

Okotoks WWTP

Capacity and Upgrades Deferral Study – Benefiting Population Technical Memorandum

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Revision History

Revision #	Date	Revised By:	Revision Description
0	2025-NOV-19	AECOM	DRAFT - Issued for Town’s Review
1	2026-MAR-11	AECOM	DRAFT - Updated UV design criteria per details provided by the Town of Okotoks
2	2026-MAR-31	AECOM	FINAL

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March 31, 2026

Boon Koay, P.Eng.
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Dear Mr. Koay,

Project No: 60586665

Regarding: Okotoks Wastewater Treatment Plant (OWWTP) Capacity and Upgrades Deferral Study – Benefiting Population

Attached is the Technical Memorandum that summarizes the benefiting population and associated capital cost estimates for the capacity upgrades recommended in the *OWWTP Capacity and Upgrades Deferral Study*.

Sincerely,
AECOM Canada ULC



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List of Acronyms

%	Percentage
AB	Alberta
APC	Activated Primary Clarifier
DAF	Dissolved Air Flotation
hr	Hour
L	Litre
m ³	Cubic Metre
MGD	Million Gallons Per Day
min	Minute
s	Second
UV	Ultraviolet
WWTP	Wastewater Treatment Plant

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1. INTRODUCTION

1.1 Background

A preliminary engineering study (*Capacity and Upgrades Deferral Study*) to assess current and projected performance of the Okotoks Wastewater Treatment Plant (WWTP) was completed by AECOM Canada ULC (AECOM) in 2024. The objective of this study was to make recommendations for upgrades considering projected population growth, treatment performance, effluent permit requirements, existing condition and remaining life span of equipment, and risks/consequences of deferring upgrades. The study assessed the ability of the existing infrastructure to meet the current and future treatment needs and identified when upgrades are recommended.

1.2 Scope of Work

The Town requested AECOM to prepare a technical memorandum that provides a summary of the following:

- The growth-related upgrades recommended in the *Capacity and Upgrades Deferral Study*;
- The estimated population that will benefit from these upgrades; and
- The estimated capital costs.

The following assumptions are applied in the preparation of this technical memorandum:

- The following upgrades were recommended in the *Capacity and Upgrades Deferral Study* but are not included in this technical memorandum given that they are not considered growth-related upgrades:
 - Upgrades recommended in the area classification investigation summary.
 - Upgrades recommended in the condition assessment summary.
 - Upgrades recommended to provide redundancy.
- The estimated capital costs are extracted from the *Order of Magnitude Construction Cost Estimate* report (AECOM, 2022). These costs have not been escalated to account for current or future dollar values.
- The timelines reviewed in the *Capacity and Upgrades Deferral Study* did not identify when the DAF-3 upgrade will be required. For the purpose of this memorandum, it is assumed that the DAF-3 upgrade will be required when the APC-3 upgrade is triggered.
- The odour control system upgrades are assumed to be required in conjunction with the APC upgrades.

2. BENEFITING POPULATION OF UPGRADES

2.1 Recommended Growth-Related Upgrades

The growth-related upgrades recommended in the *Capacity and Upgrades Deferral Study* are summarized in **Table 2-1**.

Table 2-1: Summary of Recommended Growth-Related Upgrades

Item No.	Description	Recommended Upgrade Timeline
1	DAF-2	2027 - 2032
2	APC-2	2027 - 2032
3	Odour Control System	2027 - 2032

1. Upgrades are projected to be required by year 2032. Therefore, the recommended upgrade period is between years 2027 - 2032.

2.2 Future Upgrades

The timeline of the next upgrade is essential for estimating the population that will benefit from the recommended growth related-upgrades.

2.2.1 APC, DAF and Odour Control System

The timeline for the future APC upgrade was identified in the *Capacity and Upgrades Deferral Study*. It is assumed that the DAF and odour control system upgrades will be required in conjunction with the APC upgrades. A summary of the future growth-related upgrades is provided in **Table 2-2**.

A summary of the UV disinfection system capacity assessment is provided in **Section 2.2.2**.

Table 2-2: Summary of Future Growth-Related Upgrades

Item No.	Description	Recommended Upgrade Timeline
1	DAF-3	2065 - 2070
2	APC-3	2065 - 2070
3	Future Odour Control System	2065 - 2070

1. Upgrades are projected to be required by year 2070. Therefore, the recommended upgrade period is between years 2065 - 2070.

2.2.2 UV Disinfection System Capacity Assessment

The UV disinfection system capacity was assessed based on the current and projected peak hourly influent flow rates. The UV system design parameters are based on Wedeco's design summary sheet included in Appendix A.

Two banks of UV lamps are currently installed in a single channel, with each bank containing 24 horizontally mounted lamps. Although the UV disinfection system is installed downstream of the equalization tank, the non-equalized influent peak hourly flow rate was used as the design basis flow rate given that the equalization tank may not be able to handle peak influent flows during wet weather events. This basis of design is also conservative given that some flow attenuation will be realized with the APCs and CTUs. The UV disinfection system design parameters are summarized in **Table 2-3** and a summary of the UV capacity assessment is provided in **Table 2-4**.

Table 2-3: Existing UV Disinfection System Design Parameters

Parameter	Value ^{NOTE 1}	Unit
Manufacturer	Wedeco	
Design Peak Capacity with Two UV Banks	714.42 (4.53)	m ³ /hr (MGD)
Design Peak Capacity per Bank	357.21 (2.27)	m ³ /hr (MGD)
UV Dose	>40,000	µWs/ cm ²
Minimum UV Transmittance @ 253.7 nm	65%	%
No. of UV Channels	1	ea
No. of Banks per Channel	2	ea
No. of Modules per Bank	3	ea
No. of Lamps per Module	8	ea
Total No. of Lamps per Bank	24	ea
Notes:		
1. Based on Wedeco's design summary table provided by the Town of Okotoks in January 2026.		

Table 2-4: UV Disinfection System Capacity Assessment

Year	Population ^{NOTE 1}	Peak Hourly Flow		One UV Bank in Operation	Two UV Banks in Operation	Three UV Banks in Operation
				UV Design Peak Capacity ^{NOTE 2}	UV Design Peak Capacity ^{NOTE 2}	UV Design Peak Capacity ^{NOTE 2}
		(MLD)	(m ³ /hr)	(m ³ /hr)	(m ³ /hr)	(m ³ /hr)
2023	31,741	17.5	730.5	357.21	714.42	1,071.63
2024	32,409	17.9	745.9	357.21	714.42	1,071.63
2025	33,077	18.3	761.3	357.21	714.42	1,071.63
2026	34,057	18.8	783.8	357.21	714.42	1,071.63
2027	35,037	19.4	806.4	357.21	714.42	1,071.63
2028	36,017	19.9	828.9	357.21	714.42	1,071.63
2029	36,997	20.4	851.5	357.21	714.42	1,071.63
2030	37,977	21.0	874.0	357.21	714.42	1,071.63
2031	38,957	21.5	896.6	357.21	714.42	1,071.63
2032	39,937	22.1	919.1	357.21	714.42	1,071.63
2033	40,917	22.6	941.7	357.21	714.42	1,071.63
2034	41,897	23.1	964.2	357.21	714.42	1,071.63
2035	42,877	23.7	986.8	357.21	714.42	1,071.63
2036	43,857	24.2	1,009.4	357.21	714.42	1,071.63
2037	44,837	24.8	1,031.9	357.21	714.42	1,071.63
2038	45,817	25.3	1,054.5	357.21	714.42	1,071.63
2039	46,797	25.8	1,077.0	357.21	714.42	1,071.63
2040	47,777	26.4	1,099.6	357.21	714.42	1,071.63
2041	48,757	26.9	1,122.1	357.21	714.42	1,071.63
2042	49,737	27.5	1,144.7	357.21	714.42	1,071.63
2043	50,717	28.0	1,167.2	357.21	714.42	1,071.63
2044	51,697	28.6	1,189.8	357.21	714.42	1,071.63
2045	52,677	29.1	1,212.3	357.21	714.42	1,071.63
2046	53,657	29.6	1,234.9	357.21	714.42	1,071.63
2047	54,637	30.2	1,257.5	357.21	714.42	1,071.63
2048	55,617	30.7	1,280.0	357.21	714.42	1,071.63
2049	56,597	31.3	1,302.6	357.21	714.42	1,071.63
2050	57,577	31.8	1,325.1	357.21	714.42	1,071.63
2051	58,557	32.3	1,347.7	357.21	714.42	1,071.63
2052	59,537	32.9	1,370.2	357.21	714.42	1,071.63
2053	60,517	33.4	1,392.8	357.21	714.42	1,071.63
2054	61,497	34.0	1,415.3	357.21	714.42	1,071.63
2055	62,477	34.5	1,437.9	357.21	714.42	1,071.63
2056	63,457	35.1	1,460.4	357.21	714.42	1,071.63
2057	64,437	35.6	1,483.0	357.21	714.42	1,071.63
2058	65,417	36.1	1,505.6	357.21	714.42	1,071.63
2059	66,397	36.7	1,528.1	357.21	714.42	1,071.63
2060	67,377	37.2	1,550.7	357.21	714.42	1,071.63

Notes:

1. Population was calculated using projected growth data provided by The Town of Okotoks:
2023-2025: 668/year;
2026 onward: 980/year

2. UV Capacity per Wedeco's design summary table provided by the Town of Okotoks in January 2026.

Indicates when the capacity of the UV system is exceeded

The following is a summary of the UV disinfection system capacity assessment:

- With two UV banks in operation, the design peak capacity of the UV system was exceeded in **year 2023**.
- With three UV banks in operation, the design peak capacity of the UV system is projected to be exceeded by **year 2039**.

2.3 Estimated Benefiting Population

The benefiting population is the population that will trigger the need for a capacity upgrade and will utilize the upgraded system until another capacity upgrade is triggered in the future. A summary of the estimated benefiting population for the recommended capacity upgrades is provided in **Table 2-5**.

Table 2-5: Estimated Benefiting Population

Item No.	Description	Upgrade Year	Estimated Population ^(NOTE 1)	Future Growth-Related Upgrade Year	Estimated Population ^(NOTE 1)	Estimated Benefiting Population
1	DAF-2	2027 ^(Note 2)	35,037	2065 ^(Note 3)	72,277	37,240
2	APC-2	2031 ^(Note 2)	38,957	2065 ^(Note 5)	72,277	33,320
3	Odour Control System	2031 ^(Note 3)	38,957	2065 ^(Note 3)	72,277	33,320
4	UV System (Addition of a third UV Bank)	2023 ^(Note 4)	31,741	2039 ^(Note 4)	46,797	15,056

1. Population was calculated using projected growth data provided by The Town of Okotoks:

- 2023-2025: 668/year;
- 2026 onward: 980/year.

2. Timeline based on the Town's Capital Projects Forecast between 2027 - 2034.

3. Assumed to be required in conjunction with the APC upgrades.

4. Per UV Disinfection System Capacity Assessment Summary provided in Table 2-4.

5. Assumed upgrade will be required at the beginning of the recommended upgrade timeline.

3. Capital Cost Estimate

An *Order of Magnitude Construction Cost Estimate* report was prepared by AECOM in 2022 which provided capital cost estimates for the following upgrades at the Okotoks WWTP:

- 1- DAF-2 Upgrade.
- 2- APC-2 Upgrade.
- 3- UV Disinfection System Upgrades. Note that the cost estimate provided for the UV system includes the addition of a second UV channel with three UV banks to address redundancy and firm capacity requirements. Further review will be required to estimate the costs associated with the growth-related upgrades.

A summary of the capital cost estimates is provided in **Table 3-1**.

Table 3-1: Summary of Capital Cost Estimates

Item No.	Description	Estimated Capital Costs ^(Note 1)
1	DAF-2	\$3,128,000
2	APC-2	\$5,962,000
3	Odour Control System	N/A ^(Note 2)
4	UV Disinfection System	\$3,583,000 ^(Note 3)

1. Costs were estimated in 2022 and have not been escalated to account for future dollar values.
2. Capital costs for the odour control system upgrades were not included in the 2022 cost estimate's scope of work.
3. Cost estimate is for a new UV system which includes three UV banks and one new UV Channel. Refer to the *Order of Magnitude Construction Cost Estimate* report (AECOM, 2022) for details.
4. Taxes are not included.

Appendix A:

UV Design Summary Sheet (Wedeco)

3.0 Technical Data

3.1 Uniform Identification Addresses for TAK systems

The uniform identification address for lamps, modules, banks and channels is as if one is standing facing the same direction as the water flows, in the most left channel, and standing at the inlet of the channel:

- Channels: counting from left to right, channel 1 is left channel, channel 2 is to the right of channel 1, channel 3 is to the right of channel 2, etc.
- Banks within a channel: identified with A, B, C, ... starting from the channel inlet.
- Modules within a bank: identified with 1, 2, 3, 4, ... per bank starting from the left side looking in the direction of flow.
- Lamps within a module: identified with 1, 2, 3, 4, ... per module starting with the first row (top left) from the lamp connector/cable side. Top left=1, top right=2, second row left=3, second row right=4, etc.

3.2 DESIGN SHEET

<i>DESCRIPTION</i>	<i>UNITS</i>	<i>DATA</i>
DESIGN FLOW:	MGD	
Current Peak		4.53
Future Peak		6.5
Maximum Allowable	MGD/min	1.0
Flow Variation		
UV DOSE:	$\mu\text{W-s/cm}^2$	>40,000*
SUSPENDED SOLIDS:	mg/l	10.0
BOD	mg/l	20.0
UV TRANSMITTANCE RANGE (253.7 nm):	%	65.0 (minimum)
EFFLUENT FECAL COLIFORM STANDARD:	FC/100 ml	
30 day geometric mean		100.0
EFFLUENT TEMPERATURE:	Min./max. °F	40/85
CONFIGURATION:		
Number of lamps		48
Number of channels		1
Number of banks per channel		2
Number of modules per bank		3
Number of lamps per module		8

DESCRIPTION	UNITS	DATA
CHANNEL DIMENSIONS:	Millimeters	
Total width		1030
Width with reduction baffle		770
Water depth		510
Total depth		1321
Approx. length	Meters	13.65
ELECTRICAL LOAD:	kW	
Current Maximum		19.5
Future Maximum		38.0
HEADLOSS (@ 4.53 MGD per channel)	Millimeters	
Across Inlet Baffle		50
Across Lamp Banks		30.6
Across Level Control		169
Recommended free fall after Weir		100

NOTE

The stated dose of $>40,000 \mu\text{W-s/cm}^2$ was calculated at peak flow with the following factors:

- 0.8 Lamp Aging
- 0.92 Quartz Transparency
- 0.9 Overall Safety Factor

Dose is based on the intensity at the end of the guaranteed lamp life.