DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
Board of Directors

Meeting of the
Environmental Quality and Operations Committee

5000 Overlook Avenue, SW, Room 407
Thursday, April 19, 2018
9:30 a.m.

BY EXCEPTION ONLY *

	I.	**Call to Order**	Howard Gibbs Vice Chairperson
9:30 a.m.	**II.**	**Path to Asset Management: Benchmarking with PEER Utilities**	Leonard Benson
10:10 a.m.	**III.**	**Permit Ops KPI Recovery Plan and Performance**	Leonard Benson
10:20 a.m.	**IV.**	**Assessing Contractor Responsiveness, Responsibility & Overview of EPA Outreach Program**	Patrick O'Brien
10:30 a.m.	**V.**	**Action Items**	Len Benson/ John Bosley

Non Joint Use

1. Contract No. 120210 – SAK Construction, LLC, Lower Area Trunk Sewer Rehabilitation
2. Contract No. 170140 – Stormwater Maintenance, LLC, Green Infrastructure Maintenance Contract

10:40 a.m.	**VI.**	**Blue Plains Research & Development Overview and Update**	Chris deBarbadillo
***10:50 a.m.**	**VII.**	**AWTP Status Updates**	Aklile Tesfaye

1. BPAWTP Performance

10:55 a.m.	**VIII.**	**Executive Session***	
11:00 a.m.	**IX.**	**Adjournment**	Howard Gibbs Vice Chairperson

* The DC Water Board of Directors may go into executive session at this meeting pursuant to the District of Columbia Open Meetings Act of 2010, if such action is approved by a majority vote of the Board members who constitute a quorum to discuss: matters prohibited from public disclosure pursuant to a court order or law under D.C. Official Code § 2-575(b)(1); contract negotiations under D.C. Official Code § 2-575(b)(1); legal, confidential or privileged matters under D.C. Official Code § 2-575(b)(4); collective bargaining negotiations under D.C. Official Code § 2-575(b)(5); facility security under D.C. Official Code § 2-575(b)(8); disciplinary matters under D.C. Official Code § 2-575(b)(9); personnel matters under D.C. Official Code § 2- 575(b)(10); proprietary matters under D.C. Official Code § 2-575(b)(11); decision in an adjudication action under D.C. Official Code § 2-575(b)(13); civil or criminal matters where

disclosure to the public may harm the investigation under D.C. Official Code § 2-575(b)(14), and other matters provided in the Act.

Follow-up Items from Prior Meetings:

1. Manager, Program Services: Provide updates regarding change order rates and general contract management performance as part of the next CIP quarterly update. **[To be included in the CIP Quarterly Update, May 2018]**
2. AGM, Wastewater Treatment, DC Water: Provide update of research activities regarding trends and technologies that optimize treatment process capacity and facilitate energy neutral operations**. [On Current Agenda]**
3. The IMA Regional Committee (RC) brief the EQ & Ops Cmte on the work of the IMA RC **[Target: June 2018 EQ&Ops Cmte Mtg]**
4. Chief Engineer, DC Water: Will brief the Cmte regarding certain Engineering SOP pertinent to recommendations for contract award. **[On Current Agenda]**
5. Chief Engineer, DC Water: Will brief the Cmte regarding certain Engineering SOP pertinent to recommendations for projection of CIP cashflow. **[Target: May 2018 EQ&Ops Cmte Mtg]**
6. Chief Engineer, DC Water: Provide a presentation on the prioritization criteria for selection of water mains to be replaced each year **[Target: July 2018]**
7. Assistant General Manager, Customer Care & Ops: Provide a briefing on the DDOT- DC Water Memorandum of Understanding (MOU) concerning roadway restoration requirements. **[Target: May 2018 EQ&Ops Cmte Mtg]**
8. Director, DETS: Provide additional detail regarding specific impacts to sewage pumping stations for both the 100-year and 500-year flood scenarios. **[Target: September 2018 EQ&Ops Cmte Mtg]**

Path to Achieve Asset Management: PEER UTILITIES

District of Columbia Water And Sewer Authority

Environmental Quality & Operations Committee Meeting

April 19, 2018

water is life

Asset Management Defined

- Investment in assets guided by the likelihood of failure and its consequence to the customer and regulator
- Asset function, condition, criticality, and operating environment must be considered
- Seeks to minimize the total lifecycle cost of acquiring, operating, maintaining and renewing the assets

- **FOR CIP planning**
  - Start with an **Asset Inventory**
  - Understand Current **State of Repair (Critical Assets)**
  - Understand **Capacity and Technology Needs**
  - Set **Level of Service** expectations
  - Determine **Needs** and their **Priority** (Risk)
  - Maintain adequate **CIP Investment**

Asset Management Overview

DEFINE

- **The Facility Plan (FP):**
  - Defines long term capital needs
  - Considers condition and anticipated service life
  - Incorporates feedback from key stakeholders including Operations & Maintenance

Boldly go where no one has gone before

PRIORITIZE

- **The Asset Management Plan (AMP):**
  - Incorporates input from key stakeholders to define risk in accordance with Asset Management principles and DC Water criteria
  - Validates and informs the prioritization of capital improvements

DELIVER

- **Capital Improvement Plan (CIP):**
  - Defines project scope, schedule, and delivery approach
  - Establishes lifetime budgets and forecasted spending to meet financial limits
  - Updated annually to reflect performance and/or changes to needs and priorities

Challenges of Fiscal Constraints

- Project & Program needs defined by the Asset Management process are essential and do not go away
  - Projects are deferred, delayed or phased to meet fiscal constraints

- When capital improvements are deferred, delayed or phased
  - Risk exposure increases
    - Permit Compliance
    - Health and Safety
    - System Reliability
    - Public Confidence/DC Water Reputation
  - Cost increases
    - Likelihood of emergency repairs
    - Operations & Maintenance
    - Escalation over time

Approved CIP Budget (2018-2027) Service Area Current Status

Service Area	Current Baseline
DCCR	**Fully funded** to meet Consent Decree
Wastewater	**Generally funded** to meet NPDES Permit and established levels of service
Water	
Pump Stations & Storage Facilities	**Generally funded** to current service levels
Small Diameter WMs ≤ 12" dia.	**Generally funded to meet 1%** replacement/rehab goal
Large Diameter WMs > 12" dia.	**Generally funded**
Sewer	
Pump Stations	**Underfunded**
Rehab of Sewer Lines < 60" dia.	**Rehabilitation/Replacement is substantially underfunded**
Rehab of Sewer Lines ≥ 60" dia.	**Rehabilitation is generally funded***
Inspection of Sewer Lines ≥ 60" dia	**Generally funded**
Non Process	**Fully funded** for HQ, Fleet and Sewer Operations Facilities

'Generally Funded' = What we know or expect to find can be fixed 'Underfunded' = What we know or expect to find is not all funded
'Fully Funded' = All needs known or expected are met

* Funded status could change with inspection results

Affordability

Asset Management Level Recommended Funding

Service Area ($000's)	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	10-yr Total
Non-Process Facilities	32,194	33,107	18,907	7,860	1,551	25	6,615	7,773	0	0	108,032
Wastewater Treatment	95,485	74,617	77,853	94,301	104,728	90,636	86,767	117,352	157,870	145,528	1,045,135
DC Clean Rivers Project	168,314	189,392	148,042	138,289	192,859	151,111	66,536	56,381	146,727	99,067	1,356,719
Combined Sewer Overflow	13,502	10,951	12,511	20,262	26,590	27,813	26,486	24,457	21,798	21,798	206,168
Stormwater	945	4,909	2,400	6,858	9,546	11,489	11,816	11,721	12,006	12,210	83,898
Sanitary Sewer	29,802	32,947	34,046	85,811	116,478	142,718	145,436	115,238	110,489	99,957	912,921
Water	58,044	45,747	84,256	92,392	110,939	121,149	150,640	140,445	141,230	141,003	1,085,845
Capital Projects	**398,285**	**391,670**	**378,015**	**445,773**	**562,690**	**544,941**	**494,295**	**473,367**	**590,119**	**519,564**	**4,798,719**

AM Ramp-up – Impact on Customers

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Water & Sewer Rate (%)	5.0%	13.0%	5.0%	6.0%	8.0%	8.0%	8.5%	8.0%	7.0%	6.5%
CRIAC ($/ERU)	$25.18	$23.00	$25.58	$29.07	$31.33	$33.62	$34.72	$34.93	$35.84	$37.11
Avg. Customer Bill ($)	$102	$108	$114	$122	$130	$139	$148	$156	$164	$172
Avg. Customer Bill (%)	6.2%	5.6%	5.6%	6.9%	6.9%	6.8%	6.3%	5.3%	5.3%	5.2%

Is this affordable?

EQ & Ops Committee Work Plan

- Explore Investment in Infrastructure:
  - **April:** What are our peer utilities doing?
  - **June:** What is the cost of pro-active investment vs. addressing issues as they arise.
  - **July:** What is needed to fully meet asset management principles?

- Peer Utilities:
  - Similarities/Differences
  - Infrastructure investment approach
  - Regulatory compliance
  - Infrastructure failure experience

Next Steps

- **May:** Site Visits
  - Need to discuss schedule
- **June:** What is the cost of pro-active investment vs. addressing issues as they arise?
- **July:** What is needed to fully meet asset management principles?

Path to Achieve Asset Management:
PEER UTILITIES

District of Columbia Water And Sewer Authority

Environmental Quality & Operations Committee Meeting

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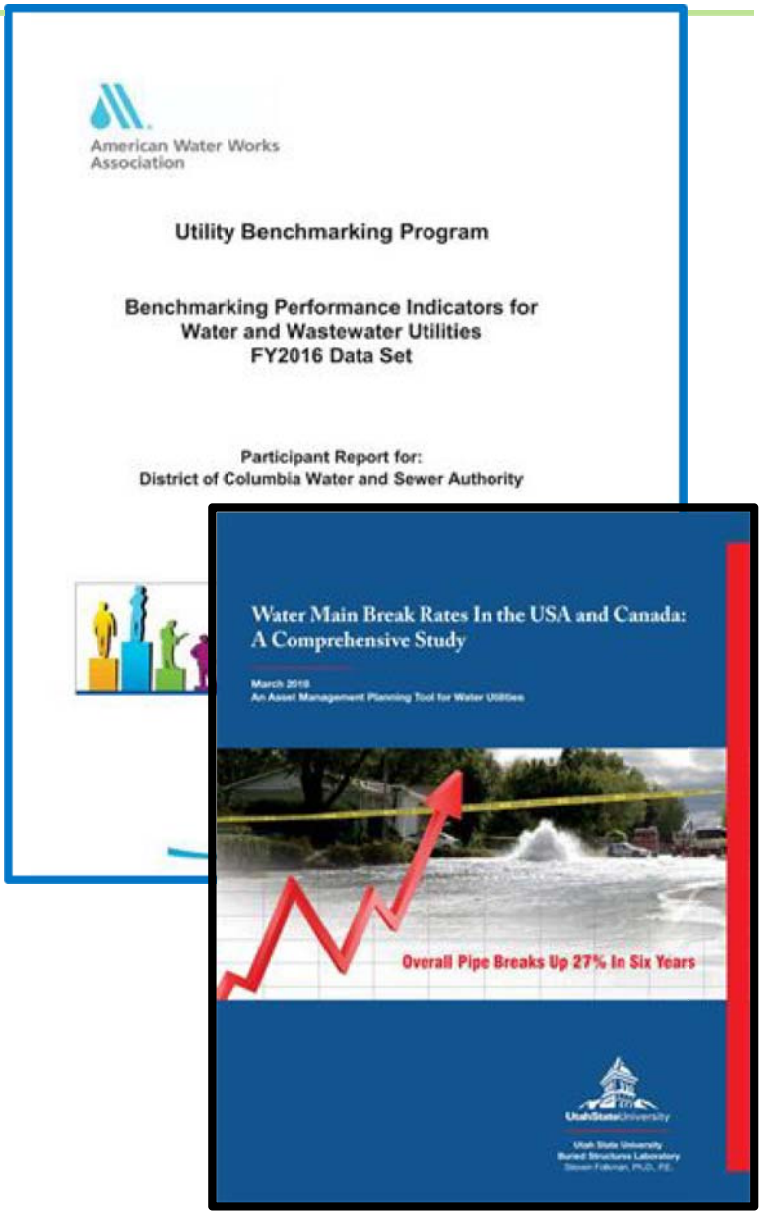
Distribution and Collection Linear Systems

Agenda

- Background
- Nationwide Utility Benchmarking Results
- Peer Utility Selection Criteria
- Overview of Peer Utilities
- Other DC Utilities
- Key Comparisons
- Summary of Findings

Nationwide Utility Benchmarking Surveys

- AWWA Utility Benchmarking for Water and Wastewater Utilities (FY 2016, issued 2017)
  - Surveyed 129 utilities of which 80 have combined W/WW systems (including DC Water)
  - Linear Water & Sewer, PSs, Treatment, Operations
  - Operational, business and asset metrics
- Watermain Break Rate in USA and Canada: A Comprehensive Study (Utah State University, March 2018)
  - Trends in watermain failures and asset renewal practices
  - 308 systems participated
  - Folkman, Steven, "Water Main Break Rates In the USA and Canada: A Comprehensive Study" (2018). *Mechanical and Aerospace Engineering Faculty Publications*. Paper 174. https://digitalcommons.usu.edu/mae_facpub/174



Nationwide Utility Benchmarking Results

AWWA Utility Benchmarking (2016) Results - **Water**

Water Metric	AWWA Survey Response				DC Water AMP
	Median	75th Percentile	DC Water	Comments	
Renewal and Replacement	1.7%	0.7%	0.9%*	Close to Bottom 25%	**2.1%**
Leaks and Breaks (per 100 miles)	21.4	34.4	32.7	Bottom 25%	**20****

Source: AWWA Benchmarking for Water and Wastewater Utilities (FY 2016, Issued 2017)

*Per DC Water's current CIP plan (data was not provided to AWWA Survey)
**DC Water's Strategic Goal is to reduce # of breaks to 20 breaks/100 miles by 2025

Nationwide Utility Benchmarking Results

AWWA Utility Benchmarking (2016) Results - **Sewer**

Sewer Metric	AWWA Survey Response				Comments	DC Water AMP
	25th Percentile	Median	75th Percentile	DC Water*		
System Inspection (%): Sewers	16.4%	9.0%	4.2%	**3.1%**	Bottom 25%	**5.0%**
System Renewal and Replacement	3.2%	2.0%	1.0%	**0.3%***	Bottom 25%	**2.4%**
Collection System Failures (per 100 miles)	0.0	1.2	5.9	**5.0**	Close to Bottom 25%	**NA**

Source: AWWA Benchmarking for Water and Wastewater Utilities (FY 2016, Issued 2017)

*Per DC Water's current CIP plan (data was not provided to AWWA Survey)

Nationwide Utility Benchmarking Results

Utah State University Study (March 2018)

"82% of cast iron pipes are over 50 years old and experiencing a 46% increase in break rates"

Item	Surveyed	DC Water
System Size	200,000 miles	1,300 miles
Dominant Pipe Material	CI (28%), DI (28%)	CI (79%)
Average Age of Failing WMs	50 years	70 Years
Water Main Breaks	11 (2012) to 14 (2017) breaks/100 mi/year (27% increase)	36.6 breaks/100 mi/year (FY13-17)
Pipe Material with Highest Break Rate	CI	CI
Major Modes of WM Breaks	Circumferential cracks	Circumferential cracks
Rate of WM Replacement	125 years (0.8% a year)	100 years (1% a year)

Source: Watermain Break Rate in USA and Canada (Utah State University Study, March 2018)

Peer Utilities Selection Criteria

- Peer Criteria
  - Water Utilities
    - Significance of impact of failure
    - Internationally recognized cities
    - Comparable infrastructure age
    - Comparable in size or larger
    - Multiple service areas (water, sewer, treatment)
  - Others – Same customer base
    - Pepco
    - Washington Gas
- Peer Utilities
  - Chicago Department of Water Management (CDWM)
  - Philadelphia Water Department (PWD)
  - New York City Department of Environmental Protection (NYCDEP)
  - Thames Water (London, UK)
  - WSSC*
  - Other DC Utilities

*WSSC added because its proximity to DC provides similar climate, soils and service expectations

Overview of Peer Utilities

Peer Utilities Water and Sewer Asset Summary

Utility	Linear Assets Water/Sewer (miles)	Pumping Stations Water/Sewer (number)	Average Age Water/Sewer (Years)	Consent Order? (Type)
DC Water	1,300 / 1,916	4 / 25	79, up to 161years 78, up to 147 years	CSO
WSSC	5,600 / 5,500	13 / 48	25% > 50 years / 46	SSO
PWD	3,200 / 3,600	9/ 19	78 / 77	CSO
NYC	7,000 / 7,500	5 / 96	78, up to 174 years Avg. NA, up to 199 years	CSO and SDWA
Chicago	4,350 / 4,600	12 / 22*	25% >100 years Sewer NA	No
Thames	19,700/ 67,000	288 / 5,000	70 / 25% > 100 years	Sewer Tunnels

*Operated by MWRD

Overview of Peer Utilities

Peer Utilities: Consent Orders

Utility	Population Served, 000's	Consent Order	
		Type	Cost
DC Water	690	CSO	$2.7 billion
WSSC	1,800	SSO	$1.9 billion
PWD	2,200	CSO/Green Infrastructure	$2.4 billion
NYC	9,000	CSO/Green and Grey Infrastructure	$3.8 billion

Other DC Utilities

Pepco

- Regulated & investor owned Utility – Return on Investment (ROI) allowed
- Serves about 290,000 customers in DC
- Main capital investment driver is improving reliability
- In 2012, DC Public Service Commission (DCPSC) established reliability performance standards for years 2013 to 2020:
  - Decrease System Average Interruption Frequency Index by 21%)
  - Shorten System Average Interruption Duration Index by 50%
- Average monthly residential electric bill in 2016 was $74.62
- 9.24% rate increase & 10.1% ROI requested to DCPSC in Dec 2017
- Moving Select Power Lines Underground (DC PLUG)
  - DC PLUG is 6 to 8 years starting 2nd quarter 2018 at a cost of $500 million
  - Cost to be recovered as a bill surcharge

Source: DCSPC 2016-Annual-Report and Pepco.com

Other DC Utilities

Washington Gas

- Regulated investor owned utility – Return on Investment (ROI) allowed
- Serves 2.2 million customers in DC and surrounding areas
- Main capital investment driver is to reduce gas leaks & safety
  - DCPSC approved WGL's 40 year $1 billion program
  - The initial 5 year program ($119 million) started in 2016
- Cost to be recovered as a bill surcharge to customers
- Average monthly residential gas bill in 2016 was $178.60*
- DCPSC approved WGL to earn 7.57% ROI in 2016

Source:
https://www.washingtongas.com
*DCSPC 2016-Annual-Report

Key Comparisons

Service Life

- DC Water's assumed service life is generally in line with that of peer utilities and industry sources (AWWA)
- Service life dependent on variety of region specific conditions

Utility	Service Life Assumption (years)				
	Water - Cast iron	Water - Ductile iron	Sewer – VCP	Sewer – Reinforced Concrete	Sewer - Brick/ unreinforced concrete
DC Water	95-150	95-130	90-125	100-125	100-150
WSSC	50-140	50-130	125-200	75-150	75 -150
NYCDEP	100	100	100	100	150
PWD*	NA	NA	NA	NA	NA
Buried No Longer** (South Large Utility)	100-110	55-105	NA	NA	NA

* PWD relies on inspections and has not adopted Service Life Assumptions

** Source: https://www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf

Key Comparisons

Infrastructure Renewal - Water

Utility	Current	Future
	Annual Renewal (miles)	Annual Renewal (miles/year)
DC Water	12 (0.9%)	13 (1.0%)
WSSC	60 (1.1%)	55 (1.0%)
PWD	20 (0.6%)	40 (1.3%)
NYCDEP	70 (1.0%)	70 (1.0%)
CDWM	90 (2.1%)	90 (2.1%)
Thames Water	64 (0.3%)	110 (0.6%)

Key Comparisons

Infrastructure Renewal - Sewer

Utility	Current	Future
	Annual Renewal (miles)	Annual Renewal (miles)
DC Water	5.8 (0.3%)	7.0 (0.4%)
WSSC	25 (0.5%)	30 (0.5%)
PWD	6-10 (0.2-0.3%)	15 (0.4%)
NYCDEP	69 (0.9%)	69 (0.9%)
CDWM	63 (1.4%)	70 (1.5%)
Thames Water	67 (0.1%)	400 (0.6%)

Summary of Findings

- AWWA Utility Benchmarking Survey:
  - DC Water linear water infrastructure is in ***bottom half*** of 80 utilities surveyed in these categories:
    - Main breaks (more than other utilities)
    - Rehabilitation (less than other utilities)
  - DC Water linear sewer infrastructure is in ***bottom 25 percent*** of 80 utilities surveyed in these categories:
    - Sewer failures (more than other utilities)
    - Sewer inspections (less than other utilities)
    - Sewer rehabilitation (less than other utilities)

→ DC Water has more issues and is doing less

Summary of Findings

- Utah State University
  - Study:
    - Water main break rate increased by 27% from 2012-2017
    - Cast iron pipe has the highest break rate
      - "Cast iron pipes represent the largest pipe material in North America"
      - "82% of cast iron pipes are over 50 years old and experiencing a 46% increase in break rates"
      - "Many studies show that water main failure rates generally increase exponentially over time"
      - "Utilities with large amounts of cast iron pipes may need to accelerate their replacement rates"
- DC Water:
  - Average water main breaks per 100 miles are much higher than others
  - Small diameter cast iron pipe has the highest break rate
    - About 80% of DC Water's small diameter water mains (915 miles)
    - Average age of nearly 90 years
    - 100% is over 50 years old!

Summary of Findings

- Peer Utilities
  - DC Water is generally similar to Peer Utilities selected in terms of:
    - System age
    - Pipe materials
    - Assumed service life
    - Need to comply with Consent Orders
  - Some differences
    - DC Water generally lags Peer Utilities' annual linear asset assessment and renewal, particularly for sewer
    - Cost per capita of Consent Order much higher

Path to Achieve Asset Management:
PEER UTILITIES

District of Columbia Water And Sewer Authority
Environmental Quality & Operations Committee Meeting
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Vertical Assets: Pumping and treatment Facilities

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Agenda

- DC Water: AM status
- Peer Utility Selection Criteria
- Overview of Peer Utilities
- Summary of Findings

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General Observations

- Public utilities nationwide are facing very similar challenges in regards to maintaining the functionality of their critical assets while balancing the financial impacts (water, wastewater and treatment)

- AM is intended to support decision making on optimizing the investment

- **Buried Linear** assets are easier to benchmark on a per foot basis, common materials, and failure modes.
- **Vertical assets** (pumping and treatment) are more unique in terms of condition, locations and operational parameters

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DC Water-Vertical Assets

Areas:

1. **Wastewater Treatment**
2. **Water Pumping**
3. **Wastewater Pumping**
4. **Stormwater Pumping**

- **Inventory**
- **State of Repair**
- **Capacity/Technology**
- **Levels of service**
- **Needs and Priority**
- **CIP and investment development**

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DCW Current Status Inventory

- Generally: Assets in Maximo
- Repair History being recorded
- Work orders are in general generated and recorded within Maximo

- Facility Plans account for major assets/Process areas
- Asset Management Plan (AMP) established latest condition baseline in 2017 (organized hierarchically by treatment and pumping areas)
- Established recommended reinvestment values and AM principled practices: business cases, life cycle analysis and project prioritizations

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DCW Current Status State of Repair

- Wastewater Treatment
  - Balanced CIP for equipment rehabilitation, equipment replacements and facility upgrades
- Water pumping
  - Major upgrades for all four pumping station within 15 years
  - Upgrades completed for six storage facilities, one upgrade in design
- Wastewater pumping
  - Last major upgrades around 2003-2009
  - Deferment of equipment replacement and station upgrades has stressed the ability to properly operate the stations and has resulted in an increase in emergency repairs
  - Upgrades will be needed at each station in the short-term to address replacement/rehabilitation of these assets
- Stormwater pumping
  - Past funding requirements have been unclear and DC Water started funding for these stations in the past several years.

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DCW Current Status Capacity/Technology

- Annotated annually Facilities Plan and redone every 5 years to adjust to system needs, based on investments made, remaining facility life and other drivers like regulatory needs
- Wastewater Pumping
  - Recommendations from Facility plans deferred historically including flood proofing and rehabilitation
- Stormwater Pumping
  - Recommendations from Facility plans deferred historically

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DCW Current Status Level of Service

- Established in the AMP, and aligned with Blue Horizon 2020
  - Health and Safety
  - Public Confidence
  - System Reliability
  - Regulatory Compliance
  - Fiscal Impact

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DCW Current Status Needs and Priority

- Risk based prioritization for each component
- Annual process categorizes each asset group by *likelihood of failure and consequence of failure*

Determines "what matters most"

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Current Status-CIP development and Investment

- Annual and iterative process with input from all stakeholders on condition, capacity and technology needs
- Includes risk-based prioritization
- Wastewater Treatment
  - "Generally addressed in the CIP to maintain levels of service"
  - Upgrades contract focus on mechanical and electrical to extend asset life and optimum delivery
- Water Pumping
  - "Generally addressed in the CIP to maintain levels of service"
  - Future advancements of widely disbursed real-time smart infrastructure pending plan development and available funding
- Wastewater/Stormwater Pumping
  - "Underfunded and no funding available for rehabilitation and emergency repair"

Peer Utility Selection Criteria for Vertical Assets

Peer Criteria

- Large systems in urban areas
- Over 750,000 served
- Comparable in size (millions of gallons)
- Vertical assets include WWTPs and Pump Stations

Peer Utilities

- San Francisco Public Utilities Commission (SFPUC)
- Wash. Suburban Sanitation Commission (WSSC)
- New York City Dept. of Environmental Protection (NYCDEP)

Additional Information

- Miami-Dade Water and Sewer Department (MDWSD)

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Benchmarking Observations- Vertical Assets

- Leading utilities are trying to optimize their investment by focusing on asset level versus major upgrades
- Lack of upgrades and insufficient annual Rehabilitation & Replacement are causing disruptions of service
- Under investment leads to emergency repairs, violations, interruptions of service and significant cost, time constrained CDs
- The car example

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Peer Experience San Francisco

System Status

- Population: 2.6 Millions
- 3 Treatment Plants (57 mgd, 65 mgd, 250 mgd)
  - Ocean/Bay outfalls
  - 1952-1993
  - All three plants are experiencing condition-based failures and require major upgrades in condition and technology.
- 26 Combined Sewer Pump Stations (2 significant)
  - Range from 15 to 70 years old
  - Being updated in current program for condition and redundancy

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Peer Experience San Francisco

Asset Management and Facilities Planning Approach

- Assets are inventoried, condition is tracked on the collection system, work orders are generated, and work history is tracked utilizing Maximo CMMS
- Master Planning Effort followed by Program Validation Feeds for CIP development

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Peer Experience San Francisco

Proactively approaching reinvestment ahead of mandates. Also aggressive with public outreach

"Routine repairs are not sufficient to keep pace with our aging and seismically vulnerable infrastructure. It is important to invest now in larger capital improvements to avoid more costly emergency repairs, potential regulatory fines, and greater impacts on our communities."

http://www.sfwater.org/index.aspx?page=607

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Peer Experience San Francisco

CIP Investment Approach

- 20-year, $7B
- $5.6B 10-year CIP, includes:
  - Sewer System Improvement Program (SSIP) funds long-term strategic improvements to treatment, pump stations, and major sewers and force mains
- Annual Renewal and Replacement (R&R) Component – funds smaller repairs and condition inspection and repairs:
  - $ 30M - Treatment (Major repairs funded under the SSIP)
  - $ 100M – Collection System (Includes Pump Stations)

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Peer Experience WSSC

System Status

- serving 1.8 million residents
- Service area 1,000 square miles in Prince George's and Montgomery counties,
- 6 WWTPs with 95MGD permitted capacity, plus 169MGD capacity at Blue Plains AWTP
- 100% of service area is separate sanitary sewers
- 48 WW pumping stations
- 3 reservoirs
- 2 WTPs treating average total 160 MGD
- 13 water pumping stations

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Peer Experience WSSC

Asset Management and Facilities Planning Approach

- Aggressive asset management planning approach
- Perform Engineering Study / Condition Assessment
- Perform Business Case Analysis for optimizing the scope of projects and prioritization

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Peer Experience WSSC

CIP Investment Approach

- 2019-2024 Capital Improvements Program , $1.9 billion
  - 82% system improvement
  - 11% growth
  - 7% environmental regulations
- Proactive funding to meet Level Of Service over 30-year period.
- 2005 SSO Consent Decree, with actual spending estimated at $1.9B (2018-2023), of which $0.7 B is left to complete
- Entered recent Consent Decree to address residuals at Potomac WTP
- All plants and infrastructure upgrades to meet ENR (liquid stream process upgrades)
- Biosolids upgrades

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Peer Experience
New York City DEP

System Status

- 835,000 customers serving a population of 9 million,
- 300 Square miles

- Water System
  - One water treatment plant
  - 5 water PS
- Wastewater system
  - Avg treatment of 1.3 billion gallons/day
  - 14 wastewater treatment plants (31 to 83 years old)
  - 96 pump stations (4 to 106 years old)
  - Pumping stations range in size from 0.22 – 57.6 MGD.
- 4 Combined Sewer Overflow (CSO) retention facilities
  - 60% of NYC is combined sewered areas
  - Under CSO Consent Order to develop and implement Long Term Control Plans (LTCPs)

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Peer Experience
New York City DEP

Asset Management and Facilities Planning Approach

- Asset Management program allows DEP to prioritize capital replacement and rehabilitation projects.
- Asset Management evaluates assets for physical condition, performance, and the consequence of failure
- Use business cases for prioritization of projects to be funded under the Capital Plan.
- Needs for Resiliency and for Sustainability, flood proofing
- And State Of Good Repairs SOGR program

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Peer Experience
New York City DEP

CIP Investment Approach

- $ 18.9B 10-year CIP for FY18-FY27 (for water and wastewater system)
- 10-year CIP is updated every 2 years
- Current 4-year Plan (FY18-FY22) is $13.76B, and is updated quarterly
- Funding for Legal Mandates consist of ~20% of CIP
- Non-mandated budget ~80% addresses other DEP priority needs: state of good repair (SOGR), new programs/ project, emergency repairs generally funded out of Capital Plan

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Summary of Findings

- Peer Public utilities are facing similar challenges
  - Large needs for reinvesting in aging infrastructure
  - Asset management approaches are investigated and used at varying levels in an attempt to optimize investments
    - Condition and consequence based assessment are widely used for plants and pump stations
    - Life cycle cost assessments, business case evaluations and prioritization are common decision making tools

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Summary of Findings

Utility	Population	System Age	AM program/ Facility Plan
San Francisco Public Utilities Commission (SFPUC)	2.6 M	Newer	Yes Validation/ Yes
Wash. Suburban Sanitation Commission (WSSC)	1.8 M	Similar	Yes/ Business Case
New York City Dept. of Environmental Protection (NYCDEP)	**9.0 M**	similar	Yes/ Business case
Miami-Dade Water and Sewer Department (MDWSD)	2.3 M	?	No/ No
DC Water	680K/1.6M	1800-1935	Yes Validation/ Yes

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Summary of Findings

- Leading utilities are proactively investing into the infrastructure while optimizing their investment by AM principled planning:
  - San Francisco is doing it proactively, ahead of regulatory mandates. Driven my level of service and technology.
  - WSSC and NYC are driven by maintaining “State of Good Repair”
  - **DC Water’s current investment is largely driven by mandates**
  - **DC Water’s reinvestment in their assets is at half the rate of other Peer utilities**
- Utilities with no pro-active approach to reinvest are facing mandates that are driving their CIP like Miami-Dade

water is life

Summary of Findings

Utility	Population	CIP ($)	Years	CIP ($)/#years	Regulatory (%)	Other ($/year)
San Francisco Public Utilities Commission (SFPUC)	2.6 M	$5.6 B	10	$560 M	N/A	$560 M
Wash. Suburban Sanitation Commission (WSSC)	1.8 M	$3.5 B	6	$583 M	7%	$543 M
New York City Dept. of Environmental Protection (NYCDEP)	9.0 M	$18.8 B	10	$1,880 M	20%	$1,504 M
Miami-Dade Water and Sewer Department (MDWSD)	2.3 M	$15.5 B	10	$1,550 M	12%	$1,209 M
DC Water	**680K/1.6M**	**$3.6 B**	**10**	**$360.0 M**	**37%**	**$227 M**

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Additional Information

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Peer Experience Miami-Dade WASA

System Status (2.3M residents served)

- 3 WWTPs treating 375 MGD
- 1,049 PS – CD required repairs ($215M to 111 PS, 27 FMs and 78 Gravity feed lines

Asset Management Approach

- No defined, organized, cross-department asset management system
- No asset management software in place
- 2013 CD required repairs to all 3 PS
- CIP planning is driven by Consent Decree needs and near-term projects in terms of failure risk and operator needs
- One of the lowest rates in Florida

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Peer Experience Miami-Dade WASA

CIP Investment Approach

- $15.5 B 10-year W&S CIP
  - 66% WW projects
  - 12% CD published – FY 2018 around 43%
  - Site says emergency repairs costs 10X planned

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District of Columbia Water and Sewer Authority
Henderson Brown, Interim CEO & General Manager

Permit Operations Department KPI Recovery Plan and Performance

Environmental Quality and Operations Committee
April 19, 2018

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Introduction / Background

- Key Performance Indicator (KPI) Service Level Agreement (SCA) is 85%.
- Historically Permit Ops had KPI of 90% or better.
- KPI started to drop off due to increased work load with simultaneous staff attrition.
- Hit a low of 58% in November 2017.
- Analysis prior to System Availability Fee (SAF) additional workload buildup showed need to add 4 positions.
- Recovery/Action Plan initiated in order to meet KPI and anticipated SAF buildup in Dec 2017.
- 4 temporary outside engineers brought in Dec/Jan to support staff.
- Takes 2 months to get staff trained and efficient, estimated 6-12 months effort.
- Recovery Plan implementation resulted in KPI increased from 66% to 93%.

2

- SAF Deferred from January 1, 2018 to June 1, 2018.

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Permit OPS KPI performance since Recovery Plan

Year	Month	KPI (% completed within the SLA time)	New In-house Staff since 9/1/17	Additional Outside Staff	Comment
2017	September	68 %	(1 vacancy)		<85%
	October	68 %			<85%
	November	58 %			<85%
	December	66 %		1 Eng. III	<85%
2018	January	80 %		3 Eng. II	<85%
	February	92 %	1 Eng. III		>85%
	March	93 %			>85%
		Totals	1	4	

3

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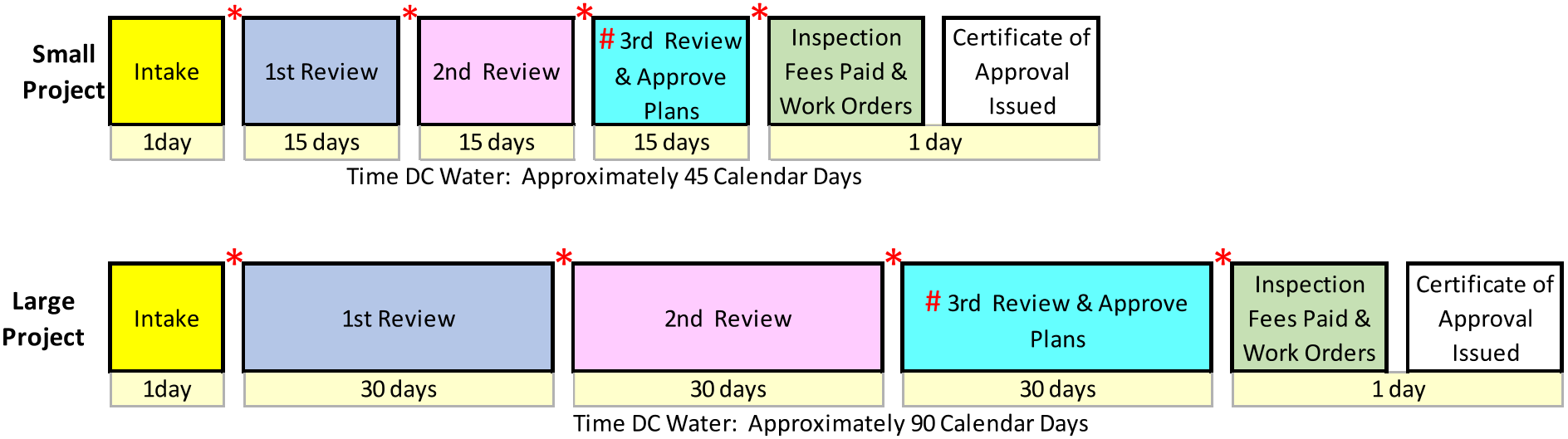
Permit Review Process Flow Chart



NOTE:

* At Each Asterisks The Process is Back In The Applicants Control. These Times Can Vary From 1 day to 1 Year

\# A 3rd Review Is Not Always Necessary Depending Upon Applicant Responses.

4

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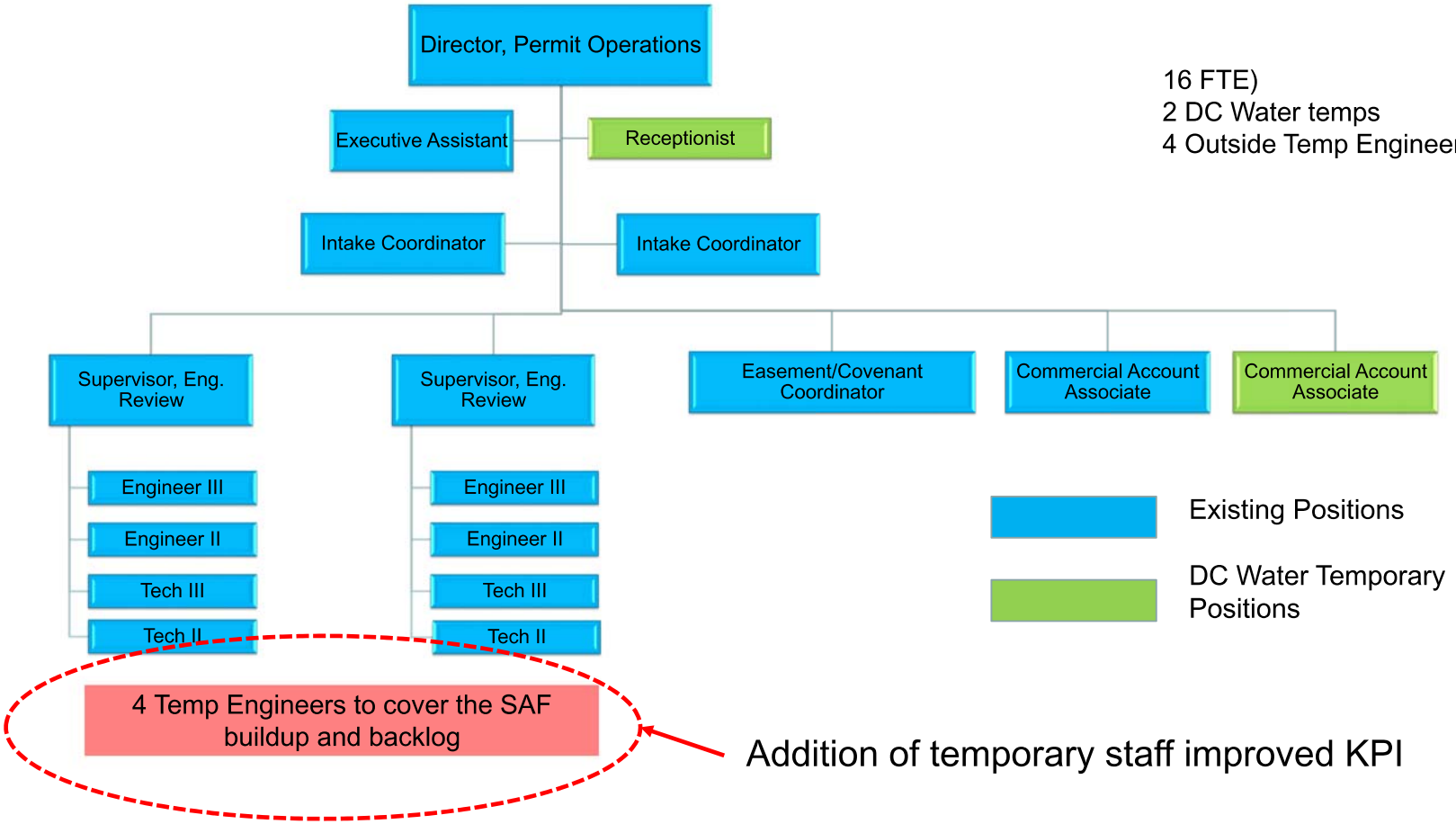
Permit Operations Department
Current Organization Chart
March 2018



16 FTE)
2 DC Water temps
4 Outside Temp Engineer-II

Existing Positions

DC Water Temporary Positions

Addition of temporary staff improved KPI

5

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Recovery/Action Plan Summary

- Statistical analysis of process review times vs KPI identifies optimal performance loading and the need for 4 additional staff to meet baseline work load.
- Removed critical path bottlenecks from review process and minimized ancillary function time requirements using online and email resources.
- Coordinated with developer/engineering community to identify SAF buildup.
- SAF will require timely responses from DC Water in order to complete processing within the one year time frame.
- Plan for staff to accomplish this on top of baseload.
- Chief Engineer approves plan in early Nov. to temporarily staff up for SAF.
- Onboard and train 4 temp staff in sufficient time to address SAF.
- KPI rose to acceptable levels of 80%, 92% and 93%.

6

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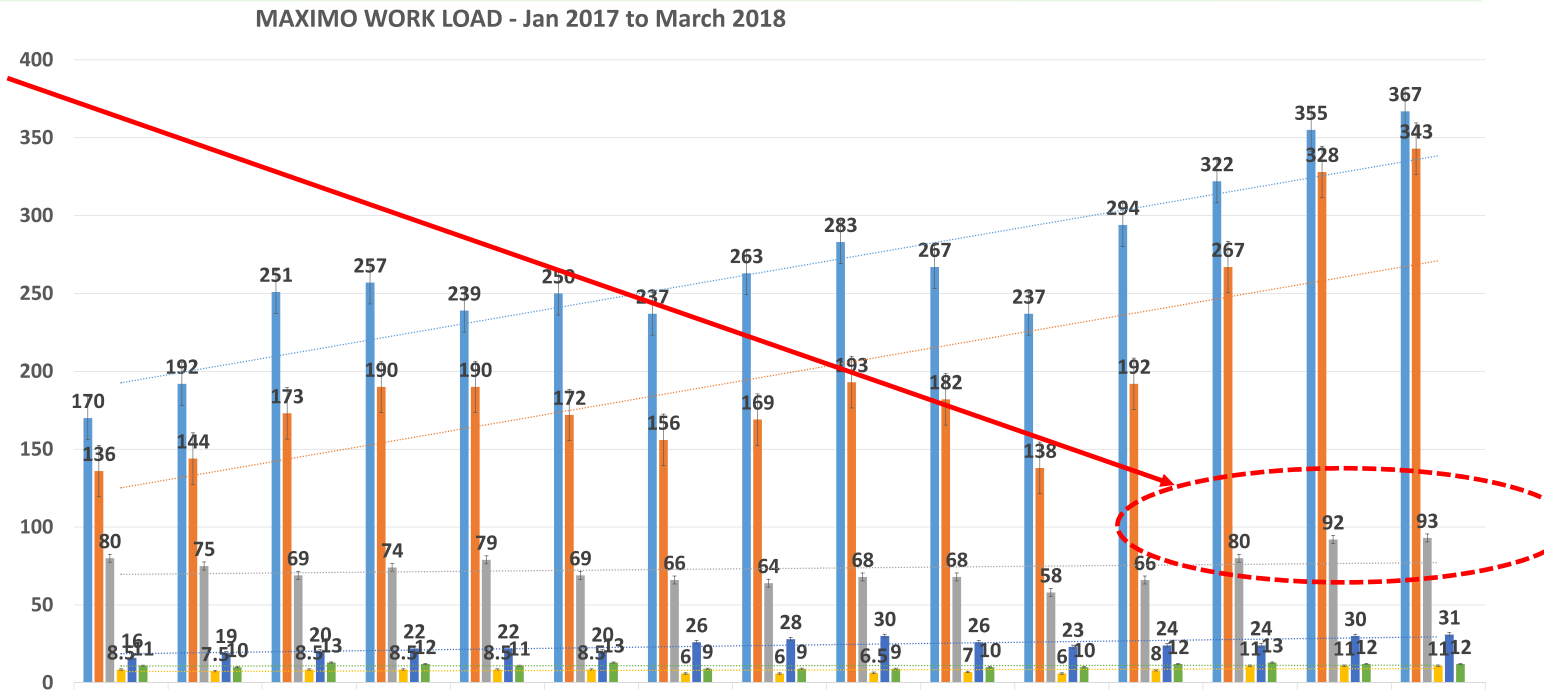
Workload Analysis

Recovery Plan results,
KPI 80, 92, 93



	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
Total Processed	170	192	251	257	239	250	237	263	283	267	237	294	322	355	367
On Time Processed	136	144	173	190	190	172	156	169	193	182	138	192	267	328	343
On Time Percentage	80	75	69	74	79	69	66	64	68	68	58	66	80	92	93
Actual Number of Reviewers	8.5	7.5	8.5	8.5	8.5	8.5	6	6	6.5	7	6	8	11	11	11
Number of On Time Projects Reviewed Per Reviewer	16	19	20	22	22	20	26	28	30	26	23	24	24	30	31
Required Number of Reviewers for 100% Achieve	11	10	13	12	11	13	9	9	9	10	10	12	13	12	12
E															

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QUESTIONS?

Assessing Contractor Responsiveness, Responsibility & Overview of EPA Outreach Program

Presentation to the Environmental Quality and Operations committee
April 19, 2018

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

Thrust Block Installation at Rhode Island Ave & 6th ST NW

Small Diameter Water Main Replacement

Optimization, Accountability, and Transparency

LOW BIDDER RESPONSIVENESS & RESPONSIBILITY

- **Responsiveness:**
  - Procurement Manual Section 6.2.8:
    - "comply in all material respects with the Instructions for Bidders."
    - Required forms and documentation

- **Responsibility:**
  - Procurement Manual Section 25.2:
    - Have the adequate financial resources to perform the contract
    - Be able to comply with the required schedule
    - Integrity & reliability which will assure good faith performance
    - Have a satisfactory performance record

Assessing Contractor Responsiveness and Responsibility

IS THE LOW BIDDER RESPONSIVE?

- Does bid contain a definite, unqualified offer to meet the material terms of the IFB?
- Material terms go the substance of the bid as it relates to price, quantity, quality or delivery

Assessing Contractor Responsiveness and Responsibility

IS THE LOW BIDDER RESPONSIVE?

Other specific responsiveness indicators may include:

- Are addenda acknowledged?
- Bonds submitted and correct?
- Authorized agent signed bid documents?
- Contractor registered business in DC?
- Contractor licensed/ certified for work?
- Qualifying MBE/WBE outreach conducted?

Assessing Contractor Responsiveness and Responsibility

IS THE LOW BIDDER RESPONSIBLE?

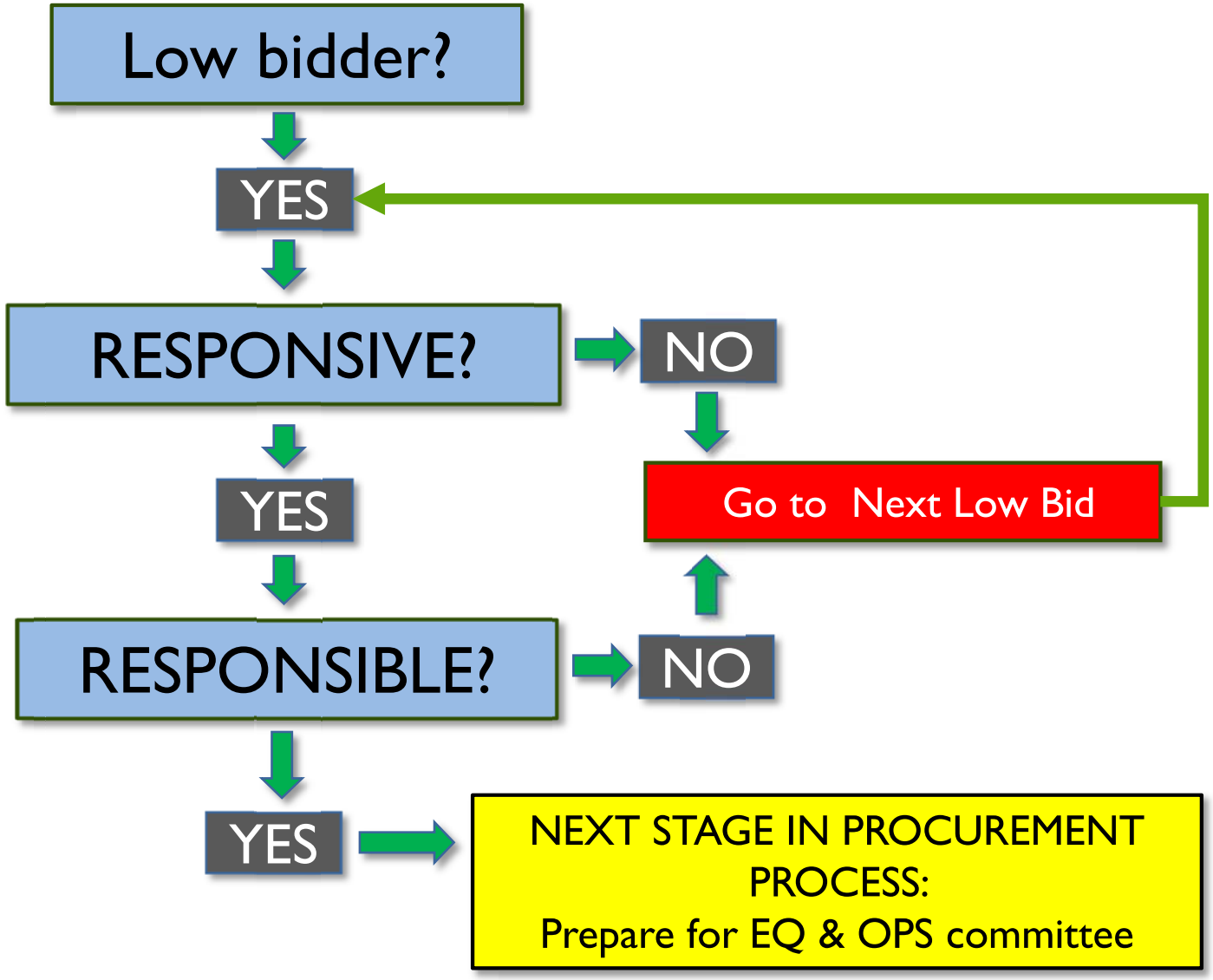
- Proposed management staffing plan? (foreman, superintendent, project manager, office management)
- Past Performance? With DC Water? Outside DC Water?
- Project work plan and schedule?
- How will the contractor achieve project milestones?
- Work scopes for MBE/WBE?
- Financial strength of bidder and existing other contracts?
- Ethical or past business integrity issues?
- Tax status? Debarment? Suspension?
- Safety record?
- Internet search

Assessing Contractor Responsiveness and Responsibility

Post-bid pre-award (pre-FACT sheet) interview with the low bidder to assess **Responsibility**

- DCW Q&A on responsibility criteria
- DCW interview team includes:
  - DCW design engineer
  - Design consultant
  - DCW CM team
  - DCW program manager
  - DCW program services staff
  - DCW quality control staff
  - DCW operations
  - DCW safety

Assessing Contractor Responsiveness and Responsibility



DC Water Strategic Goals and Business Development Plan

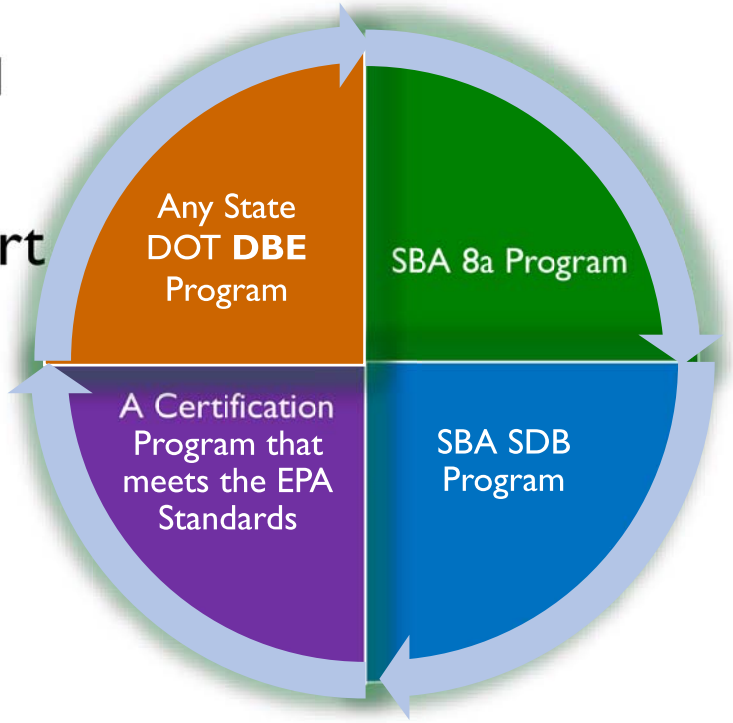
Procurement Manual Section 32.1 Policy

"..actively encourage and support the utilization and participation of certified Local Business Enterprises (LBEs), Local Small Business Enterprises (LSBEs), Minority Business Enterprises (MBEs) and Women-owned Business Enterprises (WBEs).."

Overview of EPA Procurement

Overview of EPA procurement Requirements

- MBE/WBE Fair Share Objective participation goals for construction are:
  32% MBE, 6% WBE
  - DCW Availability analysis & goals reviewed and approved by EPA every 3 years
- EPA Recognized Certifications per chart
- Good Faith Effort Outreach Required



EPA Good Faith Efforts

Prime Contractor Must Demonstrate the Following Good Faith Efforts (per 40 CFR 33 part C):

A. Ensure DBEs were made aware of contracting opportunities

B. Make information available for a minimum of 30 calendar days

C. Consider subcontract options - smaller tasks or quantities for DBE bidders

D. Encourage contracting with a consortium of DBEs

E. Use Small Business Administration (SBA) and the Minority Business Development Agency (MBDA) of the Department of Commerce.

Outreach is the key to expanding the pool of potential subcontractors & increasing competition

Unsatisfactory evidence of outreach=NONRESPONSIVE = reject bid

- Objectives (Goals) cannot be requirements
- Goals are targets
- Each project has it's own unique constraints re: ability to meet goals
- DCW Compliance and (Procurement) Engineering Review & Evaluate Outreach

Acceptable Outreach BUT falls short of the goals – how come?

- Technical components
- Innovations by contractor
- Market conditions

IS THIS OK to award?

YES

Demonstration of Outreach = critical

Outreach cannot be altered after bid received.

DCW Procurement efforts to assist contractors? (with outreach)

Training sessions, post bid meetings, NUCA involvement.

EPA Grants

- **<u>Clean Water and Safe Drinking Water grants</u>**
  - 2016 : Clean Water $3.4 MM Safe Drinking Water $8.3 MM
  - 2017 : Clean Water $2.1 MM Safe Drinking Water $7.0 MM
- Safe Drinking Water grants
  - small diameter water mains 20% DCW : 80% EPA
  - List of potential eligible projects to EPA every other year (2019)
  - 2012-2017: Safe Drinking Water eligible projects:
    - $182.6MM completed by DCW; total EPA funding $48.5MM
- Clean Water grants
  - 2017-2020 – Blue Plains Gravity Thickeners 45% DCW share : 55% EPA
  - Grant list updated annually from DCW to DDOE to EPA
  - 2012-2017: Clean Water eligible projects:
    - $373.2MM completed by DCW; total EPA funding $22.0MM

Questions?

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
BOARD OF DIRECTORS CONTRACTOR FACT SHEET

ACTION REQUESTED

CONSTRUCTION CONTRACT:

Lower Area Trunk Sewer Rehabilitation (Non-Joint Use)

Approval to execute a construction contract for $8,248,710.00

CONTRACTOR/SUB/VENDOR INFORMATION

PRIME:	SUBS:		PARTICIPATION:
SAK Construction, LLC 1405 Benson Court, Suite C Arbutus, MD 21227 Headquarters O'Fallon, MO 63366	Daco Construction Corp. Hanover, MD	MBE	5.4%
	Luther's Supply Company, LLC St. Louis, MO	MBE	11.1%
	Advantage Manhole & Concrete Svc. Houston, TX	WBE	4.2%

DESCRIPTION AND PURPOSE

Contract Value, Not-To-Exceed:	$ 8,248,710.00
Contract Time:	730 Day (2 Years)
Anticipated Contract Start Date (NTP):	5-04-2018
Anticipated Contract Completion Date:	5-02-2020
Bid Opening Date:	2-07-2018
Bids Received:	4
Other Bids Received	
Spiniello	$ 10,233,000.00
Northeast Remsco	$ 10,777,000.00
IPR Northeast	$ 15,745,221.00

Purpose of the Contract:

The District of Columbia Water and Sewer Authority (DC Water) needs to implement the Lower Area Trunk Sewer Rehabilitation Contract, to rehabilitate the damaged/deteriorated sections of the Lower Area Trunk Sewer and associated manholes. The location of the work is along Pennsylvania Avenue, N.W., 1st Street, N.W., Washington Ave, N.W., and 2nd Street S.E. The contract will utilize two rehabilitation methods (Cured-in-Place Pipe and Geopolymer Lining).

Contract Scope:

- Rehabilitate 11,900 linear feet of 42-inch sewer and 100 linear feet of 30-inch sewer using Cured-in-Place Pipe and Geopolymer Lining.
- Rehabilitate thirty-three (33) sewer manholes using Cured-in-place Lining and Geopolymer Lining.
- Reinstatement of twenty-seven (27) 6-inch through 24-inch laterals and side sewers.
- Restoration of associated paving, sidewalk, curb and gutter.
- Bypass Pumping, and Associated traffic control.
- Cleaning and pre- and post-CCTV inspection.

Federal Grant Status:

- Construction Contract is eligible for Federal grant funding assistance; inclusion in grant is pending availability of grant funds.

PROCUREMENT INFORMATION

Contract Type:	Fixed Price	**Award Based On:**	Lowest responsive, responsible bidder
Commodity:	Construction	**Contract Number:**	120210
Contractor Market:	Open Market		

BUDGET INFORMATION

Funding:	Capital	**Department:**	Engineering and Technical Services
Service Area:	Sanitary	**Department Head:**	Craig Fricke
Project:	DR		

*ESTIMATED USER SHARE INFORMATION

User	Share %	Dollar Amount
District of Columbia	100.00%	$ 8,248,710.00
Federal Funds *	0.00%	$
Washington Suburban Sanitary Commission	0.00%	$
Fairfax County	0.00%	$
Loudoun County & Potomac Interceptor	0.00%	$
Total Estimated Dollar Amount	**100.00%**	**$ 8,248,710.00**

*Eligible for Federal Grant Funding at 45% of the District of Columbia share. Grant funding is insufficient to fund all eligible contracts. Federal Grant Funding may be used if additional funding becomes available or if other eligible projects are postponed.

Leonard R. Benson / 4-11-18
Chief Engineer — Date

Matthew T. Brown / 4/12/18
Chief Financial Officer — Date

~~Dan Bae~~
~~Director~~ of Procurement Chief / 4/12/18 Date

Henderson J. Brown IV / Date
Interim CEO and General Manager

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY
BOARD OF DIRECTORS CONTRACTOR FACT SHEET

ACTION REQUESTED

GOODS AND SERVICES CONTRACT

Green Infrastructure Maintenance Contract (Non-Joint Use)

Approval to execute a goods and services contract for $1,780,617.00

CONTRACTOR/SUB/VENDOR INFORMATION

PRIME:	SUBS:		PARTICIPATION:
Stormwater Maintenance, LLC 10944 Beaver Dam Road, Suite C Hunt Valley, MD 21030	PMGL Development, LLC* Washington, DC	CBE	34.0%
	TCG Property Care* Capital Heights, MD	CBE	19.0%

*Based upon the Green Infrastructure (GI) Memorandum of Agreement with the District of Columbia, this contract shall utilize best efforts to maximize Certified Business Enterprise (CBE) participation, with a goal that at least 50% of the dollar amount of this contract be awarded to CBEs. No Federal funding (i.e. EPA) will be used for this contract.

DESCRIPTION AND PURPOSE

Contract Value, Not-To-Exceed:	$1,780,617.00
Contract Time:	853 Days (2 Years, 4 Months)
Anticipated Contract Start Date (NTP):	06-01-2018
Anticipated Contract Completion Date:	09-30-2020
Other firms submitting proposals/ qualification statements	4

AKRF, Inc
Anchor Construction Corporation
Environmental Quality Resources, LLC
John Shorb Landscaping, Inc

Purpose of the Contract:

The purpose of the contract is for maintenance of DC Water-constructed Green Infrastructure (GI) facilities as part of the practicability assessment for GI. These facilities were constructed to manage stormwater in various parts of the District of Columbia and to mitigate flooding in Bloomingdale and LeDroit Park neighborhoods.

Contract Scope:

- Maintain Green Infrastructure (GI) practices constructed under various DC Clean Rivers Contract Divisions. GI practices to be maintained under this contract include, but are not limited to, bioretention, pervious pavement, green roof plantings and infrastructure, and turf pavers.
- Report the maintenance activity using DC Water's work order management software, IBM's Maximo and Maximo Anywhere Applications.
- Obtain all necessary permits to conduct work in accordance with local, state and federal regulations.
- This Contract will be subject to the goals outlined in the Memorandum of Agreement between DC Water and the Government of the District of Columbia Regarding Job Opportunities for District Residents and Contracting Opportunities for District Businesses for Designing, Constructing, Inspecting, and Maintaining Green Infrastructure.

Federal Grant Status:

This Contract is not eligible for Federal grant funding assistance.

PROCUREMENT INFORMATION

Contract Type:	Cost Reimbursement	**Award Based On:**	Highest Ranking Score
Commodity:	Maintenance Services	**Contract Number:**	170140
Contractor Market:	Open Market		

BUDGET INFORMATION

Funding:	Capital	**Department:**	DC Clean Rivers Project
Service Area:	Combined Sewer	**Department Head:**	Carlton Ray
Project:	CY, CZ, DZ		

ESTIMATED USER SHARE INFORMATION

User	Share %	Dollar Amount
District of Columbia	100.00%	$1,780,617.00
Federal Funds	0.00%	$
Washington Suburban Sanitary Commission	0.00%	$
Fairfax County	0.00%	$
Loudoun County & Potomac Interceptor	0.00%	$
Total Estimated Dollar Amount	**100.00%**	**$1,780,617.00**

Leonard R. Benson, 3-11-18
Leonard R. Benson — Date
Chief Engineer

~~Dan Bae~~ John Dosley, 4/12/18
~~Dan Bae~~ John Dosley — Date
~~Director~~ Chief of Procurement

Matthew T. Brown, 3/12/18
Matthew T. Brown — Date
Chief Financial Officer

Henderson J. Brown, IV — Date
Interim CEO and General Manager

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DC Water Department of Clean Water Quality and Technology

Research and Development Overview

Challenges Blue Plains AWTP

DO more

- Growth
- More Stringent Regulations – Now and in the Future
  - Eliminate CSOs (370 – 1076 mgd and higher),
  - Nutrients (TN<3 & TP<0.18),
  - Class A Biosolids (pathogen re-growth / reactivation)
  - Future – PCBs, EDCs, secondary treatment for CSO by-pass

IN less

- Space constraints
- Aging infrastructure
- Urban environment – visual impact, odour, noise

WITH less

- Sustainability Vision
  - Energy Neutrality
  - Resource Recovery – Energy, Biosolids, Nutrients, Water
- Cost – long term rate impacts

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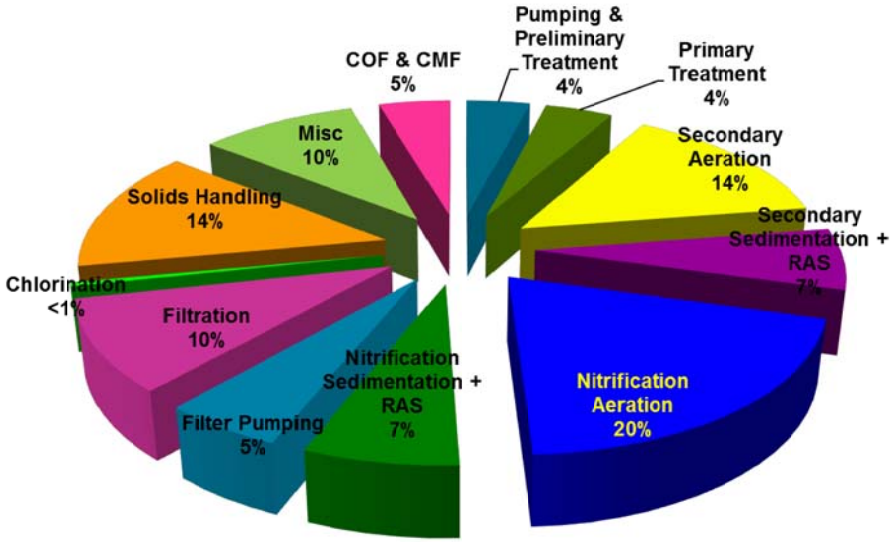
Drivers/Goals

- Operations and CIP Needs
  - Technology development and evaluations
  - Optimize use of capital investment
  - Reduce operational cost
- Future Permits
- Strategic Plan
  - Energy Neutrality
  - Resource recovery



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Team and Facilities

- Team
  - 4 DC Water Full-time staff
  - Research Associates/Interns
  - Collaboration Partners
- Research Laboratories
  - 3 Locations
  - Benchscale Testing
  - Analytical Equipment
- Pilot Processes
  - Carbon removal
  - Nitrogen removal
  - Thermal Hydrolysis
  - Anaerobic Digestion

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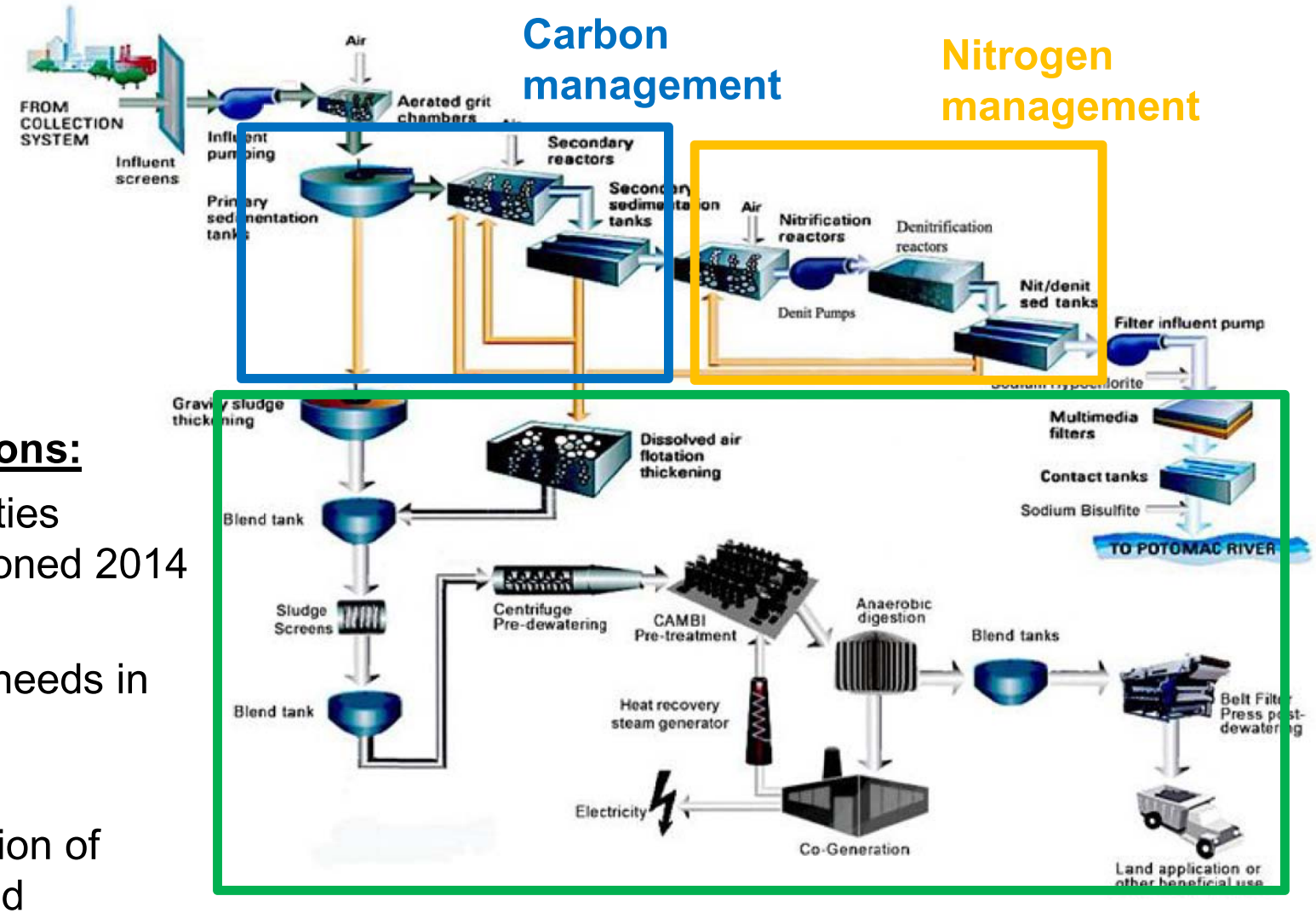
R&D Focus Areas



Considerations:

- New facilities commissioned 2014 thru 2018
- Capacity needs in out years
- Minimize consumption of energy and chemicals

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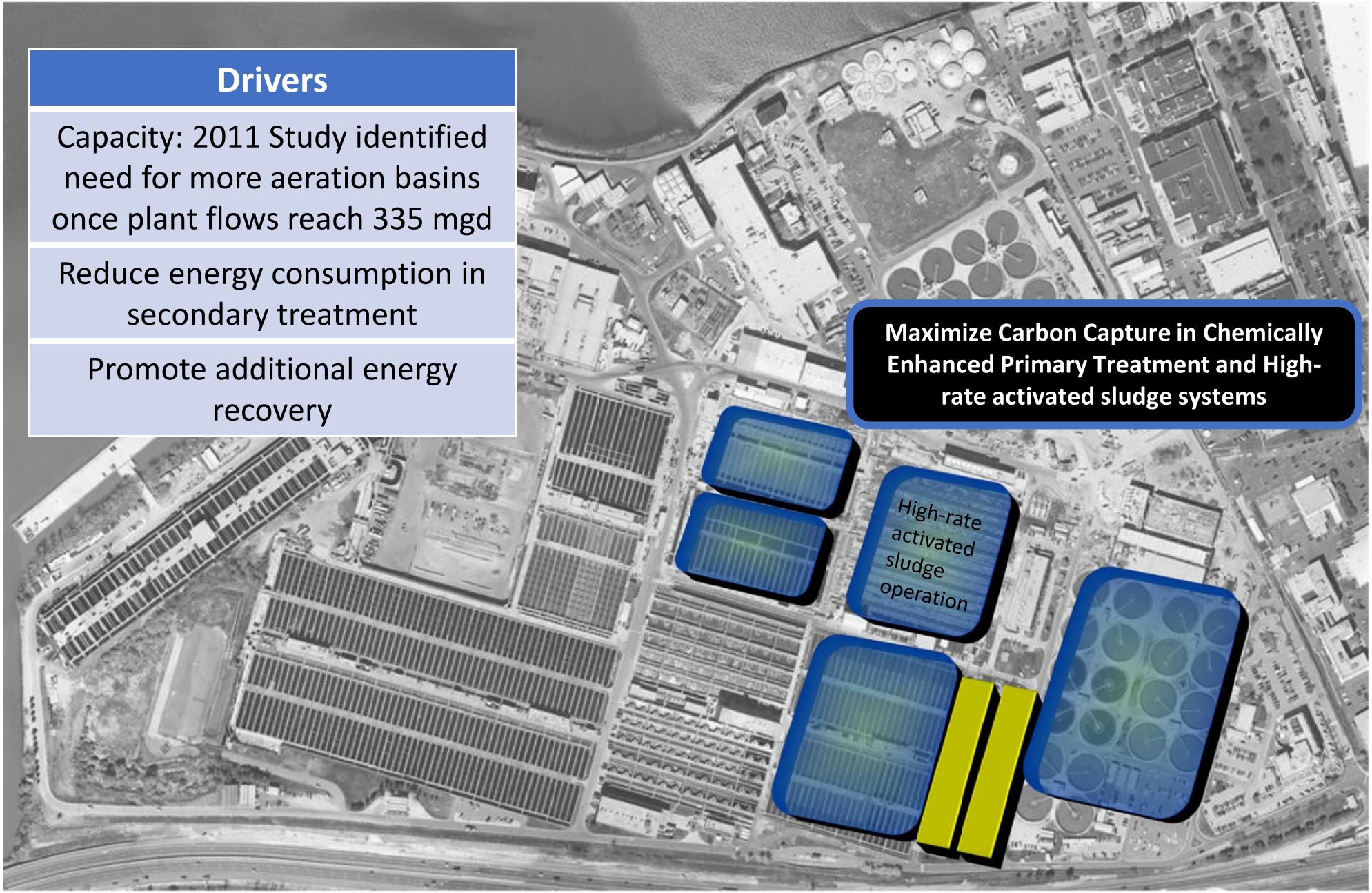
1. Carbon Management



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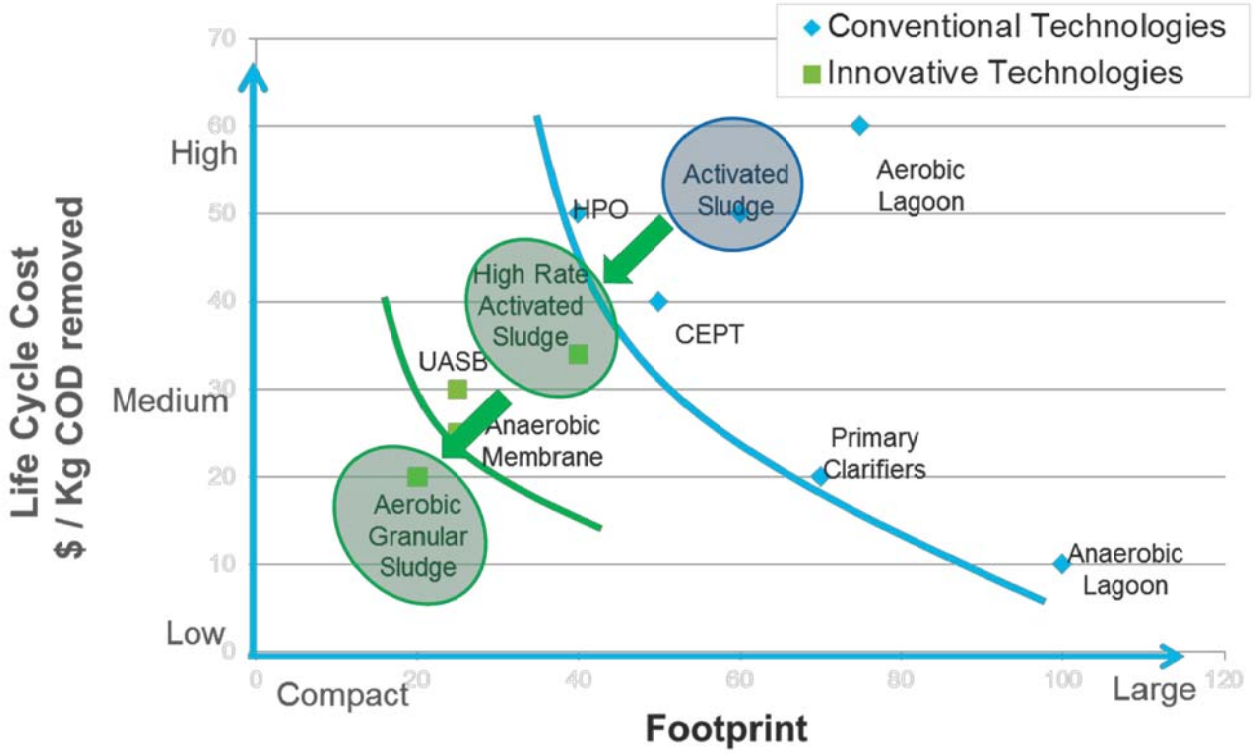
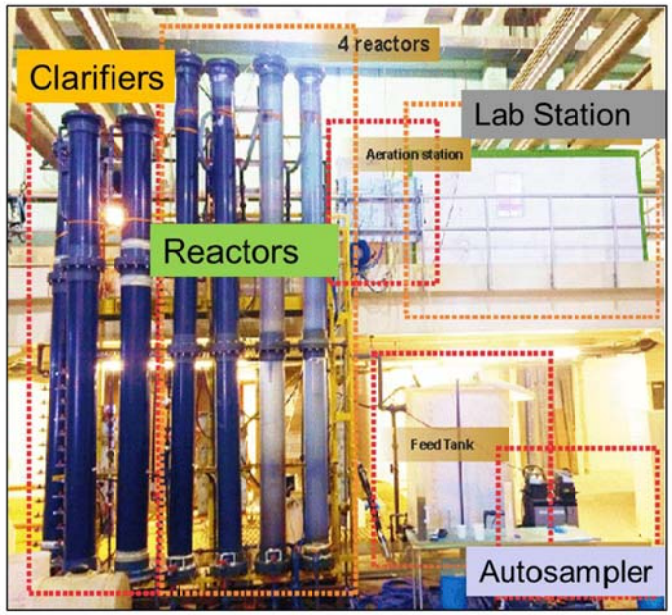
Carbon Removal
(Secondary Treatment)

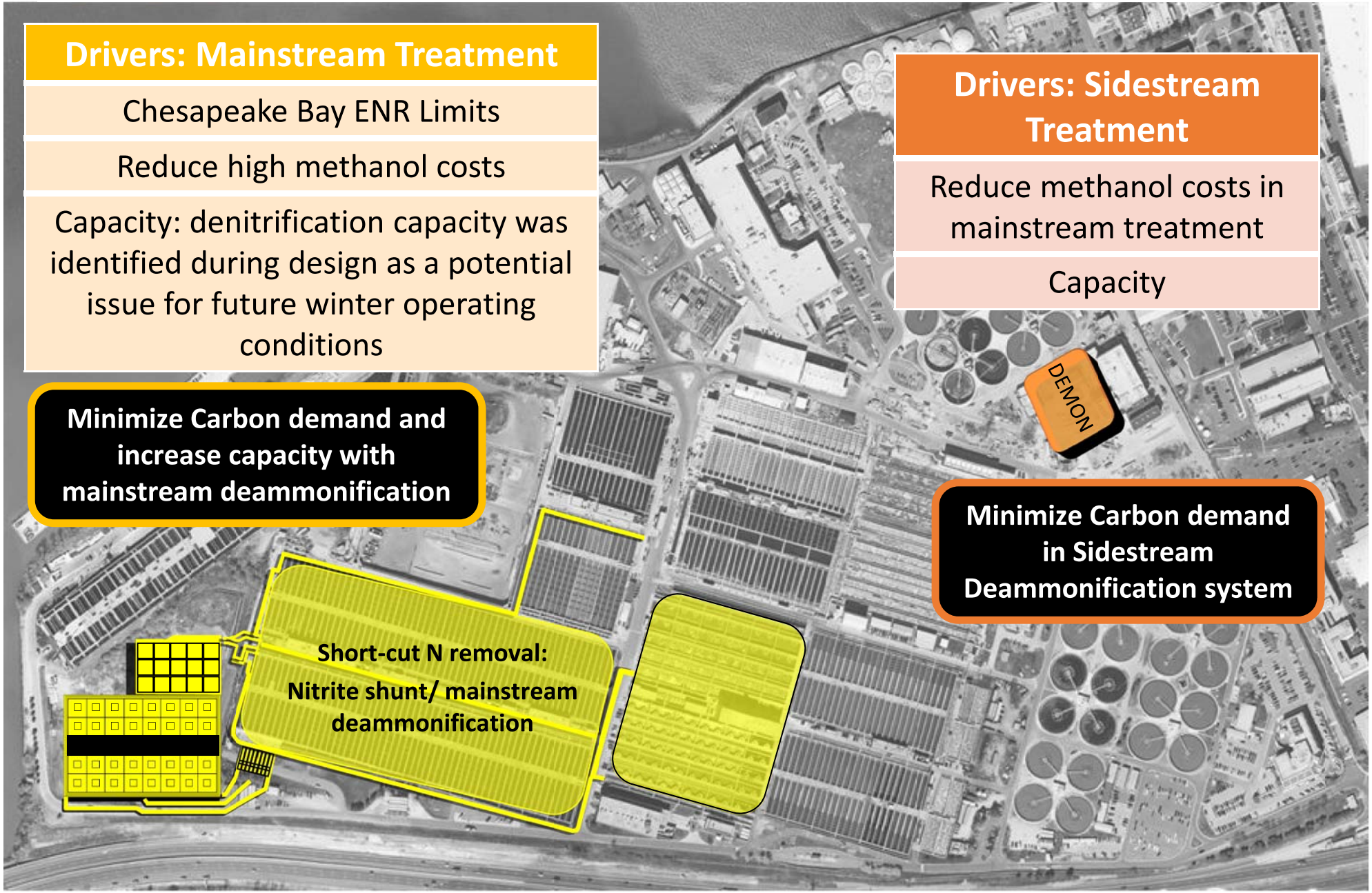


Keys to success:

- Faster solids settling
- Promote adsorption of organic material and storage in biomass rather than oxidation
- Advanced process controls



2. Nitrogen Management



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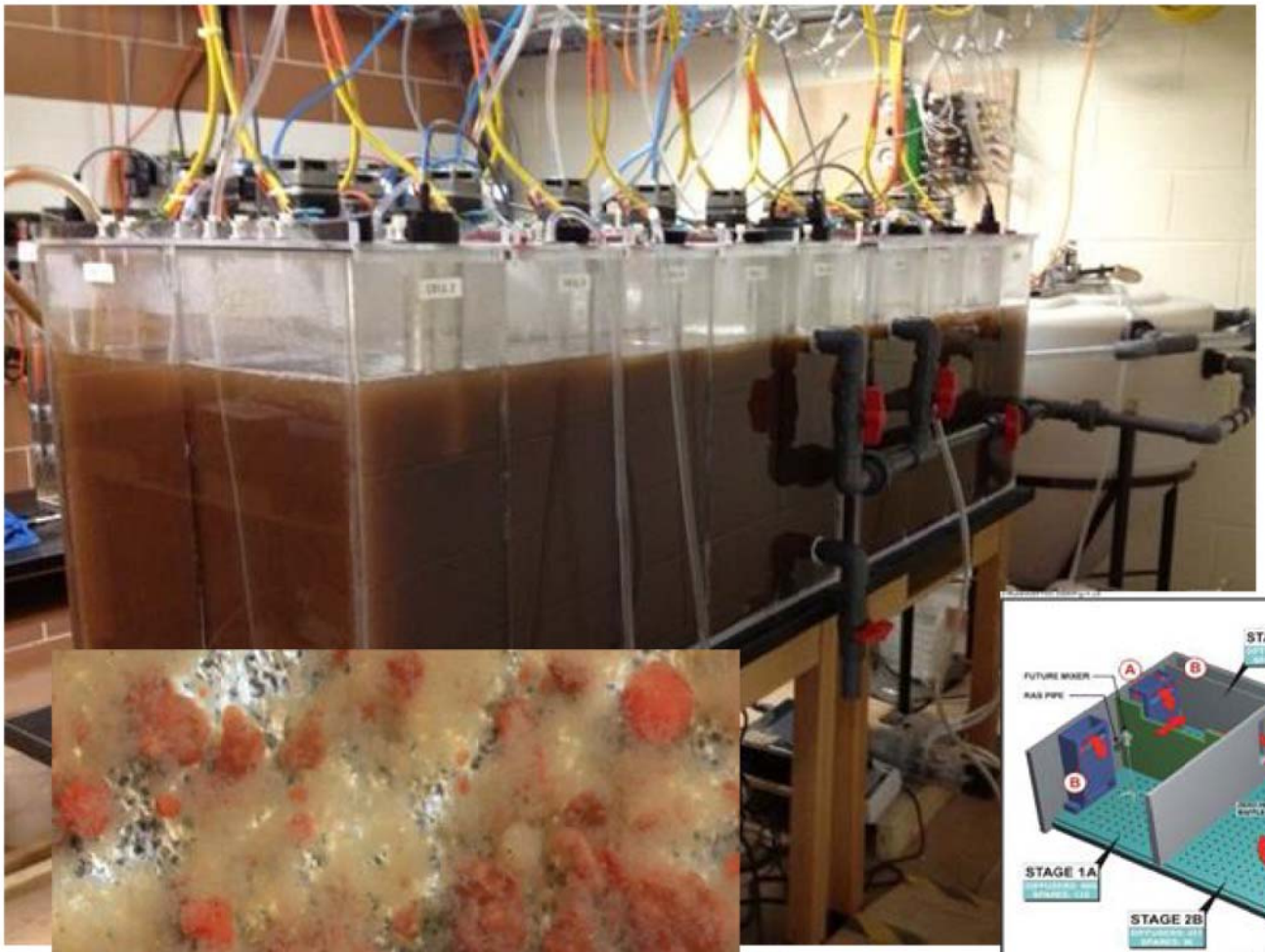
Mainstream N Removal (ENR Facilities)



Keys to success:

- Prevent full nitrification to NO_3-N
- Anammox retention
- Anammox polishing to TN levels
- Faster solids settling
- Advanced controls

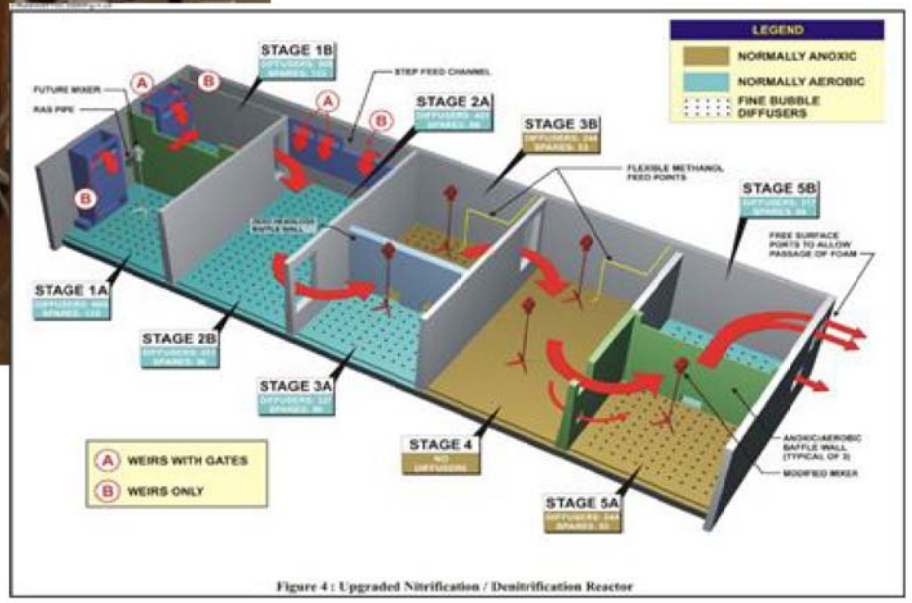


Figure 4 : Upgraded Nitrification / Denitrification Reactor

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Sidestream N Removal (Filtrate Treatment Facility)

Keys to success:

- Identify and mitigate impacts of inhibitory compounds
- Manage filtrate quality
- Anammox retention
- Continuous flow vs. batch process (future capacity)

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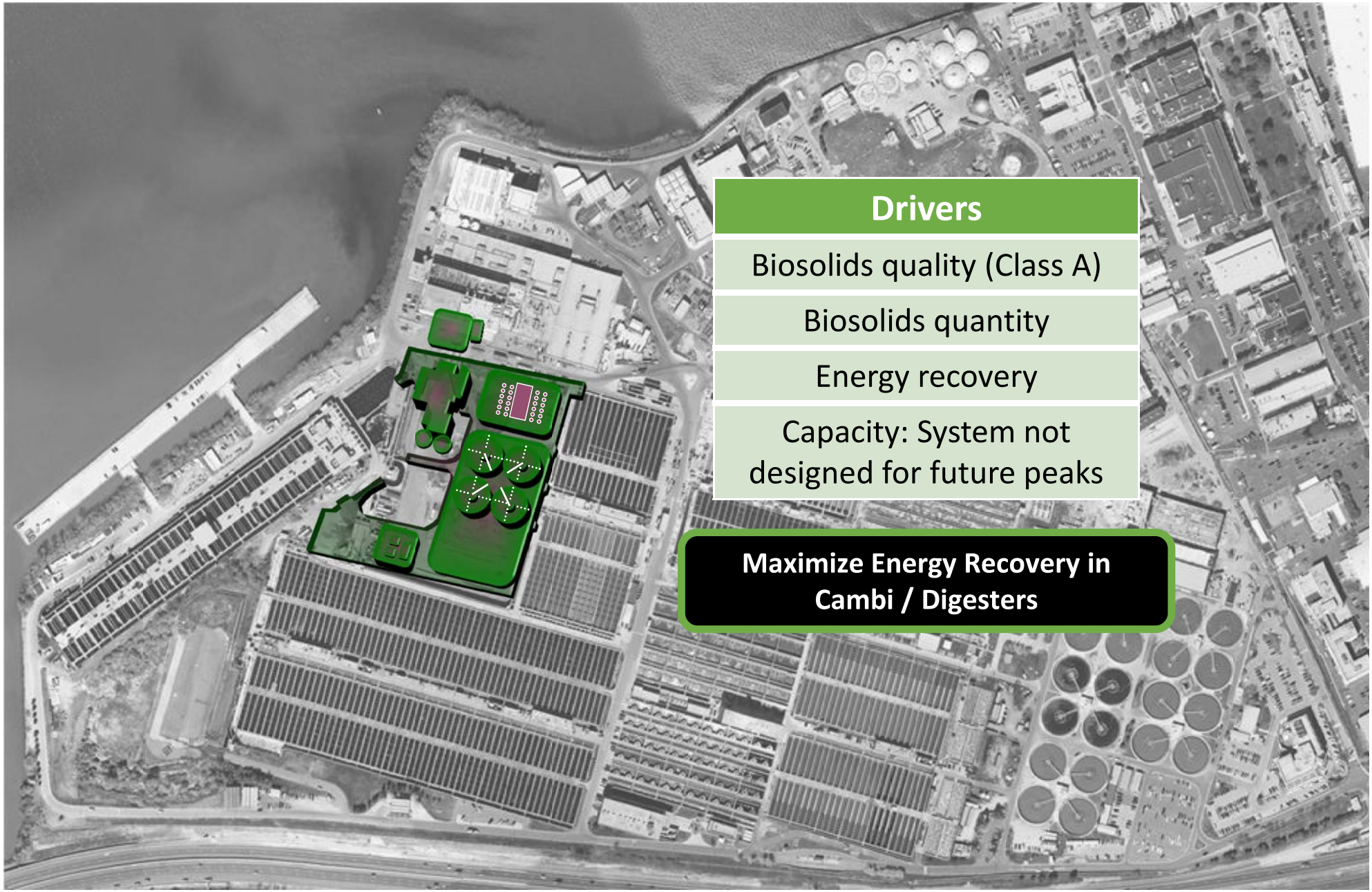
3. Biosolids Management



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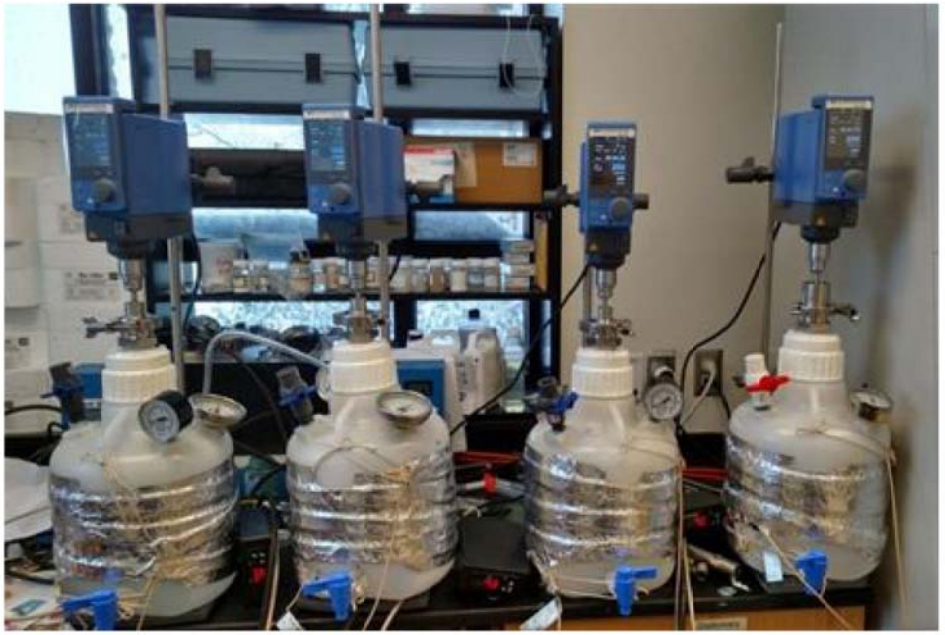
THP, Digestion, Dewatering

Keys to success:

- Solids dewaterability
- Hydrolysis in digesters
- Solids destruction and gas production
- Advanced controls



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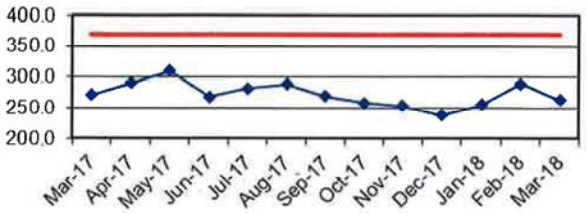
BLUE PLAINS ADVANCED WASTEWATER TREATMENT PLANT
PERFORMANCE REPORT – MARCH 2018

Average plant performance for the month was excellent with all effluent parameters well below the seven-day and monthly NPDES permit requirements. The monthly average influent flow was 264 MGD. There was no Excess Flow during this reporting period. The following Figures compare the plant performance with the corresponding NPDES permit limits.

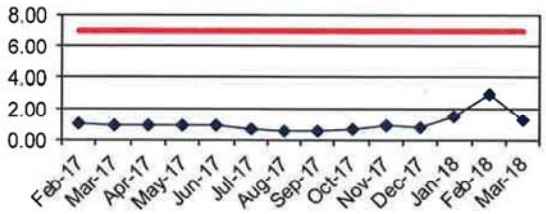
Plant Influent Flow (mgd)



Influent Flow — Average Design Capacity

This graph illustrates the monthly average influent flow to the plant. The design average flow is 370 MGD. Blue Plains has a revised 4-hour peak flow capacity of 511 MGD through complete treatment. Flows up to 336 MGD in excess of the 511 MGD peak capacity receive primary treatment, disinfection and dechlorination.

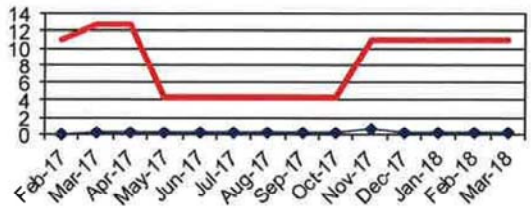
TSS (mg/l)



Effluent TSS — Permit Limit

Effluent Total Suspended Solids (TSS) is a measure of the amount of solid material that remains suspended after treatment. The effluent TSS concentration for the month averaged 1.27 mg/L, which is below the 7.0 mg/L permit limit.

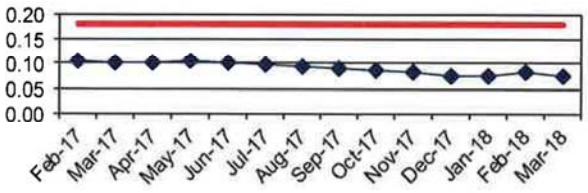
Ammonia (mg/l)



Effluent NH3 — Permit Limit

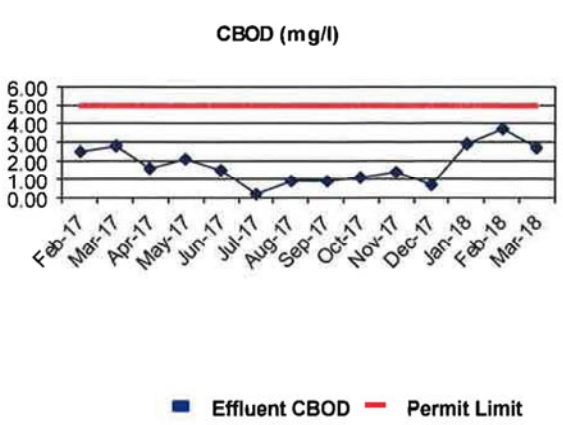
The Ammonia Nitrogen (NH3-N) is a measure of the nitrogen found in ammonia. For the month, effluent NH3-N concentration averaged 0.11 mg/L and is below the average 12.8 mg/L limit.

Total Phosphorus Annual Average (mg/l)

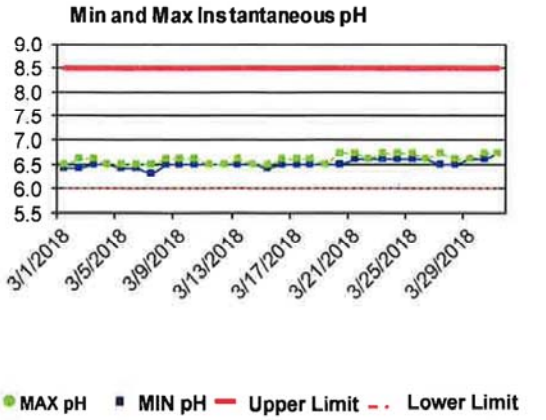


Effluent TP — Permit Limit

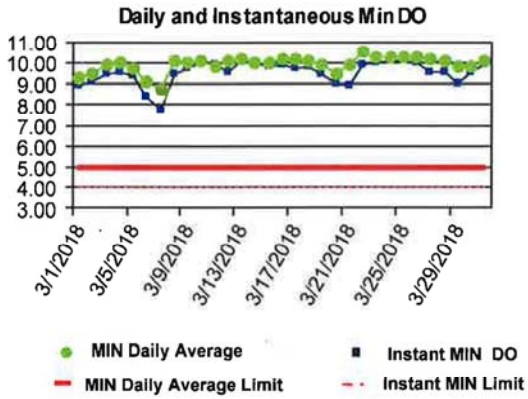
The Total Phosphorus (TP) is a measure of the particulate and dissolved phosphorus in the effluent. The annual average effluent TP concentration is 0.08 mg/L, which is below the 0.18 mg/L annual average limit.



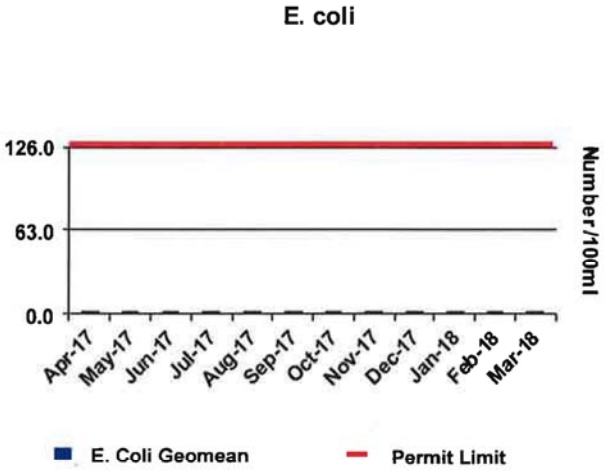
Carbonaceous Biochemical Oxygen Demand (CBOD) is a measure of the amount of dissolved oxygen required for the decomposition of organic materials. The effluent CBOD concentration averaged 2.70 mg/L (partial month), which is below the 5.0 mg/L limit.



pH is a measure of the intensity of the alkalinity or acidity of the effluent. The minimum and maximum pH observed were 6.3 and 6.7 standard units, respectively. The pH was within the permit limits of 6.0 and 8.5 for minimum and maximum respectively.



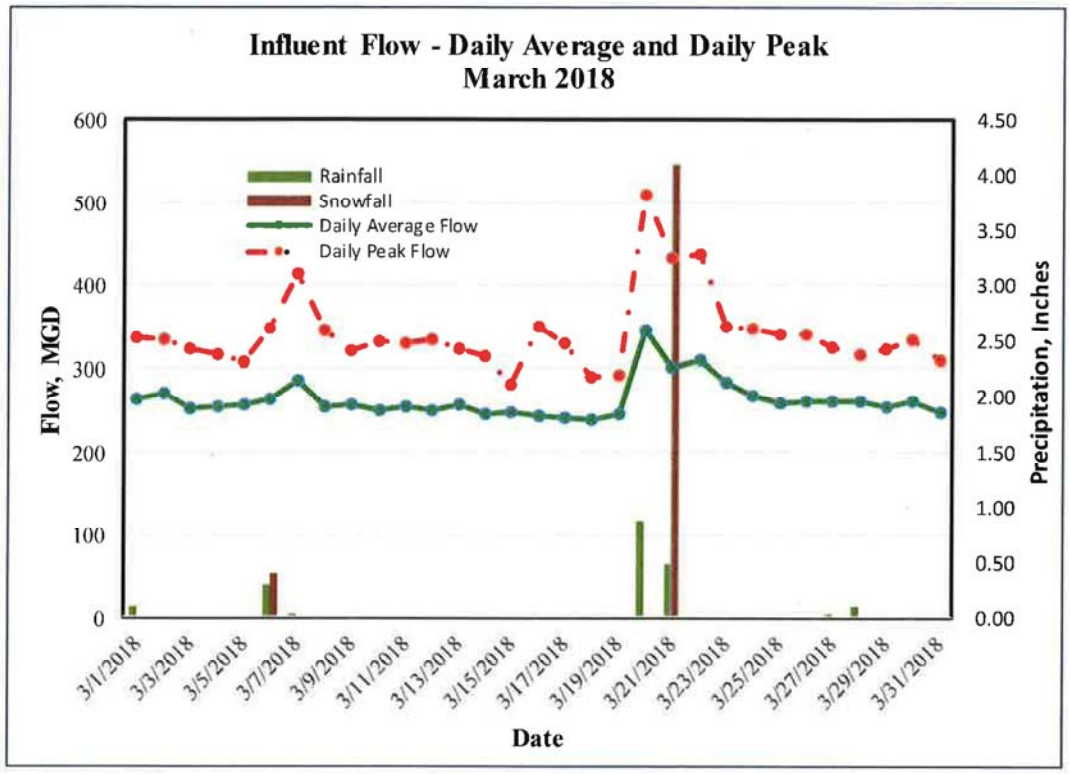
Dissolved Oxygen (DO) is a measure of the atmospheric oxygen dissolved in wastewater. The DO readings for the month are within the permit limits. The minimum daily average is 8.8 mg/L. The minimum instantaneous DO reading is 7.8 mg/L. The minimum permit limits are 5.0 mg/L and 4.0 mg/L respectively.



E.coli is an indicator of disease causing organisms (pathogens). The E.coli permit limit is 126/100mL. The E coli geometric mean is 1.1 /100mL, and well below the permit limit.

Wet Weather Impact on Plant Performance

During the month of March 2018, the Washington Metropolitan Region received below normal total rainfall (1.92 inches vs normal of 3.48 inches) and above normal snowfall (4.5 inches normal of 1.3 inches) as measured at the National Airport. The wet weather event that occurred on March 20 - 21, 2018, resulted in peak influent flows exceeding 500 MGD. The plant's performance was excellent and the event had minimal impact on the quality of the effluent discharge through the complete treatment outfall. **All effluent quality parameters were below the weekly and monthly average NPDES permit limits**.

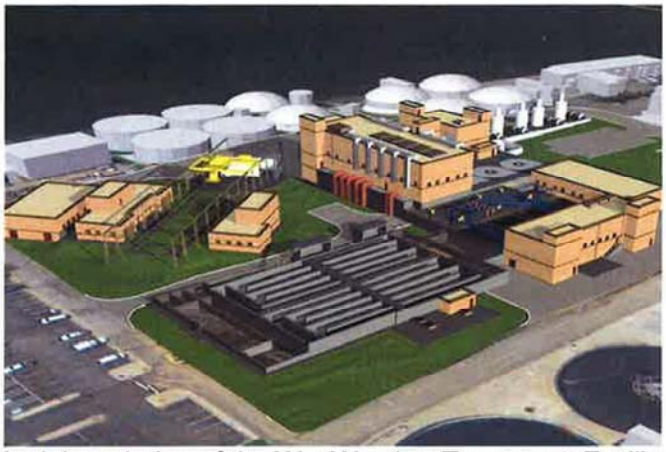


Wet Weather Treatment Facility (WWTF) at Blue Plains

Brief Description

The Wet Weather Treatment Facility at Blue Plains provides treatment for Combined Sewer Overflows (CSO) conveyed through the Long Term Control Plan (LTCP) tunnel systems to Blue Plains. With a design capacity of 250 MGD, the facility consists of sub systems to provide a flow surcharge wet well and coarse screens upstream of five 3,000 Horse Power (HP) Tunnel Dewatering Pumps (TDPs). The TDPs lift the flow 156 ft (static head) to the above ground Enhanced Clarification Facility (ECF), which comprises of fine screening, grit removal, and high rate clarification (HRC). The effluent from HRC is disinfected and dechlorinated before it's discharged through Outfall 001. When flow

rates to the main plant are below the permitted peak flow rates of 555 OR 511 MGD, the effluent from the HRC (or a portion of it) is directed to the main plant for complete treatment. On an average year, the facility is designed to receive approximately 2.5 billion gallons of CSOs and provide treatment with effluent total suspended solids quality comparable to that of Secondary Treatment effluent.



Aerial rendering of the Wet Weather Treatmentt Facility

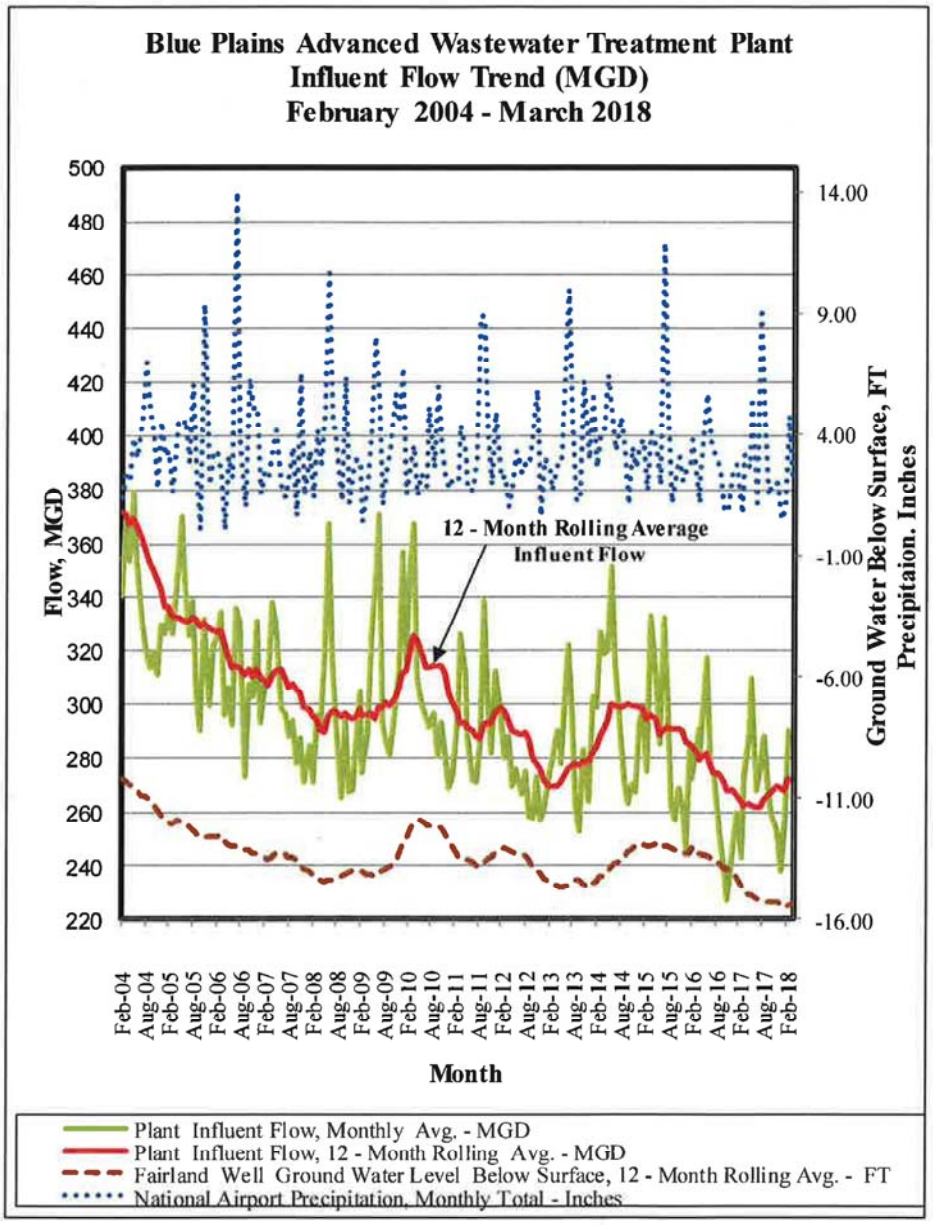
Aerial view of the High Rate Clarification (HRC) process

Commisioning and First Event

The Blue Plains and Anacostia Tunnels along with the Wet Weather Treatment Faculties at Blue Plains were put into service starting Tuesday, March 20, 2018. The first rainfall event after acceptance resulted in diverting flows from three different CSOs along the Anacostia River and capture of these flows in the new tunnel system. Diversions started at approximately 8:30 am in the morning of March 20, 2018, and the last diversion ended after 10 hours, at 6:30 pm. The total amount of CSO flow diverted into the tunnel system was approximately 20 million gallons. This flow was processed through the new Wet Weather Treatment Facility (WWTF) at Blue Plains. The treated effluent was directed to the main plant to receive complete treatment.

Plant Influent Flow Trend

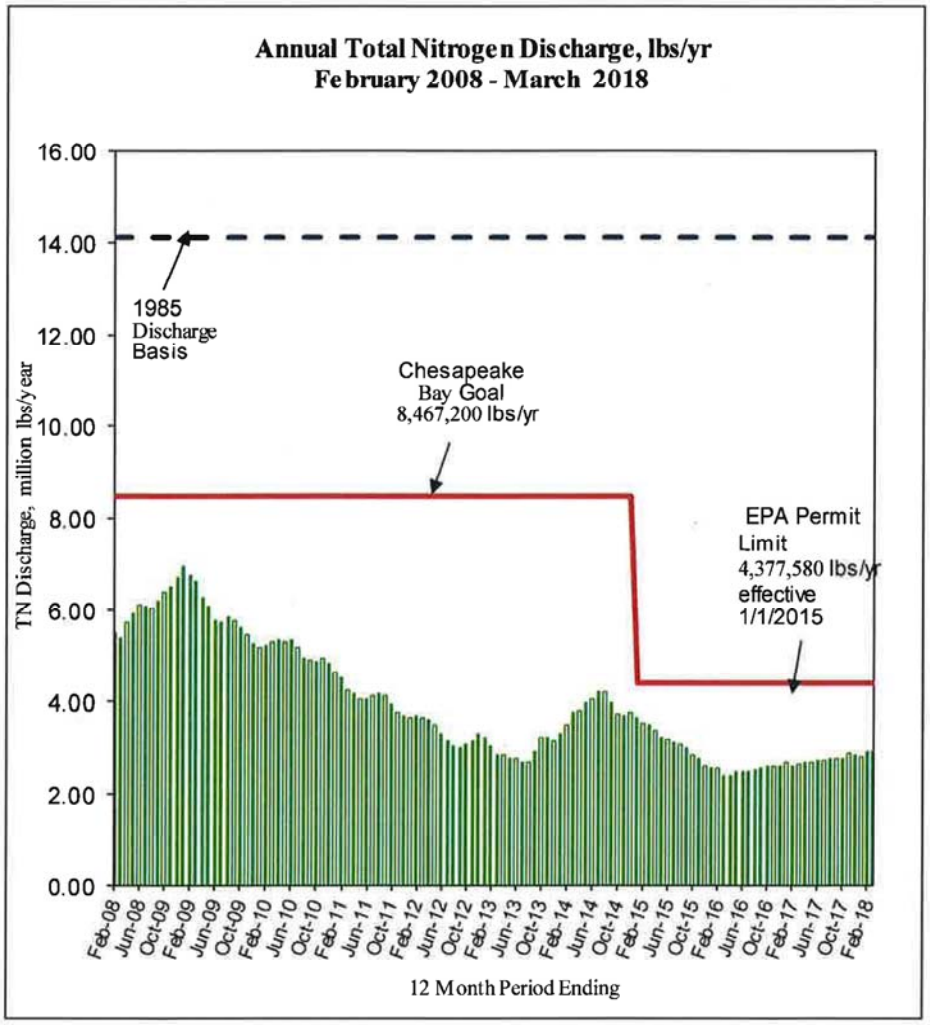
The graph below shows a long-term influent flow trend to the plant ending March 2018. While for any given month the flow is weather dependent, the 12-month rolling average influent flow has remained at or below 300 MGD since February 2011.



Blue Plains Total Nitrogen (TN) Removal – Performance

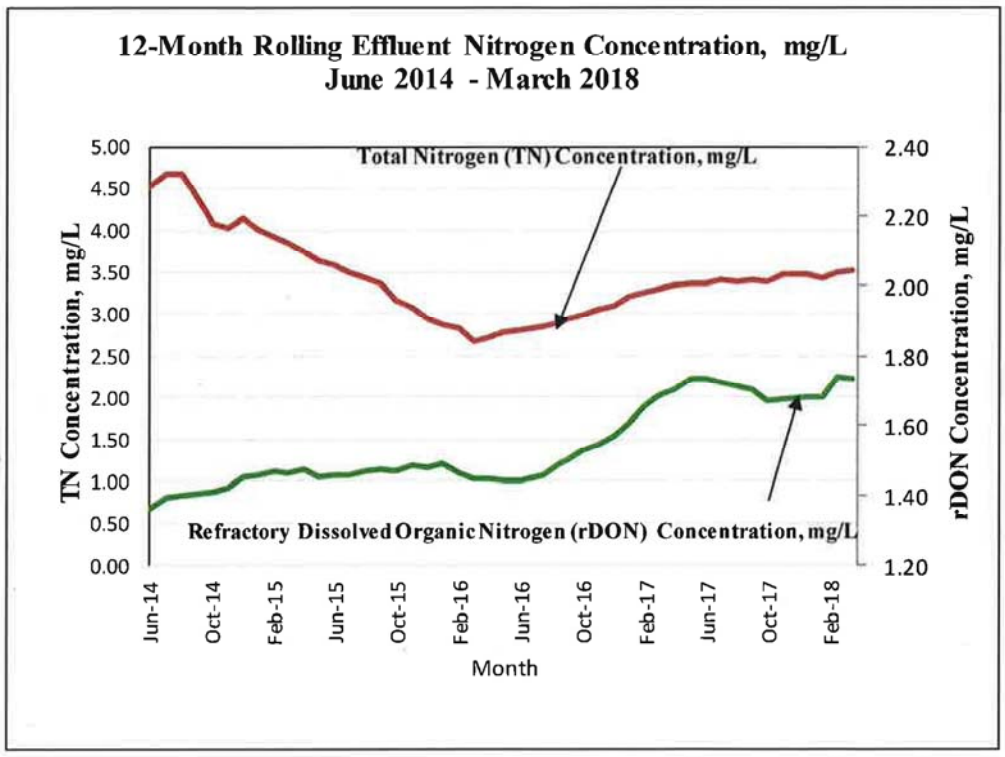
The graph below shows 12-month rolling TN discharge, in million pounds per year, over a 10-year period ending March 2018. In March 2018, the monthly average TN concentration and total load in the effluent were 3.61 mg/L and 244,700 lbs. respectively.

During the first quarter of 2018 calendar year, the total pounds of nitrogen discharged in the effluent was 802,200 lbs and is on track to remain below the NPDES permit discharge limit of 4,377,580 lbs. /year. The performance corresponds to average influent flow of 268 MGD, maximum month flow of 272 MGD, and average wastewater temperature above 16 °C observed during the quarter. The Blue Plains Enhanced Nitrogen Removal Facility (ENRF) is designed to meet the TN discharge limits at influent loads corresponding to annual average flows of 370 MGD, maximum month flows of 485 MGD, and operating wastewater temperatures below 12 °C.



Note: Since the commissioning of ENRF, the 12-month rolling average TN concentration and load in the effluent continued to decline and reached the lowest level in March of 2016. Although the TN load in the effluent remained well below the permit limit, the slight but steady increase since March of 2016 was mostly caused by higher concentrations of refractory dissolved organic nitrogen (rDON) in the filtrate (liquid removed from dewatering class A biosolids) returned for treatment in the plant's secondary and enhanced nitrogen removal processes. The rDON concentrations are within anticipated levels and have stabilized as shown on the chart below (green line).

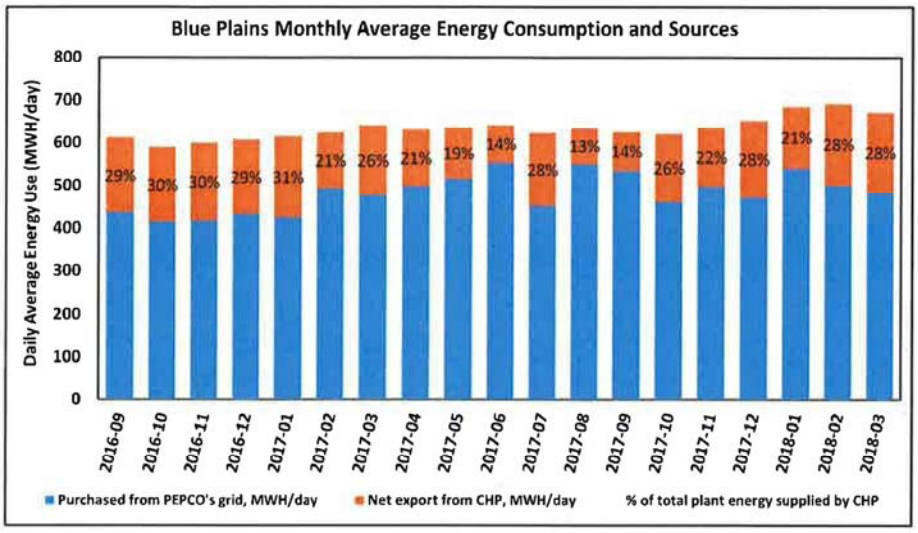
The monthly average TN concentrations in recent months were slightly elevated due to (a) major outages of Nitrification Reactors in November and December 2017 that were necessary to replace equipment (successfully completed), and (b) winter weather impact on the biological process.



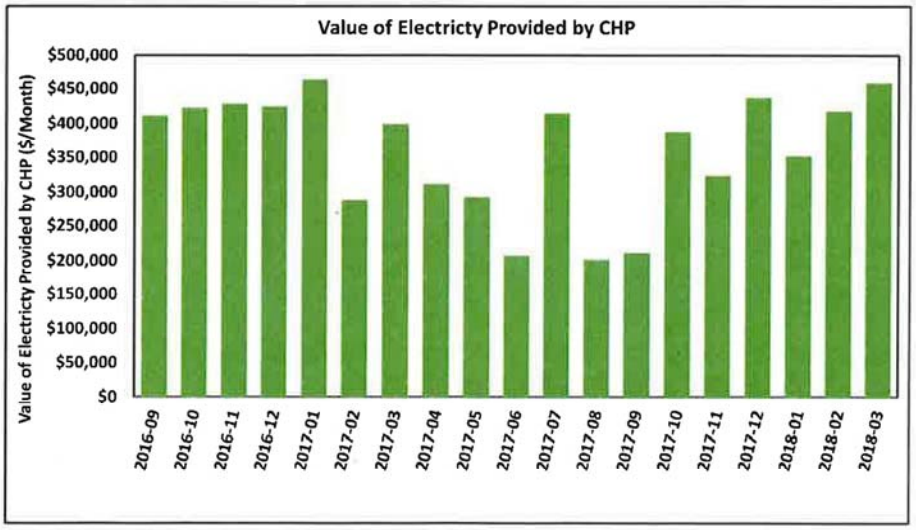
Blue Plains Electricity Generation and Usage

In March 2018, the average energy consumed at Blue Plains was 672 megawatt hours per day (MWH/day) or 2.40 MWH of electricity per million gallon of wastewater processed through complete treatment. The Combined Heat and Power (CHP) facility generated an average of 189 MWH/day, making up for 28% of total energy consumed at Blue Plains. The remaining 483 MWH/day was purchased from PEPCO.

The graph below is based on power monitors installed at the Main Substation and CHP, and reflects average energy consumed at Blue Plains in MWH/day. Of the total use, the energy purchased from PEPCO and net energy supplied by CHP are indicated by the blue and orange highlights, respectively.



The graph below shows the monthly value of the net electricity produced by CHP determined by assuming a unit price of $78/MWH of electricity.



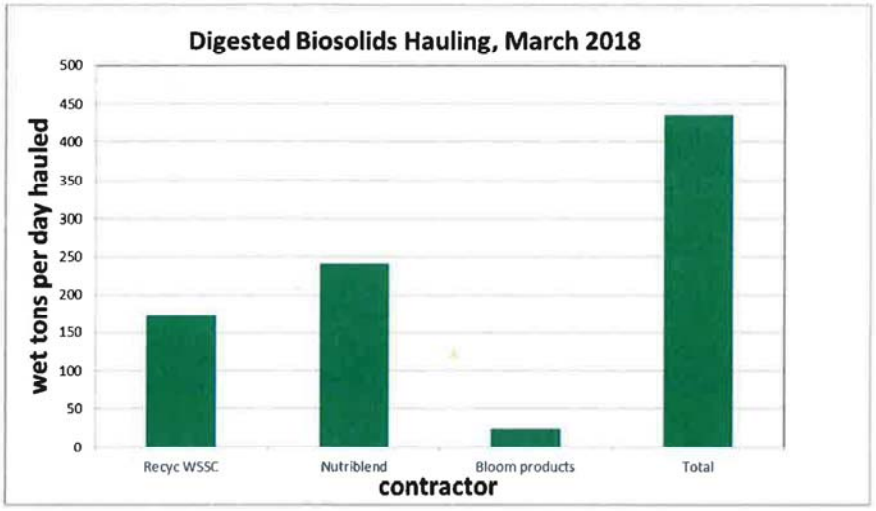
CHP Operation and Maintenance Status

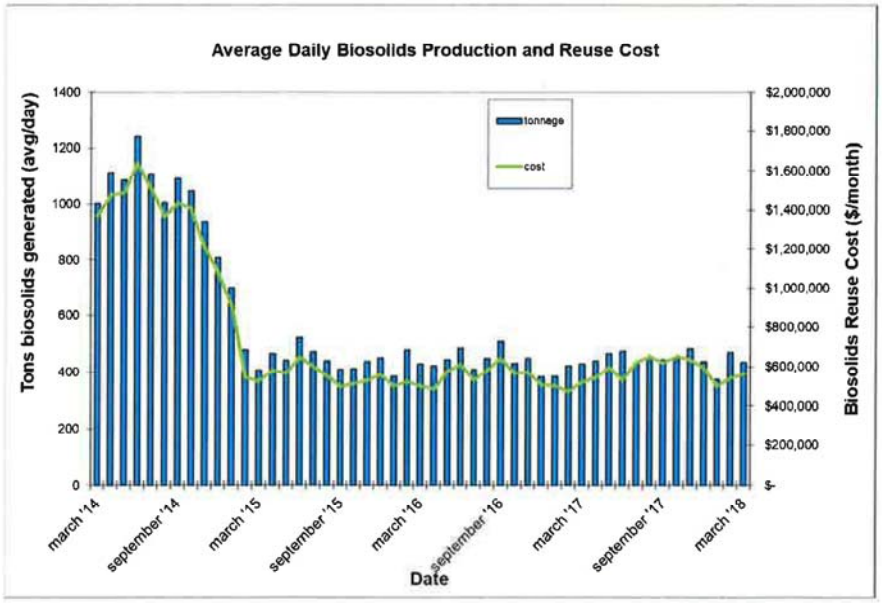
The recent repair works, completed on two of the three Heat Recovery Steam Generators (HRSG), have significantly improved the reliability of the CHP to produce and supply adequate high pressure steam to the Thermal Hydrolysis Process (THP) and maximize use of digester gas for electricity production. Pepco Energy Services (PES) has scheduled the Original Equipment Manufacturer to complete repair of the last unit and restore it to factory conditions, in April 2018.

The annual reconciliation of the contract operation period that ended on September 30, 2017 is still in progress. The reconciliation will include, amongst other items, reimbursement payments for any power production shortfalls under the Digester Gas Electrical Power Production Guarantee, as set forth in the contract.

RESOURCE RECOVERY

In March, biosolids hauling averaged 436 wet tons per day (wtpd). The average percent solids for the Class A material was 31.4%. The graph below shows average daily biosolids produced and the associated monthly cost for reuse (transportation and application cost) for a three-year period ending March 2018. In March, diesel prices averaged $3.29/gallon, and with the contractual fuel surcharge, the weighted average biosolids reuse cost (taking into account the marketed material) was $41.61 per wet ton.

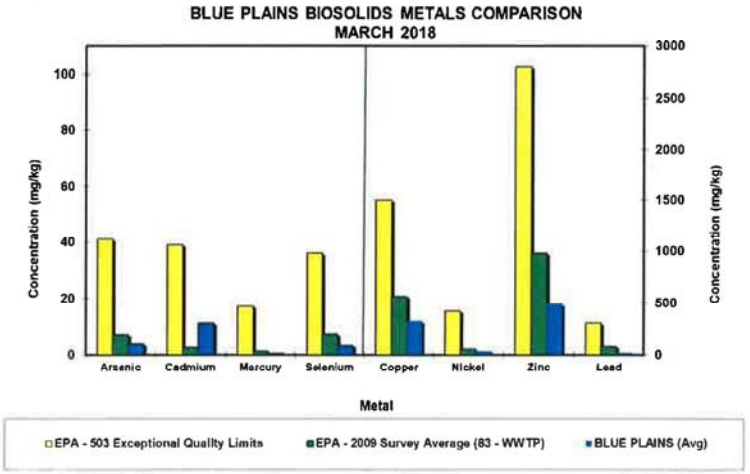




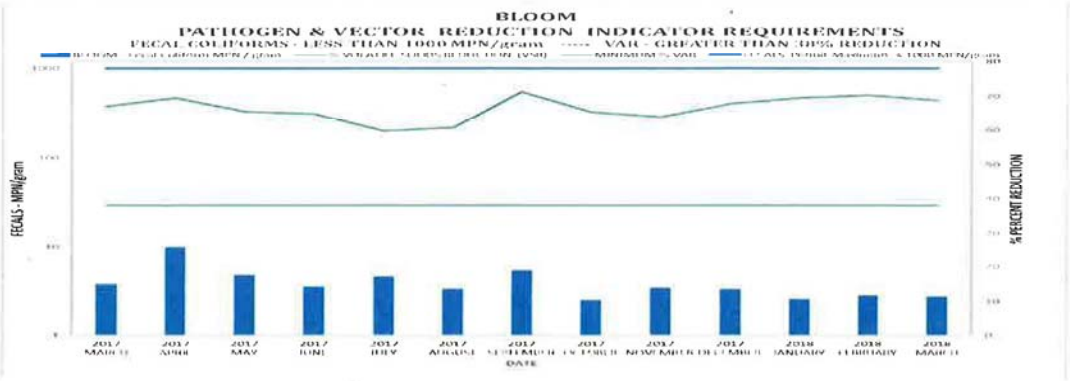
The average quanities of Class A biosolids transported and applied on farms by the two major contracts (WSSC's Recyc and DC Water's Nutriblend) and the quantites marketed as Bloom are shown on the graph above. In March, 755 wet tons of Bloom were distributed to 8 customers.

Product Quality

All biosolids produced during the month of March met Class A Exceptional Quality (EQ) requirements required by EPA. The graph below shows the EPA regulated heavy metals average concentrations in the Class A biosolids. The concentrations are considerably below the regulated exceptional quality limits (EPA-503 Exceptional Quality Limits) and the national average (EPA-2009 Survey Average).



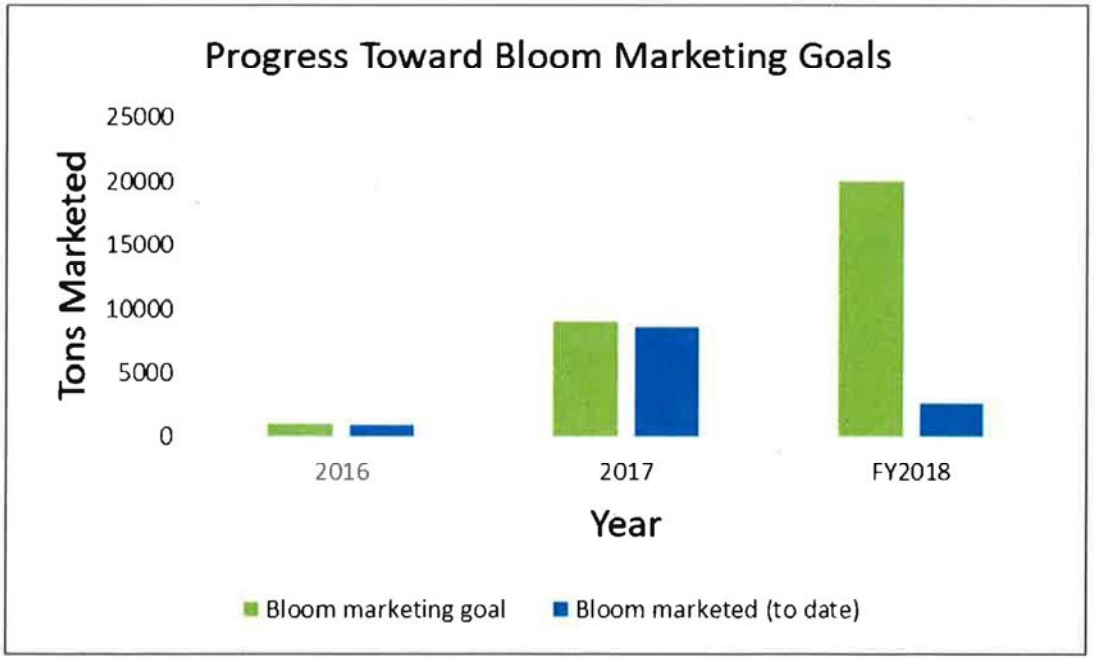
The graph below shows both Vector Attraction Reduction (VAR) and Fecal Coliform (FC) results in the Class A product, both of which are required to maintain the Class A Exceptional Quality (EQ) status. Vector Attrraction Reduction is measured by the reduction in Volatile Solids (VS) or organic compounds that may be odorous and attract nuisance vectors such as flies and rodent. DC Water anaerobic digesters reduced VS by over 65 percent, well above the required 38 percent minimum. In addition, the graph shows fecal coliforms levels in the Class A product. Fecal coliforms are indicators of disease causing organisim (pathogens), and must be below 1,000 MPN/g to meet Class A standards. The FC levels in the Class A product are two orders of magnitude less than the maximum allowable level.



Bloom Marketing

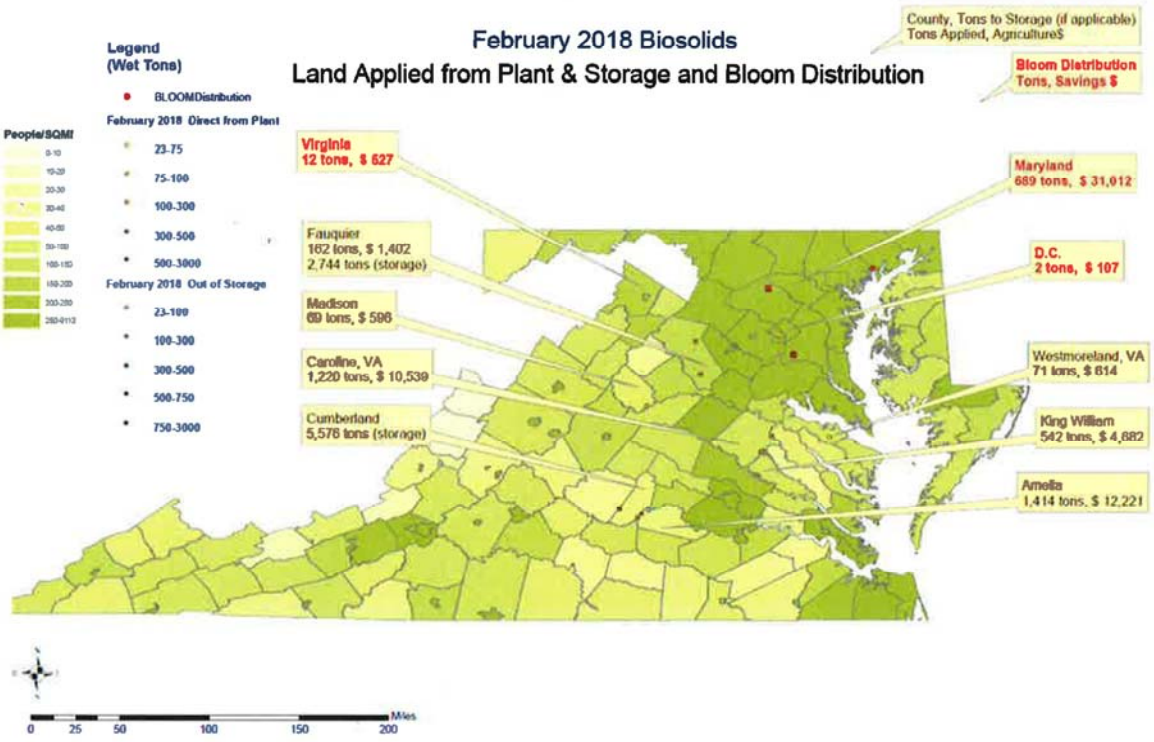
Bloom sales as of April 1st total 1,874 tons for the calendar year. This represents 9% of the goal 20,000 tons. Goals were set last year for this year, and we have reason to believe we will meet these goals. The Bloom team marketed the 1,874 tons in the first three months of the year, months that traditionally have little or no sales for soils products. The sales are picking up for the spring, with 8 different customers buying Bloom in March. The marketing plan includes tonnage to a garden center, highway project, tree farm, and soil blenders in MD; soil blenders and farmers in VA, and gardens, tree planting and restoration projects in DC. In order to protect the business plans of our customers, we will not discuss individual tonnage orders, but the expected total for this array of customers is over our goal for 2018. By sector, the expected totals are:

Garden centers	5,000
Soil blending	5,000
Highway projects	2,000
Tree farms	2,000
Farms	2,000
Restoration projects	3,000
Community gardens	1,000
DC Water use	500
Employee use	500
	21,000 tons



Bloom Reuse and Value Map

This map shows where Bloom was reused on agricultural land and sold into the market as a soil amendment product during the month of February 2018 As of March 2017, marketing activities occurred exclusively in MD, VA and DC. We just received our Distribution and Marketing permit for the state of VA, and are beginning to make deliveries to VA.



CLEAN WATER QUALITY AND TECHNOLOGY

The Department of Clean Water Quality and Technology includes the research and development, pretreatment and laboratory programs. A summary of activities for each group is provided below.

Research and Development

The research and development team focuses on research topics associated with the planning and operation of Blue Plains. The current focus of research is to optimize treatment process capacity and to work toward achieving energy neutral operations. Activities during February and March included continued work by our research team in the carbon removal/redirection, nitrogen removal, and solids treatment focus areas. In addition, members of the R&D team were involved with the activities below.

MERINO Project Kick-off Workshop, February 14, 2018

DC Water is collaborating with the University of Queensland in Australia to evaluate strategies for improving mainstream short-cut nitrogen removal processes under a project called Maximizing Energy Recovery through Innovative Nitrogen RemOval. The initial area of study includes evaluation of a strategy using elevated levels of free ammonia to repress the activity of nitrite oxidizing bacteria (NOB). NOB convert NO2-N to NO3-N, and repressing their activity makes the NO2-N more readily available for anammox bacteria which remove nitrogen more efficiently. The project will take place over a four year period, with two years of study in Queensland, Australia followed by two years of study in Washington, DC. This research project benefits DC Water by developing reliable approaches for implementation and control of a short-cut nitrogen removal strategy in our mainstream nitrogen removal process to reduce energy and methanol consumption.

WERF Aerobic Granulation Project Model Development, March 7, 2018

DC Water is part of a collaborative team working on the Water Environment and Reuse Foundation project on Aerobic Granulation led by Dr. Belinda Sturm of University of Kansas and Dr. Haydee De Clippeleir of DC Water. Many of the research tasks have been completed and the team is moving forward to develop process modeling approaches. A workshop was held in early March with the University of Kansas and DC Water teams as well as Dr. Imre Takacs of Dynamita and Dr. Bernhard Wett of ARAconsult to review data, status of existing models, and development of new approaches. This project benefits DC Water by furthering our understanding and development of aerobic granulation processes as a potential option for increasing the capacity of the secondary treatment process without building additional tank volume.

Kunming, China Technology Applications

As part of the effort to develop alternative revenue sources, DC Water is currently supporting evaluation and application of DC Water process technologies (IP) at several treatment plants owned by Kunming Dianchi Water Treatment Company in Kunming,

China. The treatment facilities in Kunming discharge to Dianchi Lake. In response to water quality issues in the lake, treatment plants are being upgraded to remove nitrogen and phosphorus to low levels, similar to what has been done in the Chesapeake Bay area. The business opportunity includes licensing for application of DC Water technologies and consulting support as a service to help ensure the technologies are applied successfully. The DC Water team worked on the following during February and March 2018:

- Kunming Plant 3 – DC Water is providing a review of the detailed design for upgrading Old Plant 3 to ensure the design is consistent with the application requirements for the planned installation of AvN, inDENSE and BIOCOS technologies. The team also prepared materials for use in a Hazard and Operability Review, which is a facilitated design review workshop that identifies risks and issues associated with operating and constructing the new facility.
- Kunming Plant 7 and 8 – DC Water is providing evaluation and process concept development for optimizing the nitrogen removal process at Plant 7 and 8 to achieve lower total nitrogen concentrations in the effluent. Additional scenarios for the two plants were evaluated this month, including the impacts of adding a supplemental carbon source to achieve higher levels of denitrification.

Blue Plains Main Laboratory

The Main Laboratory staff conducts analyses on Blue Plains AWTP effluent for NPDES Permit requirements, as well as on biosolids, pretreatment samples, storm water runoff, and process samples, on a daily basis, 365 days a year. The laboratory currently analyzes approximately 2,800 samples each month and conducts approximately 8,000 analyses, including Total Suspended Solids; Volatile Suspended Solids; Total and Volatile Solids; Ammonia Nitrogen; Nitrite and Nitrate Nitrogen; Total, Soluble, and Ortho Phosphorus; Total and Soluble Kjeldahl Nitrogen; Carbonaceous Biochemical Oxygen Demand; Chemical Oxygen Demand; Total Alkalinity and Hardness; and Fecal Coliform and E. Coli microbiological testing.

In addition to comprehensive testing to support operation of liquid stream processes, the laboratory analyzes Belt Filter Press cake samples for fecal coliform bacteria for DC Water's Class A Biosolids reporting, as well as digester samples from the new Cambi Thermal Hydrolysis and Anaerobic Digestion facility, including Total and Volatile Solids, Total and Volatile Suspended Solids, Ammonia Nitrogen, alkalinity and pH. Fecal coliforms in the BFP dewatered cake and TS and VS upstream and downstream of the digestion process are monitored to show compliance with 40 CFR 503 Pathogen and Vector Attraction Reduction requirements.

The laboratory also assisted the Department of Sewer Services conducting microbiological analysis of water samples for E. coli bacteria, as well as monitoring the Northeast Boundary Swirl Facility Effluent for NPDES compliance. Laboratory staff also participated in the WWOA Executive Board.

This month the laboratory continued analysis of samples from the new Filtrate Treatment Facility which removes nitrogen from the belt press dewatering filtrate. Parameters analyzed include ammonia, nitrate, and nitrite nitrogen; ortho-phosphorus; COD; TSS; VSS and alkalinity.

Water Quality & Pretreatment

The Blue Plains Water Quality & Pretreatment group manages the Industrial Pretreatment Program, including temporary dewatering dischargers from construction and other activities, as well as the Hauled Waste Program. The program for Dental Dischargers is being implemented as new regulations were finalized requiring compliance with reporting and best management practices as well as installation of an amalgam separator, for those dental facilities placing or removing dental amalgam fillings. Staff also provide specialized sampling and program management support for the Blue Plains NPDES permit, including PCB monitoring and reduction and storm water management. Staff, with contractor support, is currently updating the Blue Plains Storm Water Pollution Prevention Plan (SWPPP), conducting inspections of storm water structures and facilitating cleaning and repairs, as well as coordinating quarterly Blue Plains Storm Water Committee meetings and other SWPPP compliance activities. Staff also updated the sampling plan this month to provide a preliminary assessment of loadings from selected locations in the collection system and provided sampling support for a special project evaluating sewer gas.

Industrial Pretreatment Program

DC Water currently manages twelve (12) Significant Industrial User (SIU) and eighteen (18) Non-Significant Industrial User (NSIU) wastewater discharge permits. DC Water reviewed monthly self-compliance monitoring reports for six (6) SIUs and one NSIU. All SIUs and NSIUs are in compliance with discharge standards for the current month.

The Naval Research Laboratory (NRL) continued to comply with their Administrative Order for the PCB violation, including submittal of follow-up monthly monitoring and a monthly progress report.

Staff continued to work on the annual Pretreatment Program report to EPA this month, as annual reports were submitted to DC Water by the user jurisdictions. The two SIUs that were determined to be in SNC for 2017, NRL and the Naval Support Facility Carderock, were published in The Washington Post on February 16, 2018.

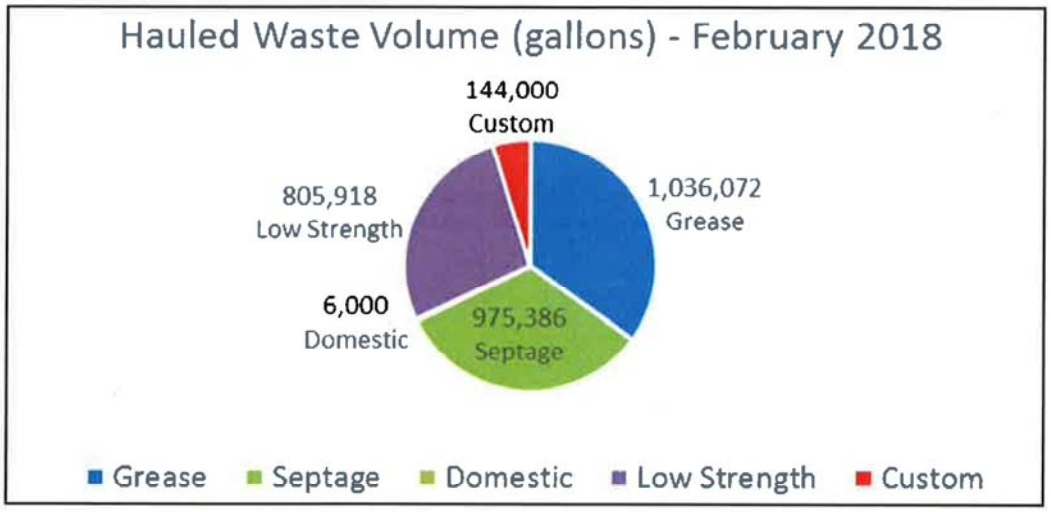
DC Water currently manages 71 Temporary Discharge Authorization (TDA) permits, primarily for construction site discharges of groundwater and/or surface runoff in the combined sewer area. Seven new TDA permits were issued this month. All TDA permits are currently in compliance with discharge standards.

Hauled Waste Program

As of the end of the current month, the hauled waste program had 32 permitted haulers authorized to discharge domestic septage, portable toilet waste, grease trap waste,

groundwater or surface runoff, and other types of waste, if approved in advance and have been characterized and meet pretreatment standards. Staff issued one new permit and renewed five hauled waste permits this month under the new volumetric fee structure.

DC Water received 1,205 hauled waste loads (2,967,376 gallons) from permitted haulers this month. Manifest forms from each truck entering the plant are collected by the security guards and picked up daily by Pretreatment staff. Data is entered into a new access database developed by Process Engineering to enhance effectiveness of tracking, analyzing, and billing those haulers subject to the new fee structure. Two hauled waste samples were collected this month to check compliance with discharge standards.



NPDES Permit Sampling

Staff collected two wet weather low level PCB composite samples at outfall 002 this month and one wet weather PCB grab sample at outfall 001.