH	33.28	1.07	MARCH	30.46	1.02
APRIL	34.33	1.18	APRIL	32.98	1.1	APRIL	29.52	0.98
MAY	33.24	1.07	MAY	35.86	1.16	MAY	30.78	0.99
JUNE	36.24	1.21	JUNE	29.9	1.00	JUNE	29.64	0.99
JULY	30.99	1.00	JULY	29.78	0.96	JULY	31.2	1.01
AUGUST	29.94	0.97	AUGUST	30.19	1.01	AUGUST	29.96	1.00
SEPTEMBER	36.36	1.17	SEPTEMBER	29.62	0.96	SEPTEMBER	33.38	1.11
OCTOBER	29.97	0.97	OCTOBER	29.02	0.94	OCTOBER	33.02	1.07
NOVEMBER	30.12	1.00	NOVEMBER	30.09	1.00	NOVEMBER	33.61	1.12
DECEMBER	35.22	1.21	DECEMBER	35.38	1.14	DECEMBER	35.2	1.14
Annual Total	401.61	1.11	Annual Total	387.15	1.06	Annual Total	382.28	1.06

Table 1.4 below summarizes the historical plant flow for the CCWWTP from 2019 through 2023. The percent plant capacity on a Maximum 3-month average daily flow basis varied from 65% to 89%. The plant expansion has been noted in the past several SSP's and is further discussed in the future projects section of this SSP. Growth has continued to increase and will be monitored to ensure that appropriate measures are taken to address sewer infrastructure and capacity needs in order to meet the needs of the regional utility.

CTUB continues to monitor growth as well as optimization efforts that have been recommended by CTUB Engineer's Gwin, Dobson & Foreman in advance of the CTWWTP expansion that may extend the service life of the existing facility, enhance process operations and provide additional capacity and improve treatment efficiencies. These optimization efforts include proper digesting of sludge through the addition of equipment which will reduce costs for sludge handling and disposal. These improvements that are part of the Renewal and Replacement project are expected to have significant impact on the operations of the facility and treatment.

<b>Table 1.4: Historical Plant Flow CTWWTP</b>					
<b>Year</b>	<b>Total Annual Flow (MG)</b>	<b>Annual Average Daily Flow (MGD)</b>	<b>Average Daily Flow (3-month max.)</b>	<b>Permit Capacity (MGD)</b>	<b>Percent Capacity (Average 3-month max/Permit)</b>
2019	459	1.26	1.56	1.75	89%
2020	419.7	1.15	1.24	1.75	71%
2021	401.61	1.11	1.52	1.75	87%
2022	387.15	1.06	1.19	1.75	68%
2023	382.28	1.06	1.13	1.75	65%

The CTWWTP and TWWTP Facilities share total effluent loading limits to the Chesapeake Bay via Outfall 003. Table 1.5 below details the outlets associated with WV0022349:

<b>Table 1.5: WV/NPDES WV0022349 Outfall Descriptions</b>	
<b>Outfall ID</b>	<b>Project Description</b>
001	Charles Town Plant outlet to Evitts Run
002	Tusawilla Plant outlet regardless of whether it is discharged to Evitts Run or used for spray irrigation
202	Contribution of the total load from the Tusawilla Plant that is used by the golf course for spray irrigation
203	Contribution of the total load from the Tusawilla Plant that is discharged directly to Evitts Run through the new effluent line
003	Total load actually discharged to Evitts Run. This is the calculated sum of the loads determined from Outlet 001 and Internal Outlet 203.

The effluent limits for Outfall 001 are listed below in Tables 1.6 through 1.8 and the minimum sampling and monitoring frequencies are listed in Table 1.6. The tables below include the following parameters:

Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), Ammonia (NH<sub>3</sub>), Total Nitrogen (TN) Total Phosphorous (TP). TN and TP concentrations.

<b>Table 1.6: NPDES EFFLUENT LIMITS (OUTLET 001) BOD5, TSS AND AMMONIA-NITROGEN</b>						
<b>Effluent Characteristics</b>	<b>Monthly Average Loading Rate, lbs./day</b>	<b>Weekly Average Loading Rate, lbs./day</b>	<b>Max Daily Loading Rate, lbs./day</b>	<b>Monthly Average Concentration, mg/L</b>	<b>Weekly Average Concentration, mg/L</b>	<b>Max Daily Concentration, mg/L</b>
BOD5	301	N/A	601	20.6	N/A	41.2
TSS*	438	N/A	876	30	N/A	60
Ammonia-Nitrogen as N	60	N/A	120	4.1	N/A	8.2

<b>Table 1.7: TMDL ANNUAL WASTELOAD ALLOCATIONS: NITROGEN AND PHOSPHOROUS</b>			
<b>Effluent Characteristics</b>	<b>Charles Town Plant (Outfall 001)</b>	<b>Tuscowilla Plant (Outfall 203)</b>	<b>Annual Total Load Limit (Outfall 003)</b>
Total Nitrogen	32,115 lbs.	10,740 lbs.	42,855 lbs.
Total Phosphorus	3,577 lbs.	1,790 lbs.	5,367 lbs.

<b>Table 1.8: EFFLUENT LIMITS (OUTFALL 001); COLIFORM, RESIDUAL CHLORINE, Ph AND D.O.</b>		
<b>Effluent Characteristics</b>	<b>Maximum</b>	<b>Minimum</b>
<b>Fecal Coliform</b>	200 Counts/100 mL (Geo. Mean)	N/A
	400 Counts/100 mL (Maximum)	
<b>pH</b>	9	6
<b>Dissolved Oxygen (All Year)</b>	N/A	6.0 mg/L at anytime

**Table 1.9: ANNUAL NPDES PERMIT MINIMUM MONITORING REQUIREMENTS (OUTLET 001)**

<u>Effluent Characteristics</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
BOD5	Once per week	24-hour composite
BOD5 % Removal	Four per month	Calculated
Total Suspended Solids (TSS)	Once per week	24-hour composite
Suspended Solids % Removal	Four per month	Calculated
Fecal Coliform	Once per week	Grab
pH	Once per week	Grab
Dissolved Oxygen	Once per week	Grab
Ammonia Nitrogen	Once per week	24-hour composite
Total Nitrogen as N (Monthly)	Once per week	24-hour composite
Total Nitrogen as N (Yearly)	Once per year	Calculated
Total Phosphorous (Monthly)	Once per week	24-hour composite
Total Phosphorous (Yearly)	Once per year	Calculated
Total Copper	Once per quarter	24-hour composite
Total Lead	Once per year	24-hour composite
Total Zinc	Once per year	24-hour composite
Total Arsenic as As	Once per year	24-hour composite
Total Cadmium	Once per year	24-hour composite
Hexavalent Chromium	Once per year	24-hour composite
Cyanide	Once per year	Grab
Total Mercury as Hg	Once per month	Grab
Total Nickel	Once per year	24-hour composite
Total Silver	Once per year	24-hour composite
Total Hardness as CaCO <sub>3</sub>	Once per 6-month period	Grab
Total Aluminum	Once per quarter	24-hour composite
Chloride as Cl	Once per quarter	24-hour composite
Chronic Tox. - Ceriodaphnia Dubia	Once per year	24-hour composite
Chronic Tox. - Pimephales Promelas	Once per year	24-hour composite
Flow	Continuous	Measured

Annual effluent loading limits contained in the permit were established under the Chesapeake Bay Total Maximum Daily Load (TMDL) for total nitrogen (TN) and total phosphorus (TP). The Charles Town and Tusawilla Facilities share total effluent loading limits to the Chesapeake Bay via Outfall 003. The other discharge limits are typical water quality - based limitations developed by the West Virginia Department of Environmental Protection.

### Tuscowilla Wastewater Treatment Plant (TWWTP)

The TWWTP is a Biological Nutrient Removal (BNR) intergraded with a Membrane Bio-Reactor (MBR) treatment facility having a hydraulic capacity of 0.50 million gallons per day (MGD). Wastewater treatment components include preliminary treatment consisting of one (1) coarse bar screen and compactor, one (1) grit removal system with a washer/compactor, one (1) flow equalization impoundment, one (1) wet well with four (4) submersible pumps and two (2) fine drum screens and compactor, two (2) BNR process treatment trains operated in parallel, chemical addition for phosphorus removal and carbon addition for denitrification, a single MBR basin in operation, one (1) ultraviolet (UV) disinfection system and a utility water system. The solids handling consists of an aerobic digester. Liquid aerobic sludge is transported to the CTWWTP for further processing and disposal. The facility primarily serves the Tuscowilla Hills Subdivision and Locust Hills area. Treated wastewater is discharged to the Tuscowilla Golf Course ponds and irrigation system (to the west) and also into Evitts Run, which is a tributary to the Shenandoah River, via a pumping system (to the east). The upgraded TWWTP has been in operation since 2014. In August of 2020 the MBR filters in Basin #3 were replaced with Toray Filters. The TWWTP operates under the West Virginia NPDES No. WV0022349. The current permit, reissued on August 23, 2021, expires on June 30, 2026. The TWWTP is permitted for an annual average flow of 0.5 million gallons per day (MGD).

### TWWTP Flows and Loading

Historical flow and loading data have been compiled and analyzed for the system. This data provides the basis for projecting future flows and loadings to better understand the timing when a capacity restriction may occur at one of the treatment processes and thus must be addressed in order to provide adequate capacity to serve future growth. Table 2.1 summarize the historical and current values for flow.

TABLE 2.1: TWWTP PLANT FLOWS 2021-2023								
2021			2022			2023		
	Total (MG)	AVERAGE (MG)		Total (MG)	AVERAGE (MG)		Total (MG)	AVERAGE (MG)
JANUARY	0.52	0.07	JANUARY	0	0	JANUARY	7.3	0.24
FEBRUARY	2.22	0.08	FEBRUARY	0	0	FEBRUARY	6.38	0.23
MARCH	4.22	0.14	MARCH	4.34	0.14	MARCH	6.41	0.21
APRIL	1.12	0.04	APRIL	4.68	0.16	APRIL	6.13	0.20
MAY	0.89	0.03	MAY	6.03	0.19	MAY	6.30	0.20
JUNE	3.37	0.11	JUNE	6.21	0.21	JUNE	6.89	0.23
JULY	3.9	0.13	JULY	6.48	0.21	JULY	7.31	0.24
AUGUST	3.6	0.12	AUGUST	7.01	0.23	AUGUST	7.7	0.25
SEPTEMBER	4.53	0.15	SEPTEMBER	7.11	0.24	SEPTEMBER	6.98	0.23
OCTOBER	3.94	0.13	OCTOBER	7.27	0.23	OCTOBER	6.92	0.22
NOVEMBER	3.73	0.12	NOVEMBER	6.94	0.23	NOVEMBER	7.22	0.24
DECEMBER	0.51	0.07	DECEMBER	6.73	0.22	DECEMBER	8.24	0.27
Annual Total	32.55	0.10	Annual Total	62.8	0.17	Annual Total	83.78	0.230

Table 2.2 summarizes the historical plant flow for the TWWTP from 2019 through 2023. The percent plant capacity on a Maximum 3-month average daily flow basis varied from 0% to 43%.

Table 2.2: Historical Plant Flow TWWTP					
Year	Total Annual Flow (MG)	Annual Average Daily Flow (MGD)	Average Daily Flow (3-month max.)	Permit Capacity (MGD)	Percent Capacity
2019	55.24	0.15	0.14	0.5	29%
2020	1.09	0.16	0.00	0.5	0%
2021	32.55	0.1	0.13	0.5	25%
2022	62.8	0.17	0.11	0.5	22%
2023	83.78	0.23	0.21	0.5	43%
** TWWTP was offline for the majority of 2020 due to MBR replacement					

Table 2.3: NPDES EFFLUENT LIMITS (OUTLET 002) BOD5, TSS AND AMMONIA-NITROGEN				
Effluent Characteristics	Monthly Average Loading Rate, lbs./day	Max Daily Loading Rate, lbs./day	Monthly Average Concentration, mg/L	Max Daily Concentration, mg/L
BOD5	42	83	10	20
TSS*	125	250	30	60
Ammonia-Nitrogen	8.3	16.7	2	4

Table 1.7: TMDL ANNUAL WASTELOAD ALLOCATIONS: NITROGEN AND PHOSPHOROUS			
Effluent Characteristics	Charles Town Plant (Outfall 001)	Tuscawilla Plant (Outfall 203)	Annual Total Load Limit (Outfall 003)
Total Nitrogen	32,115 lbs.	10,740 lbs.	42,855 lbs.
Total Phosphorus	3,577 lbs.	1,790 lbs.	5,367 lbs.

Table 2.4: EFFLUENT LIMITS (OUTFALL 002); COLIFORM, RESIDUAL CHLORINE, Ph AND D.O.		
Effluent Characteristics	Maximum	Minimum
Fecal Coliform	200 Counts/100 mL (Geo. Mean) 400 Counts/100 mL (Maximum)	N/A
pH	9	6
Dissolved Oxygen (All Year)	N/A	6.0 mg/L at anytime

Annual effluent loading limits contained in the permit were established under the Chesapeake Bay Total Maximum Daily Load (TMDL) for total nitrogen (TN) and total phosphorus (TP).

Nutrient offsets continue to enhance the City's ability to expand wastewater treatment capacity in light of the nutrient removal requirements of the Chesapeake Bay Program. Because the Tuscowilla WWTP is adjacent to the Locust Hills Golf Course, a portion of its effluent flow is utilized for course irrigation. Telemetry triggers the use of the Tuscowilla Effluent Line for direct discharge to Evitts Run (Outlet 203) when flows exceed Golf Course irrigation use.

Annual reports are submitted to WVDEP for reporting period September through August. Table 2.5 demonstrates CTUB's ability to achieve Chesapeake Bay nutrient limits:

Table 2.5: Nutrient Reporting								
Year	CTWWTP Nitrogen lbs./year	CTWWTP Phosphorous lbs./year	TWWTP Nitrogen lbs./year	TWWTP Nitrogen lbs./year	Total Nitrogen (Outlet 003) <u>Annual Limit</u> <u>42,855</u>	Total Phosphorous (Outlet 003) <u>Annual Limit</u> <u>5,367</u>	Golf Course Total Nitrogen (Outlet 202)	Golf Course Total Phosphorous (Outlet 202)
2020-2021	17,112	1,785	1,643	473	13,617	1,550	1,643	473
2021-2022	19,194	2,045	3,190	1,361	17,247	1,904	3,190	1,361
2022-2023	17,127	2,036	4,993	498	17,127	2,036	4,993	498

## Deerfield Treatment Plant

The Deerfield Sewer Treatment Plant is located off Route 480 on Southpaw Lane between Route 9 and Shepherdstown. The facility consists of two adjacent Ashco re-circulating sand filter wastewater treatment plants, one pump station and twelve septic tanks with associated piping. The effluent from this system is distributed just below ground level into two disposal fields.

The Deerfield operates under the West Virginia Department of Environmental Protection Underground Injection Control Permit No. 1503-20-037. The current permit was renewed with an effective date of August 25, 2021 and an expiration date of August 25, 2026. The monitoring requirements are detailed in Table 3.1:

Effluent Characteristics	Measurement Frequency	Sample Type
Dissolved Oxygen	Once per 6 months	Grab
BOD, 5-day	Once per 6 months	Grab
Total Suspended Solids (TSS)	Once per 6 months	Grab
Total Nitrogen	Once per 6 months	Grab
Total Phosphorous	Once per 6 months	Grab
Flow	Once per 6 months	Grab
Fecal Coliform	Once per 6 months	Grab
pH	Once per 6 months	Grab

## Performance and Capacity of Existing Treatment Systems

Effluent results indicate that both the CTWWTP and TWWTP facilities produce effluent water quality consistently meeting the permit requirements. The effluent data demonstrates that BOD and TSS concentrations are generally below the 30-day average permit value. Average monthly effluent NH<sub>3</sub> concentrations are also observed to be below the minimum daily maximum permit values.

Flow projections for the CTWWTP indicate expansion improvements will be necessary within the next ten years. In 2021 CTUB had Dewberry and GDF, Inc. review the Capacity Improvement Fees as well as a high-level assessment of future capacity needed for a Wastewater Treatment plant expansion. It is anticipated that in 2030 an expansion up to 2.35 with a potential future expansion of the TWWTP Phase 2 Expansion to 1.0 MGD. Based on the data in Table 1.10, growth projections in Table 1.2 and Appendix A, CTUB will begin preliminary evaluation of options for regional wastewater facility needs and expansion in 2024/2025 based on the extensive time required to design and permit a substantial plant upgrade.

## Nutrient Management

Nutrient Management continues to be critical in the regulatory permitting and treatment of sanitary sewer. Previous versions of the SSP documented the history of the implementation of US Environmental Protection Agency (USEPA) 2010 Chesapeake Bay Watershed Initiative. As a headwater partner in the Chesapeake Bay Program, West Virginia established permitted Total Nitrogen and Total Phosphorous pounds. CTUB continues to follow changes in the regulatory requirements to determine necessary changes that may be forthcoming in the Watershed Implementation Program (WIP). CTUB is compliant with nutrient management requirements. CTUB must report nutrient removal for the annual period September 1 to August 31. Table 4.1 depicts permitted pounds and actual pounds removed for the period 2020 through current reporting.

Table 4.1: Nutrient Management

	Total Permitted Nitrogen (lbs./yr.)	Total Reported (lbs./yr.)	Total Permitted Phosphorous (lbs./yr.)	Total Reported (lbs./yr.)
2020- 2021	42,855	13,617	5,367	1,550
2021- 2022	42,855	17,247	5,367	1,904
2022- 2023	42,855	17,127	5,367	2,036

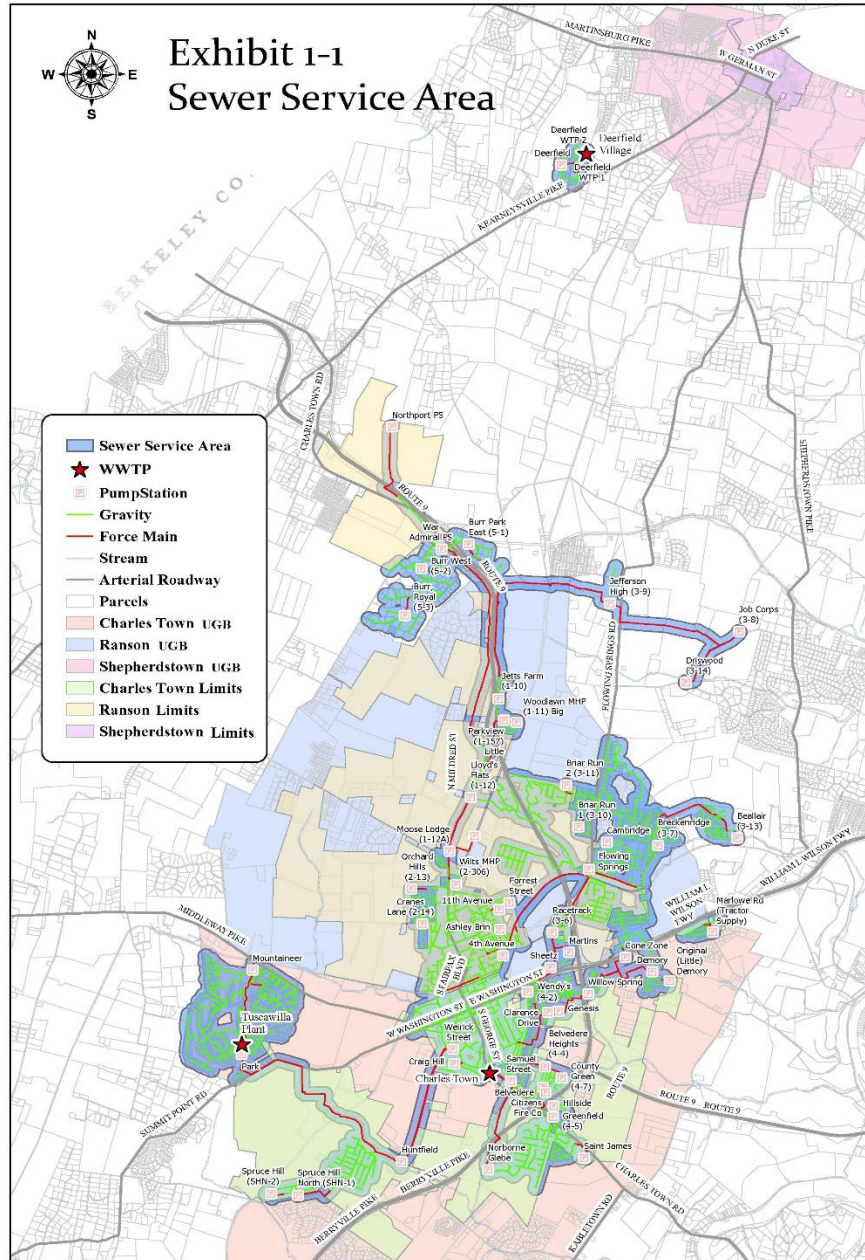
Forecasted capacity must now also be based on nutrient limitations. In addition to volumetric capacity, nutrient limits will be a factor in determining the timing of capital projects. The ability to achieve the reported levels, as shown in Table 4.1, will eliminate the need for the CTWWTP Nutrient Removal Phase 2 Project.

### Sludge Disposal

Sludge Management is covered under the West Virginia NPDES No. WV0022349. The current permit, reissued on August 23, 2021, expires on June 30, 2026. The requirements for sludge management reporting are extensive and are covered in the permit. The Charles Town Plant currently accepts all of the waste sludge from Tuscowilla as well as the water treatment plant process waste. An upgrade to the sludge process is included with the Renewal and Replacement project which will eliminate the belt press process and construct a new centrifuge process. This process will eliminate the use of lime and will drastically improve operations with a reduction in labor expense due to the improved process.

## COLLECTION SYSTEM, TRANSMISSION MAINS AND PUMP STATIONS

CTUB provides wastewater service to approximately 8,800 sewer customers through a network of collection and transmission systems through over 125 miles (over 100 miles of gravity and over 25 miles of force main) and 43 pump stations to the three (3) treatment facilities noted in the previous section. Refer to Exhibit 1-1 and Appendix B for the current collection system service area and pump station locations.



## Collection System and Pumping Stations

The collection system includes gravity and force mains that range from 1.5 to 24 inches in diameter. The collection system comprises of varying pipe materials including asbestos-cement, clay, ductile, cast and PVC piping. There are significant portions of the collection system that are aging and will likely need of repairs or replacement. A sewer hydraulic model was completed in January 2021 that identified several portions of the conveyance system that may need to be addressed due to capacity concerns. Specifically, the study identified capacity concerns along the Evitt's Run interceptor as well as the gravity line through Jefferson Memorial Park. These critical upgrades have been included in the 2022 Collection System Project.

Additionally, studies have focused on manholes structures throughout the system that need to be repaired or replaced in the near future. To the extent possible these will be achieved within the annual operation and maintenance budgets. CTUB will continue to perform flow monitoring throughout the system to assess capacity constraints.

Pump stations and force mains are used to pump flows to another gravity collection system, to a master pump station or directly to the wastewater treatment facilities. There are 43 pump stations in the CTUB system. As a result of utility consolidation, efficiencies have been realized that allow for the installation of gravity sewer mains and decommissioning of pump stations. Where possible, the efficiencies will be pursued to reduce overall operation and maintenance expenses. To the extent possible these projects may be performed in-house to reduce overall project costs.

## Fats, Oils and Grease

Overflows and sewer backups are commonly caused by fats, oil and grease (FOG). FOG gets into the sewer from household drains and neglected grease interceptors at businesses and restaurants. The FOG blocks sewer pipes, causing health hazards and leading to expensive fixes. CTUB will focus on community education and outreach to reduce the damage to the utility sewer system.

## Inflow and Infiltration

Inflow occurs when stormwater flows directly into the sewer collection system. This may be through a manhole cover, or a cross connection between a storm drain and the sewer collection system. Infiltration is typically caused by ground water entering the collection system at defects in mains, laterals or manholes. CTUB has included additional smoke testing in the operational budgets for the next Strategic Planning period. CTUB continues to assess ways to address disconnection of any cross connections of storm drains to the sewer system which are considered illegal connections. CTUB is working with the City of Charles Town staff and officials to determine the appropriate enforcement actions to remove the illegal connections from the sewer system.



## PROJECT REVIEW

### Completed Projects

Since the last issuance of the SSP, significant improvements have been made throughout the treatment and collection system. Necessary upgrades and improvements to the CTWWTP and TWWTP were completed to address WVDEP Inspection requirements as well as operation and maintenance improvements to the collection and pump station network have been made as a result of consolidation into a regional utility. These improvements include elimination of pump stations through installation of gravity lines which reduce operation and maintenance expenses as well as projects that address rehabilitation of aging pump stations and lines to further reduce utility expenses.

Table 5.1: Projects Completed since 2021 SSP	
Year	Project Description
2021	NPDES Permit Reissuance
2021	Completed 1st step in rate equalization
2021	Completed Manhole assessment
2021	\$1,966,030 EEG Grant received for the Renewal and Replacement Project
2021	Decommissioned Hale Road and County Green Pump Stations
2021	Initiated and Completed Sewer Capacity Improvement fee assessment
2022	Issue Notice to Proceed on Renewal and Replacement Project in September 2022
2022	Cave Road and Shenandoah Junction Distressed Utility assistance
2022	Initiate Greenfield Force main upgrade project
2023	Received \$1,620,000 EEG Grant from IJDC for the Collection System Project
2023	Completed Class Cost of Service Study on rates
2023	Wendy's Pump Station Upgrades
2023	Basin Cleaning at Charles Town Wastewater Plant
2024	Completed rate equalization of all rates in January 2024

It should be noted that since the last SSP several key projects have either been completed or are no longer viable projects for CTUB. Specifically, the initial phases of Inflow and Infiltration studies and sewer modeling efforts were completed. Additionally, the Shenandoah Junction and Cave Road distressed utility connections were deemed part of the Jefferson Utility acquisition by West Virginia American Water therefore they are no longer part of planning efforts for CTUB.

### Current Development and Projects

There are numerous on-going sewer projects that CTUB is evaluating:

#### **2022 Collection System Project (formerly JCPSD Flowing Springs Project/Modified Flowing Springs Plan)**

CTUB is working with RK&K and various consultants to finalize this project and is currently in the process of obtaining easements for the project. The engineer's construction cost estimate for this project is currently \$8,283,000. CTUB has received a grant award in the amount of \$1,620,000. CTUB also anticipates contributing approximately \$3,000,000.00 towards the project from Capacity Improvement Fees. Funding for the Project consists of (i) a \$3,575,000 USDA RD loan at a 2.5 percent interest rate over 40 years. And (ii) a WVDEP SRF loan of \$2,844,984 at .25 percent interest, and a .25 percent administrative fee for a term up to 40 years, and debt forgiveness in the amount of \$500,000 per the January 17, 2017 WVDEP assurance letter. During the consolidation of utilities, CTUB committed to the WV PSC completing necessary components of the Flowing Springs project through submission of a Modified Flowing Springs Plan in March 2018. Since the utility consolidation and completion of the Route 9 sewer project, CTUB has evaluated efficiencies and operational alternatives to significantly reduce components and costs of the Modified Flowing Springs Plan. The Flowing Springs Project and Modified Flowing Springs plan have evolved into a 2025 Collection System projects which consists of necessary improvements to the CTUB collection system. Table 5.2 includes a summary of the anticipated components and costs of this project.

#### **2021 Renewal and Replacement Project for CTWWTP and TWWTP**

In 2022, CTUB issued the Notice to Proceed on the Renewal and Replacement Project for the Charles Town Wastewater Treatment Plant. This project was awarded to Alvarez Contractors, Inc. in the amount of \$10,151,000.00. The project was designed by Gwin, Dobson and Foreman, Inc. (GDF) and included improvements to the following:

- Headworks screening
- The influent and effluent pump stations
- UV disinfection system
- Supervisory Control and Data Acquisition (SCADA) system modifications
- Solids Handling upgrade to Centrifuge
- New Electrical Building and electrical throughout the plant
- Implementation of full sludge digestion
- FRP Shelter installation for electrical components.

The Renewal and Replacement project is approximately 75% complete with several key electrical components waiting to be shipped. Although the project was expected to be substantially complete by June 2024, however it appears that these delays will impact the schedule and delay substantial completion by several months. The project continues to be within budget.

Table 5.2 below illustrates the anticipated costs associated with the current and future projects:

<b>Table 5.2: 2024 Project Estimate Summary</b>	
<b>WASTEWATER TREATMENT PLANT PROJECTS</b>	
<b>Wastewater Treatment projects</b>	<b>Costs</b>
Renewal and Replacement Project (Near Completion end of 2024)	\$12,135,000.00
Preliminary Engineering for Plant expansion	\$50,000.00
Blue-Nite Sand Filter Rehabilitation	\$200,000.00
Maintenance Shop (split with Water Operations)	\$250,000.00
<b>Future Plant Projects</b>	
CTWWTP Upgrades and Expansion (2030)	\$20,500,000.00
<b>Total Wastewater Plant Project Costs</b>	<b>\$33,135,000.00</b>
<b>Collection System Projects</b>	<b>Costs</b>
RK&K Task 7 Parkview MHP Pump Station Decommission	In-house (COMPLETED)
RK&K Task 7 Lloyd's Flat Pump Station Decommission	In-house (COMPLETED)
Upgrades to Existing Wendy's Pump Station	In-house (COMPLETED)
<b>2022 Collection System Project</b>	
Burr East Pump Station	\$910,900.00
Moose Lodge	\$426,400.00
Jett's Farm	\$721,100.00
Lakeland Place	\$1,257,800.00
Jefferson Memorial Park Collector	\$332,500.00
Evitt's Run Collector	\$1,668,400.00
Flowing Spring Pump Station (Possible Bid Alternate)	\$2,965,900.00
Collection System Engineering, Legal, Design	\$1,275,000.00
<b>RK&amp;K Collection System Project Total</b>	<b>\$9,558,000.00</b>
<b>Future CTUB Collection System Projects</b>	<b>Costs</b>
Cantor Hollow Pump Station	\$145,000.00
Greenfield	\$1,100,000.00
Greenfield Pump Station	\$370,000.00
Fairfax Parallel Line/Collector Project	\$510,000.00
2026/2027 Collection system project	\$3,000,000.00
Collections Project and Pump Stations Project (2031)	\$3,250,000.00
<b>Total 2022 and Future Collection System Project Costs</b>	<b>\$17,933,000.00</b>
<b>Total Plant and Collection Projects</b>	<b>\$51,068,000.00</b>

## Future Projects

CTUB is actively working on various projects that will result in more operational efficiencies, tracking and growth of the utility system. CTUB continues to keep the sewer hydraulic model updated and follows changes in growth that may impact the collection and transmission system growth related projects. CTUB has developed a 10-year Capital Improvement Plan (CIP) Expenditure Plan to track capital projects and expenditures. The CIP prioritizes planning projects that are needed as a result of the following factors:

- Regulatory Compliance
- Condition/Probability of Failure
- Consequences of Failure/Risk
- Capacity / System Operational Efficiencies
- Improved Operations and Maintenance costs
- Safety
- Design Life / Best Replacement Practices
- Redundancy / Reliability
- Opportunity Projects
- Development Extensions

The CTUB Asset Management Plan will be updated to assist with the development and maintenance of a CIP over the next several years. CTUB is continuing to evaluate conversion to a software program that will provide cohesive interaction between accounting, billing, asset management and maintenance programming for all facilities.

## CTWWTP Plant Expansion

Expansion of the CTWWTP is expected within the next 10 years based on the historical flow data in Table 1.4 as well as the development projections detailed in Table 1.2. Design efforts will be initiated in 2024/2025.

There are various factors that need to be evaluated with an expansion of the CTWWTP including location, size, type of facility and environmental protection. An expansion from 1.75 MGD is estimated to cost approximately \$18 to \$23 million in today's dollars. Every effort will be made to provide the most cost-effective design to minimize any burden to ratepayers.

## RATE EQUALIZATION, FUNDING AND FINANCIAL OPTIONS

### Rate Equalization

During the consolidation of utilities, the City of Charles Town agreed to exercise its best efforts to equalize the rates and charges for water service of all water and sewer customers within 10 years after the closing date. In January 2024, CTUB completed this obligation nearly 5 years ahead of schedule. CTUB continues to maintain a positive financial position. The ability to equalize rates well in advance of the 10-year mark demonstrates the benefits of the consolidation efforts.

The Class Cost of Service Study performed in 2023 identified several rate adjustments necessary for sewer. No rate increase was necessary however the rate tariff structure was revised to more appropriately align the various rates with the customer classes.

CTUB continues to maintain a minimum debt/service coverage ratio of 130%. The debt service coverage ratio required by bondholders for the combined utility is 115%.

### Funding and Financial Planning

CTUB has successfully initiated the Renewal and Replacement project at the Charles Town Wastewater Plant. In addition, CTUB is nearing completion of the 2021 Collection System Project and expects to have the project out to bid in the summer of 2024.

CTUB continues to pursue a strategy for funding upgrades and expansion in a manner that will minimize the burden to the current and future ratepayers. CTUB intends to fund the costs for the above projects through conventional rate impacts, payment of prior bonds and Capacity Improvement Fees. The development of a capital improvement plan will identify future capital purchases that are necessary for the operation of the sewer system. CTUB continues to update the Capital Improvement Plan that will identify system needs and will aid in the evaluation of the Capacity Improvement fees. The next evaluation of Capacity Improvement Fees is anticipated to be underway in 2025.

Future CTWWTP expansion is expected to be necessary within the next 10 years. This will require a significant capital outlay and funding strategies in a future SSP and project discussion. It is anticipated that plant expansion could range from \$18 to \$23 million.

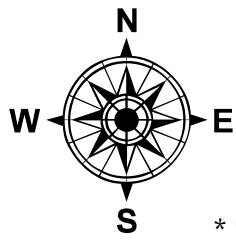
## APPENDIX A – GROWTH PROJECTIONS

Table 1.2 - CTUB Sewer Strategic Plan 2024 Development Forecast																														
	Development	Total Design EDUs	Total Built as of 2024	20 year forecast to be built	Total Flow	Beyond 20 year forecast	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Years 11-20	TOTAL @ Year 20	TOTAL REMAINING	
							2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2034-2043			
1	Aspen Green	203	85	118	30,450	0	30	30	30	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	118	0	
2	Beallair	372	176	196	55,800	0	30	30	30	30	30	30	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	196	0	
3	Blackford Village/Tackley Mill	500	0	500	75,000	0	0	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20	20	200	260	240	
4	Briar Run	164	126	38	24,600	0	30	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	
5	Burr Industrial Park & Bardane	200	178	22	30,000	0	3	3	3	3	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	
6	Cambridge	134	92	42	20,100	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3		0	0	0	0	0	12	42	0	
7	Cantor Hollow	124	0	124	18,600	0	0	0	30	30	30	34	0															124	0	
8	Charles Town Infill	250	38	212	37,500	112	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	50	100	112	
9	Clayhill Farm	300	0	300	45,000	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	200	300	0	
10	Country Club Commons	8	0	8	1,200	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	8	0	
11	Fairview	450	0	450	67,500	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	210	450	0
12	Harvest Hills	392	6	386	58,800	166	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	200	220	166	
13	Huntfield	3,200	554	2,646	480,000	2,046	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	300	600	2046	
14	Huntwell West	350	26	324	52,500	0	30	30	30	30	30	30	30	30	30	30	24	0	0	0	0	0	0	0	0	0	24	324	0	
15	Jefferson Orchards	888	0	888	133,200	688	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	200	200	688	
16	Kable Townhomes	22	0	22	3,300	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	
17	King's Crossing	404	58	346	60,600	0	30	30	30	30	30	30	30	30	30	30	30	16	0	0	0	0	0	0	0	0	46	346	0	
18	Locust Knoll	300	0	300	45,000	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	140	300	0	
19	Magnolia Springs	300	259	41	45,000	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	0	
20	Norborne Glebe	1,050	626	424	157,500	0	30	30	30	30	30	30	30	30	30	30	30	30	30	34	0	0	0	0	0	0	124	424	0	
21	Old Town Ranson - Infill	250	10	240	37,500	90	10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	50	150	90	
22	Orchard Springs	270	0	270	40,500	0	0	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	270	0	
23	Potomac Marketplace	54	2	52	8,100	0	5	5	5	5	5	5	5	5	5	5	2	0	0	0	0	0	0	0	0	0	2	52	0	
24	President's Pointe	1,100	233	867	165,000	267	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	300	600	267	
25	Prospect Place	170	0	170	25,500	0	0	0	0	0	9	9	25	25	25	25	25	27	0	0	0	0	0	0	0	0	52	170	0	
26	Ranson Gateway / Boulevard	1,175	0	1,175	176,250	815	0	0	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	200	360	815	
27	Ranson Heights	428	0	428	64,200	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	8	0	0	0	0	0	128	428	0	
28	Red Clover Meadows (formerly Lloyd Property)	258	0	258	38,700	0	30	30	30	30	30	30	30	30	18	0	0	0	0	0	0	0	0	0	0	0	0	258	0	
29	Shenandoah Springs	705	285	420	105,750	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	120	420	0	
30	Spring Hill	588	0	588	88,200	48	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	300	540	48	
31	Stonecrest	320	0	320	48,000	0	30	30	30	30	30	30	30	30	30	30	20	0	0	0	0	0	0	0	0	0	20	320	0	
32	Stone Spring (formerly Fritts Property)	328	0	328	49,200	0	30	30	30	30	30	30	30	30	30	30	28	0	0	0	0	0	0	0	0	0	28	328	0	
33	Washington Landing	274	204	70	41,100	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	
34	Windmill Crossing	150	146	4	22,500	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	
35	Lakeland Place	464	0	464	69,600	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	14	0	0	224	464	0	
36	Shoemaker Property	300	0	300	45,000	0	0	0	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	60	300	0	
37	WVU Medical	500	0	500	75,000	50	0	0	0	0	0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	300	450	50	
38	Hillside	150	0	150	22,500	0	0	30	30	30	30	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	150	0	
39	Vinton Property	300	0	300	45,000	0	0	0	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0	0	0	60	300	0	
	<b>Total Projected Development</b>	<b>16,145</b>	<b>3,104</b>	<b>14,291</b>	<b>2,541,750</b>	<b>4,232</b>	<b>528</b>	<b>447</b>	<b>548</b>	<b>546</b>	<b>526</b>	<b>550</b>	<b>518</b>	<b>520</b>	<b>507</b>	<b>509</b>	<b>472</b>	<b>386</b>	<b>343</b>	<b>347</b>	<b>258</b>	<b>250</b>	<b>250</b>	<b>200</b>	<b>200</b>	<b>200</b>	<b>3,130</b>	<b>8,569</b>	<b>4,472</b>	

**APPENDIX B – EXISTING SERVICE AREA**



## APPENDIX C – PROJECTED DEVELOPMENTS



# Exhibit 1-2 Projected Developments

\* See 2024-2043 Development Forecast spreadsheet in Appendix A of Strategic Plan

	Development
1	Aspen Green
2	Beallair
3	Blackford Village/Tackley Mill
4	Briar Run
5	Burr Industrial Park & Bardane
6	Cambridge
7	Cantor Hollow
8	Charles Town Infill
9	Clayhill Farm
10	Country Club Commons
11	Fairview
12	Harvest Hills
13	Huntfield
14	Huntwell West
15	Jefferson Orchards
16	Kable Townhomes
17	King's Crossing
18	Locust Knoll
19	Magnolia Springs
20	Norborne Glebe
21	Old Town Ranson - Infill
22	Orchard Springs
23	Potomac Marketplace
24	President's Pointe
25	Prospect Place
26	Ranson Gateway / Boulevard
27	Ranson Heights
28	Red Clover Meadows (formerly Lloyd Property)
29	Shenandoah Springs
30	Spring Hill
31	Stonecrest
32	Stone Spring (formerly Fritts Property)
33	Washington Landing
34	Windmill Crossing
35	Lakeland Place
36	Shoemaker Property
37	WVU Medical
38	Hillside
39	Vinton Property

- WWTP**
- Gravity**
- Force\_Main**
- Stream**
- Arterial\_Roadway**
- Parcels**
- Charles\_Town**
- Ranson\_UGB**
- Shepherdstown\_UGB**
- Charles\_Town\_Limits**
- Ranson\_Limits**

