INDIRECT POTABLE REUSE (IPR) PERMIT SUMMARY REPORT & FACT SHEET (SRFS)

Project Type: Indirect Potable Reuse – Reservoir Water Augmentation

State Application Number.: 24 - IPR- 01, NPDES ID Number MD2401IPR

Facility Name: Westminster PureWater Facility

Address: 1117 Old New Windsor Pike, Westminster, Maryland 21158

Facility Location: Latitude: 39.5579 Longitude: -77.0391

Reservoir Name: Cranberry Reservoir

Reservoir Location: Latitude: 39.6026 Longitude: -76.9641

Proposed Reservoir Discharge Period: all seasons, if weather and site conditions are suitable.

County: Carroll

Contact (Name, Title): Sara Imhulse
City Administrator
City of Westminster
45 West Main St
Westminster, MD 21157

Phone: 410- 848-9000

Applicant provides public water supply to the City of Westminster

Legal Name of Applicant: The City of Westminster

Address: 45 West Main St
Westminster, MD 21157

1. PUREWATER FACILITY INFLUENT CHARACTERISTIC

Design Average Flow of PureWater Facility: 0.5 MGD (million gallons per day)
Influent wastewater quality to the PureWater Facility, as described in the table below, is based on the monthly average (unless specified) water quality data excerpted from the Discharge Monitoring Report (DMR 1/2024 - 12/2024) of the Westminster wastewater treatment plant (14-DP-0837, NPDES: MD0021831)

Month (2024)	DO (mg/l)	BOD5 (mg/l)	pH (SU) Min-Max	TSS (mg/l)	Total nitrogen (mg/l as N)	Total Ammonia (mg/l as N)	Total Phosphorus (mg/l as P)	Average Flow (MGD)	Total Chlorine Residual (mg/l)	E. coli (MPN/100ml) Geometric Mean
January	7.8	2.1	6.5-7.2	1.1	1.4	0.2	0.2	4.735	<0.1	5.2
February	8.2	2	6.6-7.2	1.1	0.8	0.2	0.07	4.465	<0.1	1.99
March	7.8	2.2	6.5-7.2	1	1.09	0.24	0.1	4.674	<0.1	11.98
April	7.7	2	6.7-7.3	0.9	0.9	0.1	0.04	5.173	<0.1	6.69
May	7.2	2	6.8-7.2	1	1.1	0.1	0.1	4.224	<0.1	26.93
June	7.6	2	6.8-7.3	1.1	1.4	0.3	0.1	3.806	<0.1	10.08
July	7	2.06	6.8-7.3	0.87	1.32	0.27	0.09	3.634	<0.1	5
August	7	2.1	6.7-7.6	0.8	2.08	0.2	0.1	4.326	0.1	3.33
September	7.3	2.1	6.5-7.4	1.1	2.14	0.4	0.39	3.869	<0.1	23.74
October	7.3	2	6.5-7.1	1.1	1.1	0.5	0.1	3.746	<0.1	71.53
November	7.1	2	6.6-7.2	1.1	1.4	0.1	0.1	3.533	<0.1	55.2
December	8.5	2	6.6-7.3	1.1	2.37	0.14	0.12	3.687	<0.1	2.79
Average	7.54	2.05	6.6-7.3	1.02	1.43	0.23	0.13	4.156	<0.1	18.71
Range	7.0-8.2	2.0-2.2	6.5-7.6	0.8-1.1	0.8-2.37	0.1-0.5	0.04-0.39	3.533-5.173	<0.1-0.1	1.99-71.53
Effluent limitation	>5.0	30	6.5 -8.5	30	4.0 (for TMDL calculation)	2.7 (5/1-9/30) 5.5(10/1-4/30)	0.3 (for TMDL calculation)	5 (for TMDL calculation)	0.012	126

IPR RECLAIMED WATER TREATMENT FLOW DIAGRAM

PureWater Facility Influent from Westminster Water Reclamation Facility → Ultrafiltration → Adding RO scale inhibitor → Cartridge Filter → Reverse Osmosis (RO) → Ultraviolet (UV)/Advanced Oxidation Process (AOC) → Granulated Activated Carbon (GAC) → Decarbonator → Disinfection & pH adjustment→ Effluent Pumping Station → Dechlorination → Cranberry Reservoir → Cranberry Water Treatment Plant (WTP)

RO Concentrate or Reject → Chlorination/Dechlorination Tank of the Wastewater Treatment Plant → Little Pipe Creek

2. SUMMARY OF CRANBERRY RESERVOIR

Surface Area: 25 acres*

Depth: Mean depth: 15 ft, Max. depth: 26 ft*

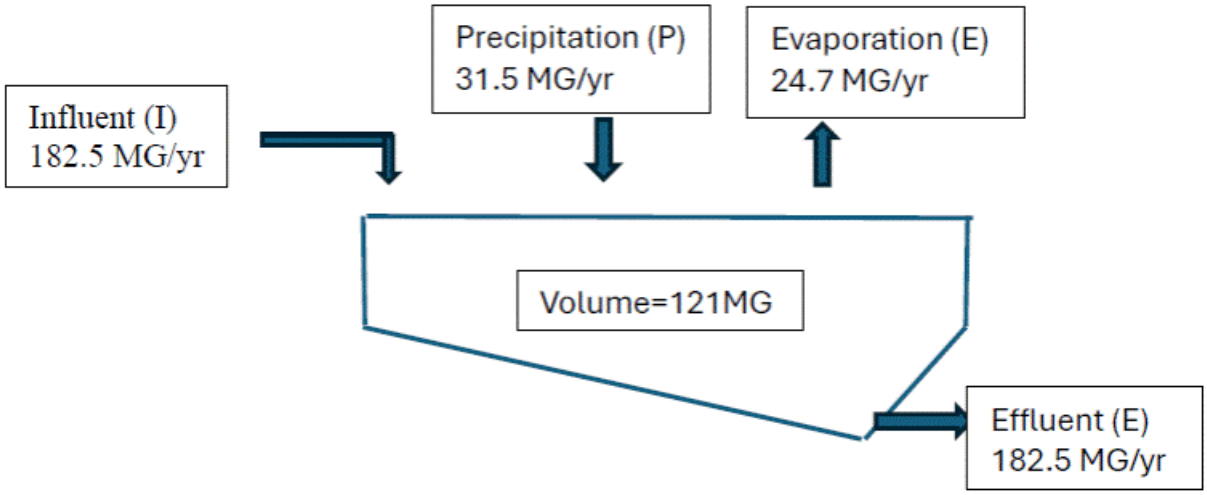
Storage Volume (v): 121 million gallons*

V = 25 acres x 15 ft x 12 inches/ft x 27, 154 gal/acre-inch = 121,743,000 gallons or 121 MG

Mixer: Two existing mechanical mixers - one Solarbee mixer and one AIRE-O_2 mixer

* Source: Hydrodynamic water quality modeling of Cranberry Reservoir to support City of Westminster Wastewater Potable Reuse Pilot Project" Progress report, April 15, 2022, DRAFT by Professor Ciaran Harman, Johns Hopkins University.

Estimated Yearly Water Budget in the Cranberry Reservoir



I = 0.5 MGD x 365 days/yr = 182.5 MG/yr

E = 0.5 MGD x 365 days/yr = 182.5 MG/yr

P = 46.45 inch/yr* x 25 acres x 27,154 gal/acre-inch = 31.5 MG/yr

* 46.45 inch/year was the 10 years average precipitation measured at BWI between 2015 and 2024

In Maryland, E value is 25 cm (about 10 inches) less than the P value (from Figure 2.2 of EPA publication 625/1-81-013 - Process Design Manual for Land Treatment of Municipal Wastewater). E= 36.45 inch/yr x 25 acres x 27,154 gal/acre-inch = 24.7 MG/yr.

3. DESCRIPTION OF THE FACILITY

The City of Westminster has applied an indirect potable water reuse (IPR) permit to treat 0.5 MGD wastewater from the existing Westminster Wastewater Treatment Plant at the proposed PureWater Facility and discharge the highly treated reclaimed water to the Cranberry Reservoir as a source water supply to the Cranberry Water Treatment Plant.

The treatment processes of the PureWater Facility include ultrafiltration, reverse osmosis, UV/AOP, GAC, Disinfection, pH adjustment and dechlorination.

The proposed IPR permit includes effluent quality limitations, system operation and maintenance conditions, effluent quality monitoring requirements to ensure the reclaimed water quality meets Federal Drinking Water Standards and requirements included in the Maryland Environment Article § 9-303.2 a prior to discharging to the Cranberry Reservoir.

4. DISCUSSION/RATIONALE FOR PERMIT SPECIAL CONDITIONS

Item	Permit Condition and Rationale
1	Section II.A.2 (Page 4) of the permit requires all reclaimed water to be treated to produce an effluent meeting (a) maximum (or minimum) limit in Table 1; and (b) Pathogens Log Removal Values (LRV) of 12 for virus; 10 for giardia and 10 for cryptosporidium, Discussion/Rationale: (a) To conform with the requirements included in MD Environment Code § 9-303.2 (1) the reclaimed water quality shall meet primary and secondary MCLs established by the US EPA under 40 CFR. §§141 and 143 and by the Department under COMAR 26.04.01 before entering the environmental buffer and before entering the distribution system (b) To conform with the requirement included in MD Environment Code § 9-303.2 (2) that the treatment process shall meet LRVs for virus, giardia and crypto. The parameters and the Primary MCL and Secondary MCL included in Table 1 were excerpted from EPA publication-National Primary Drinking Water Regulations latest updated on 12/14/2024 at web link: https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations. Except for flow and turbidity, all other parameters are required to be monitored quarterly unless reduced monitoring has been approved. Quarterly monitoring frequencies will ensure that seasonal changes or other factors do not adversely affect contaminants levels at different times throughout the year.
2	Section II. B. 1. (Page 7) requires RO and UV disinfection treatment processes. Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2. which indicates RO and UV are necessary.
3	Section II.B. 2. (Page 7) requires monitoring the RO treatment performance using the following methods: sodium chloride rejection; permeate recovery; total organic carbon (TOC) and; total dissolved solids (TDS). Discussion/Rationale: To be consistent with the RO performance requirements included in California Code of

	Regulation Section §60320.302. Advanced Treatment Criteria.
4	Section II.B. 3. (Page 8) requires monitoring the UV/AOP treatment performance in removing 1,4 – dioxane Discussion/Rationale: To be consistent with the oxidation process performance requirements included in California Code of Regulation Section §60320.302. Advanced Treatment Criteria
5	Section II.C. 1. (Page 8) requires a 180-day residence time for the reclaimed water in the Cranberry Reservoir. Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2. To provide at least 180 days reclaimed water residence time.
6	Section II. C. 2. (Page 8) states that a reduction in the reclaimed water residence time in the Cranberry Reservoir from 180 days to no less than 60 days is permissible if the system demonstrates a reliable and satisfactory operation in protecting public health. Reduction of reclaimed water retention time in the reservoir would affect the pathogen die off rate in the reservoir. This concern should be addressed in the Permittee application for the 180-day residence time reduction. Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2. D.2., an applicant may request that reclaimed water be stored in an environmental buffer for less than 180 days, but not less than 60 days, before intake into a drinking water treatment facility if: (i) The process reliably and consistently meets the requirements of the potable reuse permit under varying operating conditions to the satisfaction of the Department; and (ii) The applicant demonstrates to the satisfaction of the Department that a lower residence time sufficiently protects public health.
7	Section II. C. 3. (Page 9) requires the Permittee to submit a tracer study proposal for Department review within 6 months of the permit effective date. Discussion/Rationale: To be consistent with the reduction of retention time requirements included in California Code of Regulation Section §64668.30, (d). Augmented Reservoir Requirements
8	Section II. C. 4. (Page 9) requires the Permittee to submit results of the tracer study to the Department for review. Influent mixer (such as SolarBee Mixer or equivalent) shall be installed in the reservoir if tracer study result indicates the retention time is less than 180 days based on the effective storage volume (V_e). Discussion/Rationale: The temperature of the reclaimed water entering the reservoir is likely warmer than reservoir water in the winter and cooler than reservoir water in the summer. Without an effective mixer, the reclaimed water may form a plug flow due to temperature difference and exit the reservoir resulting in retention time reduction.
9	Section II. C. 5. (Page 9) requires the existing mixers to be operated and maintained effectively at all time. Discussion/Rationale: To eliminate the flow short circuiting and enhance the Purified water retention time in the Reservoir.
10	Section II. C. 6. (Page 9) requires determining the reclaimed water retention time (t) in the reservoir monthly, based on the following equation: $t = V_R/Q_{OF}$

	Discussion/Rationale: The "t" value is the retention time of the reclaimed water in the Cranberry Reservoir, on a monthly basis. The value of "t" varies with the total volume of water (V_R) in the Cranberry Reservoir at the end of the month and the total outflow (Q_{OF}) from the Cranberry Reservoir during the corresponding month. A correlation curve between water depth (D in ft) in the reservoir and volume (V in MG) of the reservoir should be established. At the end of the month, the operator should record the D value and obtain the (V_R) value from the correlation curve. Q_{OF} (in MG per month) shall include, but not be limited to, all outflows and withdrawals from the Cranberry Reservoir during the corresponding month. The unit of "t" determined from this calculation is in months. It can be converted into days by multiplying the total number of days in the month of calculation. The value "t" is the same as the theoretical retention time mentioned in the California regulations §64668.30. (b)
11	Section II. D. 1. (Page 9) requires the Cranberry Water Treatment Plant (WTP) to be operated in accordance with the Safe Drinking Water Act (SDWA), 40CFR§ 141 *et seq*., Title 9, Subtitle 4 of the Environment Article, Annotated Code of Maryland, and COMAR 26.04.01. The Permittee shall also operate Cranberry WTP to meet all secondary maximum contaminant levels in 40 CFR § 143 *et seq* Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2 stating that primary and secondary maximum contaminant levels established by the U.S. Environmental Protection Agency under 40 C.F.R. §§ 141 and 143 and by the Department under COMAR 26.04.01 before entering the environmental buffer and before entering the distribution system.
12	Section II. D. 2. (Page 9) requires that at least 90 days prior to the commencement of discharge from the Facility to the Cranberry Reservoir, the Permittee notify the Compliance Program and the Water Supply Program of the Department about the anticipated date of the discharge from the Facility. The notification shall be provided in writing to *mde.wsacompliance@maryland.gov* Discussion/Rationale: This condition ensures that MDE Compliance Program and Water Supply Program staff are informed that the facility will start the treatment process operation in 90 days. The 90 day prior notification allows MDE to visit the facility and prepare the DMR form to include all monitoring parameters and reflect the permit monitoring conditions.
13	Section II. D. 3. (Pages10) requires the Permittee to provide an adequate operating staff, qualified to carry out the operation, maintenance, and testing functions necessary to comply with this permit. The Permittee shall ensure that the Facility and the Cranberry WTP are run by operators certified by the State of Maryland in accordance with the provisions of COMAR 26.06.01 and consistent with the "Manual of Operation and Maintenance" (MOM) approved by the Department. Discussion/Rationale: This condition ensures the PureWater facility has enough qualified staff to operate it properly. COMAR 26.01.05 (Certification) states that an individual may not practice as an operator or superintendent unless that individual has been certified by the Board in the appropriate classification
14	Section II. D. 4. (Page 10) requires the permittee to develop a MOM and submit the manual to the Department for review within 90 days of permit issuance date

	Discussion/Rationale: To be consistent with the operation plan requirements included in California Code of Regulation Section §60320.322. Operation Plan, At a minimum, the Operation Plan shall identify and describe the operations, maintenance, analytical methods, monitoring necessary for the SWSAP to meet the requirements of this Article, and the reporting of monitoring results to the State Board and Regional Board.
15	Section II. D. 5. (Page 10) requires that the Permittee immediately terminate the entry of any reclaimed water to the Facility and divert all reclaimed water from the Facility to the Westminster WRF with no discharge to the Cranberry Reservoir if any treatment process malfunctions, any exceedance of the limits in **Table 1** occurs, as measured in Section II.D.7., or at the direction of the Department Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2 requiring the discharge entering the environmental buffer (Cranberry Reservoir) to meet the Primary and Secondary MCLs which are included in Table 1.
16	Section II. D. 6. (Pages 10 - 11) prohibits water from the Facility from bypassing any treatment process and being discharged into the Cranberry Reservoir unless the bypass does not cause any violations of the maximum (or minimum) limits specified in **Table 1** and is necessary for essential maintenance to occur, or unless the Permittee can prove that (a) the bypass is unavoidable, (b) no other feasible alternative exists, (c) the Department receives the bypass notification, and (d) the Department authorizes the bypass. Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2 requiring the discharge entering the environmental buffer (Cranberry Reservoir) to meet the Primary and Secondary MCLs which are included in Table 1. Bypassing the treatment process(es) would degrade the effluent quality resulting in water quality limit violation.
17	Section II. D. 7 (Pages 11-12) requires that if a sample measured at Sampling Port A (see **Figure 1**) exceeds a maximum (or minimum) limit in **Table 1**, the Permittee must perform the following corrective actions: a. Turbidity and nitrate exceedance are required to collect a confirmation sample within 72 hours of receiving a result that exceeds the limit in Table 1**.** If the average of the confirmation sample and initial sample exceeds the limit in Table 1**,** initiate weekly monitoring until 4 consecutive weekly results are below the limit. If at any time a 4-week running average of weekly results exceeds the limit, notify the Department within 24 hours and immediately suspend all discharge of reclaimed water to the Cranberry Reservoir until the Department authorizes discharges to resume. b. Total Coliform or E. coli exceedances are required to collect a confirmation sample within 24 hours of receiving a result that exceeds the limit in Table 1. If the confirmation sample tests positive for E. coli, notify the Department within 24 hours of receiving the results of the confirmation sample; and upon the direction of the Department, suspend all discharge of reclaimed water to the Cranberry Reservoir until the Department authorizes discharges to resume. If the initial sample was positive for Total Coliform but negative for E. coli, and the confirmation sample tests positive for Total Coliform but negative for E. coli, return to routine monitoring. c. For exceedances based on Running Annual Averages, the procedures are shown in II.D.7.b. Discussion/Rationale: To conform with the requirements included in MD Environment Code § 9-303.2 requiring the discharge entering the environmental buffer (Cranberry Reservoir) to meet the Primary and Secondary MCLs which are included in Table 1 and to be consistent with the corrective action requirements included in California Code of Regulation Section § 60320.312. Regulated Contaminants and Physical Characteristics Control.
18	Section II.D.7.c, (Page 12) requires an Emergency Operational Plan (EOP). Discussion/Rationale: This condition will ensure that the Permittee has adequately prepared for disruptions to

	operation, including maximum limit exceedances. The EOP requirement is similar to the California Joint Plan included in Section §60320.301 of the California Surface Water Augmentation Regulations.
19	Section II. E. 1 (Page 12) requires the Permittee to monitor for the contaminants listed in **Table 1** at Sampling Port A shown on **Figure 1**. Samples are required to be analyzed in accordance with analytical methods indicated in 40 CFR Subpart C. Discussion/Rationale: This condition ensures that samples are collected at the appropriate location, immediately preceding discharge to the reservoir, and that samples are analyzed using the appropriate analytical method.
20	Section II. E.2 (Page 12) requires a one-time influent sample to be taken at the UF Feed Tank shown on **Figure 1,** within 3 months after the Facility begins operating, to establish the background quality of the reclaimed water before treatment at the Facility. The sample shall be analyzed for all contaminants listed in **Table 1**. Results of the influent water quality analysis shall be included in the MOR. Discussion/Rationale: This requirement establishes a process for evaluating the background water quality data for the influent to the facility. This will be useful in understanding the effectiveness of treatment processes. The DMR data of the existing Westminster Wastewater Treatment Plant do not include the drinking water parameters shown in Table 1.
21	Section II. E. 3 (Pages 12-13) requires the Permittee to certify annually, in writing, to the Department (using third-party or manufacturer certification), when acrylamide or epichlorohydrin is used to treat water. The combination (or product) of dose and monomer level shall not exceed the following levels: Acrylamide = 0.05 percent dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01 percent dosed at 20 mg/L (or equivalent). Discussion/Rationale: Acrylamide and Epichlorohydrin are not shown in Table 1 but are included in the EPA National Primary Drinking Water Regulations as organic chemical contestants with a treatment technique footnote indicting the water system must certify, in writing, to the state (using third party or manufacturer's certification) that when acrylamide or epichlorohydrin is used to treat water, the combination (or product) of dose and monomer level does not exceed the levels specified, as follow: Acrylamide = 0.05 percent dosed at 1 mg/L (or equivalent); Epichlorohydrin = 0.01 percent dosed at 20 mg/L (or equivalent).
22	Section II.E.4 (Page 13) allows the Permittee to file a petition with the Department to reduce the monitoring frequency if the monitoring data for Sampling Port A demonstrates consistent compliance with the limits in **Table 1** during the first 12 months after the Facility begins discharging reclaimed water to the Cranberry Reservoir. If the Department grants the Permittee's request and the measured concentration of any contaminant in **Table 1** subsequently exceeds 50% of the applicable limit in **Table 1**, the Permittee shall resume sampling at the frequency required in **Table 1**. Discussion/Rationale: To be consistent with how reduced monitoring requirements are handled under the SDWA.