Maryland National Capital Region One Water Cycle Decarbonization and GHG Reduction

CPRG Implementation Grant Application

Washington Suburban Sanitary Commission

1. Overall Project Summary and Approach

a. Description of GHG Reduction Measures

Established in 1918, the Washington Suburban Sanitary Commission (WSSC Water) is currently among the largest water and wastewater utilities in the nation, with a network of nearly 6,000 miles of drinking water pipeline, 5,600 miles of sewer pipeline, two water filtration plants (WFPs), and five water resource recovery facilities (WRRFs). The service area spans nearly 1,000 square miles in Prince George's and Montgomery counties, which is all the Maryland section of the National Capital Region as defined by the Federal government. WSSC Water serves 1.9 million residents through approximately 475,000 customer accounts.

In 2010, the State of Maryland and the Metropolitan Washington Council of Governments (which includes both Montgomery and Prince George's counties) have adopted a greenhouse gas (GHG) emission reduction goal to achieve a 10 percent reduction in emissions every 5 years through 2050, for a total reduction of 80 percent below the baseline year of 2005. In 2011, WSSC Water adopted this same goal, in alignment with the jurisdictions it serves. Since 2010, WSSC Water has annually inventoried greenhouse gases associated with water and wastewater treatment processes and developed future projects and strategies to decrease environmental emissions. WSSC Water's greenhouse gas inventory includes emissions from water and wastewater treatment processes, purchased electricity, biosolids hauling, chemical manufacturing and business travel. WSSC Water has updated its goal and presently plans to reduce Greenhouse Gas emissions 50% by 2030, and to zero by 2050.

As part of our commitment to environmental justice, we strive to do our part to improve air quality in the region and reduce our carbon footprint. We put a Green House Gas Reduction Action Plan in place in 2008 and are continually looking for ways to reduce energy use across all our operations.

- We receive 33 percent of our energy from wind power and own the associated Renewable Energy Credits (RECs). No capital costs were incurred as part of the wind procurement.
- Three high efficiency 700-horsepower pump turbines operate at WSSC Water's Rocky Gorge Water Pumping Station, saving an average of $200,000 annually in energy costs.
- Six MW of solar photovoltaic power at two water resource recovery facilities and one off-site facility add to the renewable energy used in our operations. We incurred no out-of-pocket expenses for this project.
- We replaced fluorescent lighting at our field offices and headquarters with energy-efficient LED lighting, saving 5.7 million kWh or $545,000 annually.
- Facility equipment upgrades at our water resource recovery facilities and water filtration plants have saved over 18.5 billion kWh and over $1.6 billion in operating costs.

- We are committed to purchasing electric vehicles as part of our fleet and currently have ten in service, including six vans for our field crews to use.

Despite these achievements, we know that there is still more to do and for this application we are proposing a transformative group of projects we have called the '**Maryland National Capital Region One Water Cycle Decarbonization and GHG Reduction'** effort. These projects demonstrate a commitment to reducing GHG emissions but also the internal understanding that we need to think big, broad, and creatively to address the climate crisis. WSSC Water is a complex operation, with many aspects to it: water and wastewater, collection/distribution, treatment, offices, workshops, employee parking areas, and many others and this proposal includes projects that touch on many of those.

For this application, WSSC Water is proposing four measures/projects linked to the Priority Climate Action Plan (PCAP) developed by the Metropolitan Washington Council of Governments (COG) for the Washington-Arlington-Alexandria. DC-VA-MD-WV Metropolitan Statistical Area. These are 1) Advanced Aeration Control for Water Resource Recovery Facilities (WRRF); 2) Asset Health and Monitoring Pump Optimization; 3) Potomac Water Filtration Plant Microgrid; and 4) Anacostia Depot Sewer (Wastewater) Thermal and Solar.

For detailed milestones of each project in this application please see Section 3.c. below and for GHG reductions see Section 2 below and the Technical Appendix.

The assumptions used in developing the cost estimates and schedules for the projects presented in the application already internalize the challenges around materials pricing and availability, and labor shortages that were triggered by the COVID-19 pandemic and that persist today. The current landscape of the construction industry is starting to see some stabilization in prices, supply times, and labor, albeit that is not to say there is relief from those pressures as the underlying contextual drivers are sticky and a reversal is unlikely. Moreover, the tenuous stabilization seen in the last few months can be easily upset given the geopolitical disruptors in eastern Europe and particularly the Red Sea and these present both cost and schedule risks to the projects presented in this application, but more generally to the whole construction industry.

1. <u>Advanced Aeration Control for Water Resource Recovery Facilities (WRRF)</u>

The proposed project/measure is to implement advanced aeration control systems at the Seneca and the Western Branch Water Resource Recovery Facilities.

The Seneca and the Western Branch facilities play a crucial role in treating wastewater and returning clean water to the environment. However, operating these facilities can be energy-intensive primarily due to processes like aeration. The Seneca and Western Branch were upgraded for Enhanced Nutrient Removal (ENR) in 2015 to meet new standards set by an updated National Pollutant Discharge Elimination System (NPDES) permit. In May 2017, the Maryland Department of the Environment (MDE) updated the NPDES permit to include more stringent limits for ammonia. In 2021, WSSC Water began a pilot test of an operating strategy known as ammonia-based aeration control (ABAC). The pilot test demonstrated that implementing ABAC would yield significant reductions in electricity and chemical demand, while still providing reliable nutrient removal performance.

Aeration is a critical process in biological water resource recovery treatment, where oxygen is introduced into the treatment tanks to support the growth of aerobic bacteria that consume organic

pollutants. Traditionally, aeration systems operate continuously based on preset schedules, leading to inefficiencies and unnecessary energy consumption. ABAC is a control strategy that aims to optimize the amount of air based on a target ammonia concentration. This contrasts with a conventional system that supplies air based on a target dissolved oxygen (DO) concentration—typically 2.0 mg/L. In ABAC mode, the DO setpoint is typically lower (as low as 0.2 mg/L), but the setpoint varies based on the ammonia concentration. If the reactors are not receiving enough air to achieve nitrification, the ammonia concentration will increase, causing the DO setpoint to increase, thereby calling for more air in the reactors. By fine-tuning the DO setpoint to the ammonia concentration, the system can deliver precisely as much air as required to achieve full nitrification. ABAC allows for lower DO concentrations in the reactors, which results in improved ENR performance by creating favorable conditions for a biological community to perform simultaneous nitrification-denitrification and biological phosphorus removal. These biological nutrient removal processes also reduce the amount of chemical required for ENR and internal mixed liquor recycle pumping requirements.

The implementation of ABAC improvements across Seneca and the Western Branch, including the integration of new blowers and upgrades/replacements of aeration systems, would reduce greenhouse gas emissions associated with biological nutrient removal (usually comprises of 40-60% of the WRRF's electrical energy use). Along with these benefits, potential equipment failures can be detected before they occur, minimizing downtime and reducing maintenance expenses. These systems utilize real-time data, sophisticated algorithms, and automation to optimize the aeration process. A key factor is utilizing an effective monitoring system to control parameters such as dissolved oxygen (DO) levels, biochemical oxygen demand (BOD), and ammonia concentrations to allow for precise control of aeration rates.

ABAC systems offer a way to mitigate greenhouse gas emissions for wastewater treatment plants by optimizing the aeration process. With this technology, these systems can reduce energy consumption, reduce chemical demand, and enhance treatment efficiency, thereby decreasing the overall carbon footprint of treatment operations. Energy consumption is reduced by optimization of aeration rates based on real-time demand, lowering electricity bills and operational costs. Improved aeration control enhances treatment efficiency, reducing the need for additional treatment steps or chemical additives, resulting in cost savings. Implementation of ABAC systems may qualify water resource recovery plants for carbon credits or other incentives aimed at greenhouse gas emissions reduction. Gaining more control over the aeration process improves the treatment efficiency and therefore reduces the need for excessive chemical additives, further lowering the carbon footprint associated with chemical production and transportation.

With a more advanced aeration control system capabilities come a few risks and potential challenges that WSSC Water is proactively considering. Integrating blower optimization technology with the existing blower systems and control architectures can pose a challenge. Compatibility issues, communication protocols, and interface requirements may need to be addressed to ensure seamless integration and interoperability with other components. Along with these constraints, obtaining readily available data to ensure pump and blower efficiency at this site is also an issue. Supply of technical expertise can create another challenge when trying to implement this technology.

To successfully implement ABAC technology, the project has been split up into 5 phases. In year 2 of the grant the Planning, Design, and Supervision of the project will take place for the Seneca WRRF portion. While the Planning, Design, and Supervision for the Western Branch WRRF will start in year 3. The construction phase for both WRRFs will begin in year 4 and is forecasted to be complete at the end of year 5. The overall duration of this project is predicted to take is 5 years.

ABAC systems offer a promising solution to mitigate greenhouse gas emissions by optimizing the aeration process. This follows the Waste PCAP high priority GHG reduction measures found on pages 43-47. Implementing measures to reduce energy consumption and increase waste reduction, reuse/recovery, and recycling from wastewater are all a part of the high priority action plan. With this technology, these systems can reduce energy consumption and enhance treatment efficiency, thereby decreasing the overall carbon footprint of treatment operations. The traditional approach of constant or fixed-rate aeration results in unnecessary energy consumption, leading to higher GHG emissions. Implementing ammonia-based aeration control systems can lead to significant reductions in energy use.

2. Asset Health and Monitoring: Pump Optimization

The goal of this project is to install a process / system to continuously monitor pump health in order to increase reliability of operations and reduce energy consumption.

The health and performance of these pumps through advanced asset health and monitoring systems offers numerous environmental benefits, including reduced energy consumption, minimized greenhouse gas emissions, and enhanced operational efficiency. Monitoring operations can also provide actionable information related to servicing and maintenance of a pump ensuring efficient operation with minimal energy usage. Another goal of this project is to provide financial information related to energy usage and return on investment, including a health score on a regular basis that will be used as basis for long term capital improvements. Monitoring systems for wastewater pumps contribute to asset health ultimately leading to a sustainable infrastructure and emissions reduction. This Asset Health and Monitoring project has been submitted as one of WSSC Water's top green initiatives and submitted for consideration for external state-level (Maryland Energy Administration—MEA) funding.

Asset health and monitoring systems utilize sensor technology, data analytics, and predictive maintenance algorithms to monitor the condition and performance of wastewater pumps in real-time. One of the key features includes real-time monitoring where continuous monitoring of parameters such as pump vibration, temperature, flow rates, and energy consumption provides insights into pump health and performance. These advanced features would allow advanced analytics techniques to monitor pumps for any failures or malfunctions. This technique helps prevent spills and overflows, minimizing environmental contamination and reducing the need for emergency response measures that may generate additional emissions. Asset health and monitoring systems for wastewater pumps offer tangible environmental benefits by improving energy efficiency, reducing greenhouse gas emissions, and enhancing operational reliability in wastewater treatment plants. This measure aims to prevent, reduce, divert waste, and reduce emissions at wastewater treatment plants.

As with any other multi-year project involving existing equipment, implementing these pump health and monitoring systems has some risks and potential challenges that WSSC Water has given serious consideration to. This project proposes to update 20 pumps every year. With the quantity of pumps and amount of work, a shortage of workers, supply chain issues, and inclement weather shifting the schedule could cause some delays. However, WSSC Water has the in-house expertise to mitigate these risks via inventory management or using their own forces for the installation.

Optimizing pumps would allow for WSSC Water's facility to contribute to the PCAP Waste section found on pages 43-47, addressing this area by reducing emissions from the wastewater treatment sector in the metropolitan Washington region. Energy savings achieved through improved pump efficiency directly

translate to reduced greenhouse gas emissions associated with electricity generation. The project also complies with the Building and Clean energy sector by prioritizing low emission practices across the lifecycle of retrofits to existing buildings to yield more integrated emissions savings. With enhanced pump performance, operational efficiency increases and may reduce the need for frequent replacement of pump parts and pumps. This project also supports innovative initiatives with predictive and preventative maintenance that the workforce is excited about and will help them fine tune their maintenance and operating procedures.

3. Microgrid

This project/measure proposes to install new natural gas generators and carbon sequestration technology at the Potomac Water Filtration Plant to reduce GHG emissions and provide system resiliency.

The Potomac Water Filtration Plant (WFP) is a 285 MGD conventional Water Treatment Plant serving Montgomery and Prince Georges Counties of Maryland. The electric supply to the plant comes from two PEPCO 69KV overhead feeders from the same Pepco substation. The plant does not have any onsite generation to allow emergency operations if the supply from PEPCO fails. The proposed project would involve the construction and interconnection of 8,976 kW natural gas fired generators as well as 838 kW of on ground and rooftop solar. Two natural gas sources were considered for the onsite generation in the initial feasibility study. The first was distributed gas from Washington Gas and Light (WGL) and the second was pipeline gas directly from the gas transmission pipeline that crosses the plant's property. Access to the gas transmission system will allow a full bypass of WGL's delivery system and will provide the natural gas needed for the proposed generation plant at a cost level similar to the natural gas used for larger generation plants.

Natural gas electric generation would allow the plant to operate in full island mode, with controlled start-up of some of the larger pump should an event cause a failure of the utility electric grid. Natural gas-fired engines are widely used in various industries for power generation, transportation, and other applications due to their cleaner combustion compared to traditional fossil fuels. However, they still produce carbon emissions, contributing to environmental concerns such as climate change and air pollution. WSSC Water plans to add Carbon stripping technology to the project in order to mitigate these emissions by capturing and storing carbon dioxide (CO2) before it is released into the atmosphere. The installation of the Natural Gas fired engine Generator at the Potomac Water Filtration Plant will be coupled with a carbon stripping equipment/module.

Carbon stripping from natural gas engines typically involves exhaust gas capture, CO2 separation, compression and transportation, and storage or utilization. The exhaust gases containing carbon dioxide are directed through a capture system, where CO2 is separated from other exhaust components. Various separation techniques, such as absorption, adsorption, or membrane separation, can be employed to capture and isolate CO2 from the exhaust stream.

Carbon stripping technology offers several benefits for reducing greenhouse gas emissions. By capturing and storing or utilizing CO2 emissions from natural gas engines, carbon stripping technology significantly reduces the carbon footprint of these engines, contributing to overall emissions reduction efforts. Mitigating CO2 emissions from natural gas engines helps mitigate climate change by preventing the release of greenhouse gases into the atmosphere and reducing the concentration of CO2 in the atmosphere. Another benefit of this technology is assisting natural gas engine operators in complying

with environmental regulations and emission standards, avoiding potential fines or penalties associated with excessive greenhouse gas emissions. The captured CO2 can also be utilized in carbon offset projects, effectively achieving carbon neutrality or even carbon negativity for natural gas engine operations. For this project it is estimated that 90% of the carbon emitted by the engines will be captured.

However, despite its benefits, carbon stripping has several constraints that hinder its widespread adoption and effectiveness. One of the primary constraints of carbon stripping technology is its significant energy consumption during the capture and separation process. This technology also requires ongoing maintenance and operational expenses which further add to the overall cost, limiting its adoption. There are several technological challenges with the new and upcoming technology, such as the supply of efficient and cost-effective capture materials, optimal process design, and integration with existing engine systems. WSSC Water and their team of highly qualified technical consultants are aware of these challenges and have strategies to overcome them.

This project is long overdue due to the critical nature of the Water Treatment Facility to the National Capital Region, having been listed as a Mitigation Action in two Montgomery County Hazard Mitigation Plans 2008 and 2013, under both the Severe Storm and All Hazards categories. The next decade or two will only increase demands on the regions and nation's electrical grid which in turn increases the possibility of grid failure. This is in addition to the risks posed by Climate Change. An MWCOG 2014 National Capital Region (NCR) Water Supply and Distribution System Redundancy Study estimated that the total impact due to the loss of potable water service per capita, per day is $114.38" In 2023, this is equivalent to $149.24 per capita per day. Considering WSSC Water currently serves approximately 1.9 million people, this constitutes a total damage of $283,555,917 per day across all sections of the service area.

The project is split up into three phases, Preliminary Engineering, Design-Builder RFP Solicitation, and Design Builder. The project is scheduled to start up in year 1 of the grant and end in year 5.

With Carbon Stripping technology the addition of the microgrid to the Potomac Water Filtration Plant qualifies it for the PCAP Buildings and Clean Energy section. This project falls under the measure focused on targeted and strategic uses of district energy systems, with the opportunity to deploy clean energy sources and potentially pair with microgrids. This project would also help facilitate net zero building development, with prioritizing low emission practices in Water Treatment Plant services through, these sections can be found on pages 30-33. With the addition of onsite generation and carbon stripping technology, the Potomac Water Filtration Plant furthers technological advancements with the development of a low carbon emission microgrid.

4. Anacostia Depot Sewer (Wastewater) Thermal and Solar

The proposed project will implement Sewer Thermal Technology[1] and install solar technology to further energy reliability as a part of the Anacostia Depot Reconfiguration Project. Wastewater thermal (Sewer

[1] Various sewer thermal options are being evaluated as part of the Anacostia Depot Renovation Project and final sewer thermal engineering and design will be completed as part of the renovation project by the contractor and their subcontractors. The information presented in this grant application is based on most possible sewer thermal option in the already completed feasibility study.

thermal) and solar at Anacostia Depot will be implemented in conjunction with the upcoming major Reconfiguration (renovation) Project at Anacostia Depot.

The Anacostia Depot is the largest of WSSC Water's four depots that support water and sewer field operations. The existing buildings were generally constructed in the 1970s. The depot houses several critical functions for WSSC Water, including the Trade Shop and administrative space for the Industrial Asset Maintenance Division and the Facility Services Division, the Meter Shop, the Heavy Equipment Shop, the Fleet Services Division building and garage, and the main Warehouse.

The goal of the Anacostia Depot Renovation Project is to greatly improve the workplace environment and productivity for depot personnel. Replacement of the Customer Service Building, the Trade Shop, and the Meter Shop into one building, as well as renovations to the fleet garage building, the warehouse building, the heavy equipment shop, new storage sheds, new guard booth, and a new radio shack structure are all part of the site improvements plan. These site improvements will greatly benefit WSSC Water's Anacostia Depot facility in Prince Georges County, Maryland

The first component of the Anacostia Depot Reconfiguration Project that is included in this application is the Sewer Thermal Project. Sewer Thermal Exchange technology is an innovative approach that harnesses thermal energy stored in wastewater to provide heating and cooling for buildings, thereby reducing energy consumption and greenhouse gas emissions. This technology utilizes the constant temperature of wastewater flowing through sewer pipes as a heat source or sink. Heat exchangers are installed within the sewer network to transfer thermal energy between the wastewater and heat exchange fluid circulating through building heating and cooling systems. In heating mode, heat is extracted from the wastewater to warm the heat exchange fluid, while in cooling mode, heat is rejected to the wastewater to cool the fluid. Including sewer thermal technology to the Anacostia Depot Renovation Project will serve as a prime example of the application of this emerging sewer thermal technology. This technology offers building owners a way to leverage potential energy within local systems to provide low-carbon heating, cooling, and hot water. There are three sewers in the vicinity of the new building available for sewer thermal implementation, which allows for several areas for energy to be captured.

While Sewer Thermal technology offers promising benefits, several challenges need to be addressed for widespread adoption. The composition of the wastewater may affect heat exchanger performance and lead to corrosion issues, necessitating appropriate materials and maintenance protocols. Regulatory frameworks and permitting processes may also create delays implementing challenges for the installation. The Depot site is adjacent to three sewers that can be tapped for sewer thermal implementation -102-inch and 60-inch diameter sewers (west of the site) and an18-inch diameter sewer (south of the site) (see Figure 1). There is a CSX freight rail line and levee embankment located between the larger sewers and the new admin building creating constraints in installing this technology which will need to be resolved. In order to maximize implementation of this sewer thermal technology at the Anacostia, piping will cross underneath the existing CSX tracks. To mitigate the risk of securing access to the main sewer line, an alternative smaller sewer line is accessible to the warehouse and heavy equipment buildings, however we do not anticipate that the larger sewer lines won't be accessible and will work diligently to secure the necessary access. Designing and installing these systems requires careful consideration of factors such as sewer characteristics, heat exchanger design, and system integration, which can be complex and lead to delays in the project. WSSC Water has engaged highly skilled consultants with expertise in the subject to mitigate the risks of the project.

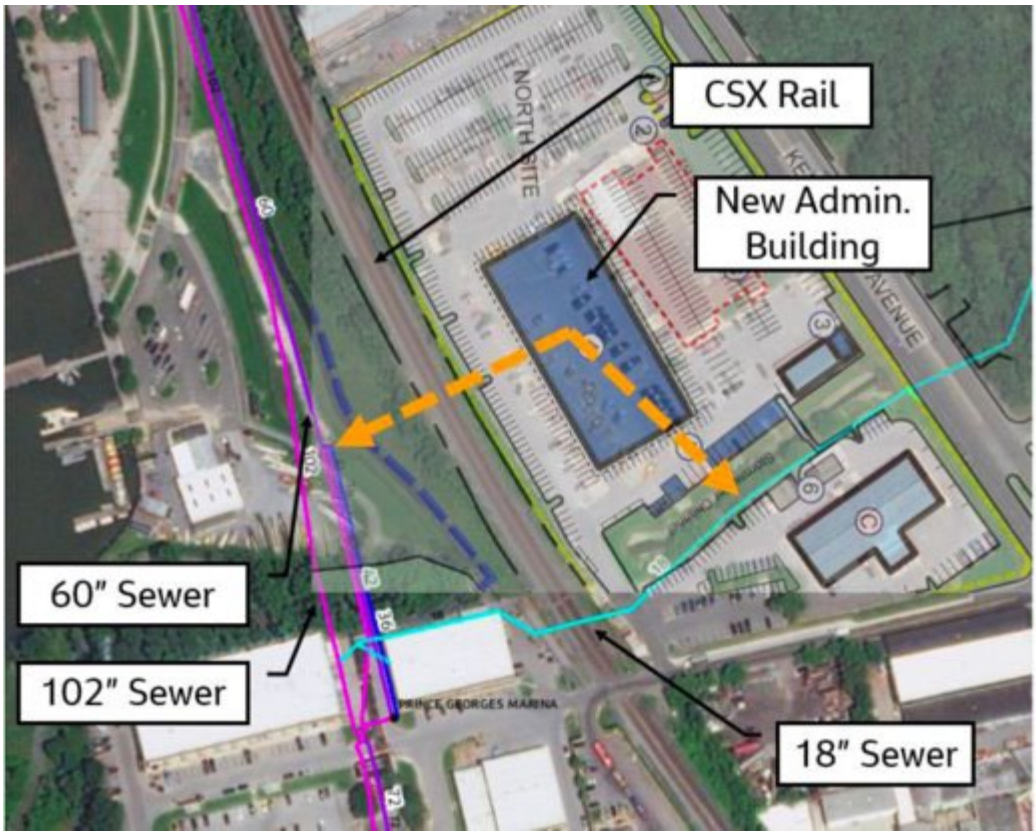

Figure 1. Anacostia Depot and available sewer lines

Sewer thermal implementation at the new Anacostia Depot building would provide benefits that this grant program seeks to achieve. Decreased reliance on the electric grid for heating and cooling improves facility resilience. Additionally, this project will see a reduction in greenhouse gas (GHG) emissions for heating and cooling. This follows PCAP high priority GHG reduction measures, Buildings and Clean energy along with Waste. The Building and Clean energy section can be found on page 23, the Sewer Thermal Technology meets these guidelines by facilitating net zero building development, upgrading property energy consumption, and upgrades to municipal and government buildings which can be found on page 24. Along with these measures, the Waste section is also met by improving practices and technologies to increase waste reduction, reuse/recovery, and recycling for all waste streams, along with developing a wastewater heat exchange project located on page 45-46. Sewer thermal is an emerging technology, with only a few local example installations and no in-line sewer installations. Advancing this technology in Maryland will help pilot a low-carbon thermal technology that could be used for achieving Building Performance Standards and generating Tier 1 Renewable Energy Credits (RECs). WSSC Water seeks to obtain grant funding for this special project to further goals of decarbonization and develop familiarity and expertise in dealing with sewer thermal system design, procurement, and installation.

The second component of the Anacostia Depot Reconfiguration Project is expanding the development of Solar Technology by installing approximately 107,100 sq ft of rooftop and canopy solar panels (see figure 2). Solar energy, harnessed through photovoltaic (PV) panels and solar thermal systems, has witnessed rapid advancements in recent years. With concerns over climate change and the depletion of fossil fuels, the expansion of solar technology has gained significant attention globally.

The integration of solar energy into the electricity grid plays a crucial role in decarbonizing the energy sector. As solar installations proliferate, they contribute to reducing the carbon intensity of the grid by displacing fossil fuel-fired power plants. Additionally, advancements in energy storage technologies such as batteries enable the storage of surplus solar energy for use during periods of low sunlight, further enhancing grid stability and flexibility while reducing reliance on fossil fuel backup generation.

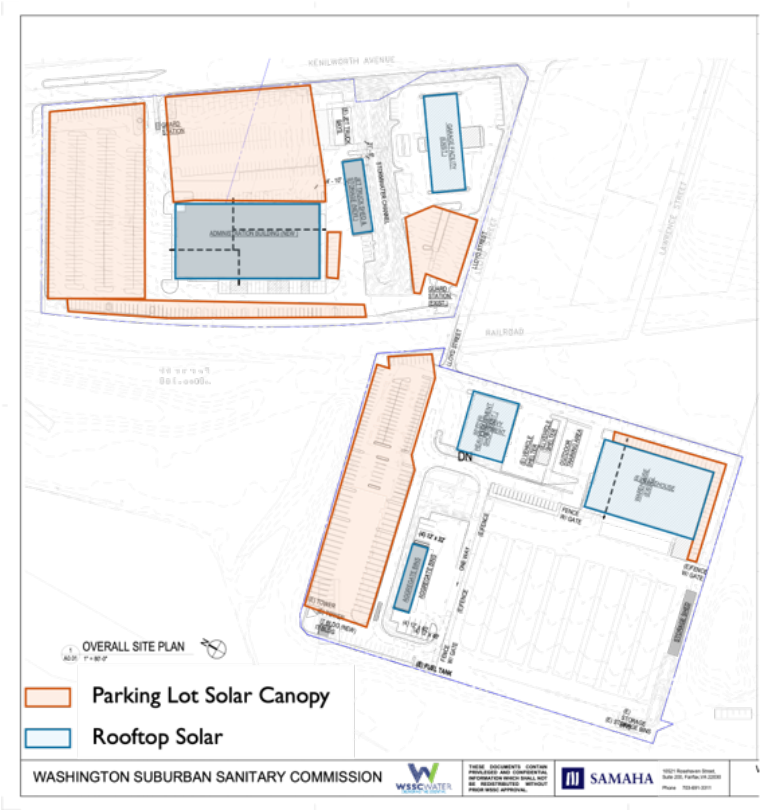

Figure 2. Anacostia Depot photovoltaic (PV) panels plan

One of the most significant ways solar technologies reduce greenhouse gas emissions is by displacing the use of fossil fuels for electricity generation. By substituting coal, natural gas, and oil with solar power, emissions of CO2, sulfur dioxide (SO2), nitrogen oxides (NOx), and other pollutants associated with fossil fuel combustion are avoided. Studies have shown that each megawatt-hour (MWh) of solar electricity generated displaces a significant amount of CO2 emissions, leading to net reductions in greenhouse gas emissions over the lifespan of solar installations. Additionally, advancements in energy storage technologies such as batteries enable storage of surplus solar energy for use during periods of low sunlight, further enhancing grid stability and flexibility.

Solar technology has emerged as a promising renewable energy source with numerous benefits for both the environment and society. By continuing to further Solar energy through the Anacostia Depot Reconfiguration project, it will further along energy efficient development making this site more sustainable for the future following PCAP Buildings and Clean energy guidelines. This follows PCAP guidelines on pages 23-28, addressing energy efficiency and fuel switching in wastewater utility buildings. With the continuance of solar development at this site, it assists in solutions to make buildings more energy efficient and decarbonize buildings, including reducing the use of building-code-required back up diesel generators and transition to cleaner alternatives. It will also serve with the acceleration of

the deployment of clean and renewable energy with the installation of renewable energy systems for municipal infrastructure.

The Anacostia Depot Reconfiguration Project is split into three categories. The first two phases of Sewer Thermal Design and Solar Installation take place during year 1. Once Phase 1 of the Sewer Thermal Technology is completed, Phase 2 of the Sewer Thermal Technology starts up with construction in year 2 and into year 3. Solar installation also continues into year 2 and is estimated to be completed by the end.

b. Demonstration of Funding Need

WSSC Water is responsible for annually preparing a Six-Year Capital Improvements Program (CIP) for major water and sanitary sewerage facilities, and auxiliary projects. The projects included in the latest (2025-2030) CIP are to be funded primarily by issuance of water supply and sewage disposal bonds and to a lesser but important degree, projects may also be funded by state and federal grants. These grants become quite important as it allows WSSC Water to balance WSSC Water bond issuance and PAYGO contributions, rate affordability and maintain its strong credit ratings. In addition, these grants allow for more innovative projects like the ones presented in this application.

WSSC Water is also pursuing various funding streams from the Maryland Energy Administration (MEA). WSSC Water has applied for a MEA 2024 Open Energy Program grant for the Anacostia Depot Sewer Thermal project. This program is designed to fund proposals that fall outside the range of existing programs but that serve to advance the State's energy goals and agency mission. The application was submitted on January 30, 2024, and notification of award is pending. We are also seeking a 2024 Public Facilities Solar Grant for the parking lot solar canopy and rooftop solar projects, which are part of this CPRG grant application. This program provides grant funding to City, County or Municipal government entities to support the planning and installation of solar arrays on existing infrastructure of public facilities. Application was submitted on March 8, 2024, and notification of award is pending.

Last year WSSC Water applied for a FEMA BRIC grant for the Potomac Microgrid project that is part of this application. We were unsuccessful in our application because the scope and cost of the project were misaligned with the State of Maryland's priorities for the BRIC funds allocated to the state. WSSC Water is also assessing the applicability of the new or enhanced energy tax credits under the Inflation Reduction Act (IRA). The points of concern are if execution of the projects presented in this application would qualify and if changes in the project development would be required to access these tax credits (e.g., domestic preference procurement). We will seek those credits if they are available to us but the proposed regulations and guidance from the Department of Treasury related to elective pay and transferability, domestic preference thresholds, and other tax credit conditions still leave some unresolved questions that may ultimately dictate the applicability and benefits of those tax. At this time, we cannot include these energy tax credits in our financial considerations until there is more certainty from Treasury.

WSSS is actively seeking funding from the Maryland Clean Water State Revolving Fund for projects included in this application and several other projects. For example, we have recently submitted applications for the Parkway Electrical Upgrades, Piscataway Mixers, and Western Branch Process Train Improvement projects, all of which included installation of equipment that will achieve energy savings. Notification of award is pending.

c. Transformative Impact

Sewer thermal is an emerging technology, with only a few local installations and no in-line sewer installations in Maryland. Currently, two systems are located in the region, both in the District of Columbia: DC Water H2O Headquarters (building-scale system) and the American Geophysical Union Building (building-scale system, DC Water customer). The sewer thermal project at the Anacostia Depot provides an opportunity for both Maryland and WSSC Water to pilot a new technology that has long-term viability and potential in the region. Installation of this technology at the Anacostia Depot is expected to help WSSC Water gain familiarity and expertise in dealing with sewer thermal system design, procurement, installation, and maintenance. With 5,600 miles of sewer within its service area, WSSC Water hopes to use this knowledge and apply it at multiple other sites in the future.

Based on the successful performance of advanced aeration control at the Seneca and Western Branch WRRFs, WSSC Water hopes to consider implementing this technology at its other water resource recovery facilities. Prorated by annual average daily flow, implementing advanced aeration control at WSSC Water's other three major facilities may potentially yield over $2.3 million in annual cost savings and reduce GHG emissions by approximately 3,200 metric ones per year. The estimated cost savings and GHG reductions for upgrading each facility are presented in the table below. (*Note: advanced aeration control at the Damascus, Parkway, and Piscataway facilities is not part of this CPRG grant application*)

Facility	Average Flow, MGD	Estimated Annual Reduction with ABAC	
		O&M Costs, 2023 USD	GHG Emissions, metric tons CO2e
Damascus	0.8	$60,000	100
Parkway	6.5	$500,000	700
Piscataway	22.6	$1,740,000	2,400
Total	**29.9**	**$2,300,000**	**3,200**

The process and energy optimization achieved by WSSC Water as part of the advanced aeration project listed in this application has the potential to be shared and deployed nationwide with tremendous results. The latest EPA Clean Watersheds Needs Survey Report to Congress estimates that there are approximately 15,000 wastewater treatment facilities in the United States, which could compute to an order of magnitude reduction of tens of millions of metric tons of CO2e saved per.

Asset health and monitoring systems for wastewater pumps offer tangible environmental benefits by improving energy efficiency, reducing greenhouse gas emissions, and enhancing operational reliability in wastewater treatment plants. By leveraging real-time data and predictive analytics, these systems enable proactive maintenance interventions, preventing costly pump failures and minimizing environmental risks.

2. Impact of GHG Reduction Measures

a. Magnitude of GHG Reductions from 2025 through 2030

The table below summarizes the GHG Reductions from 2025 through 2030 for the projects/measures presented in this grant application. As shown in the Technical Appendix, the reductions are permanent.

Measure/Project	2025-2030 reductions	
	Commutative metric tons CO2e	Average metric tons CO2e/year
Advanced Aeration Control	8,095	1,349
Pump Optimization	49,669	8,278
Microgrid	32,192	5,365
Anacostia Depot Sewer Thermal and Solar	4,555	759
Total	**94,511**	**15,752**

b. Magnitude of GHG Reductions from 2025 through 2050

The table below summarizes the GHG Reductions from 2025 through 2050 for the projects/measures presented in this grant application. As shown in the Technical Appendix, the reductions are permanent.

Measure/Project	2025-2050 reductions	
	Commutative metric tons CO2e	Average metric tons CO2e/year
Advanced Aeration Control	98,550	3,790
Pump Optimization	298,015	11,462
Microgrid	547,272	21,049
Anacostia Depot Sewer Thermal and Solar	25,855	994
Total	**969,693**	**37,296**

c. Cost Effectiveness of GHG Reductions (15 points)

Total Budget (Requested CPRG funding)	$49,888,092	
Sum of Quantified GHG reductions from CPRG funding from 2025-2030	94,511	metric tones
Cost Effectiveness	$528	$/metric ton

d. Documentation of GHG Reduction Assumptions

Please see Appendix 1: Technical Appendix to this Application.

3. ENVIRONMENTAL RESULTS – OUTPUTS, OUTCOMES, AND PERFORMANCE MEASURES

a. Expected Outputs and Outcomes

The main objective and outcome of the measures/projects in this application is the reduction of GHG emissions as presented in the table below. However, there are also secondary benefits that should not be discounted. For example, the projects presented will reduce electricity consumption and because Maryland has a high dependence on fossil fuels for electricity generation, with 47% of the total electrical generation coming from natural gas or coal fired power plants according to the US Energy Information Administration, this reduction will also reduce other criteria air pollutants (CAPs) and hazardous air

pollutants (HAPs) associated with these plants such as nitrogen oxides (NOX), sulfur dioxide (SO2), mercury, and particulate matter (PM). A similar secondary benefit will result from the sewer thermal system as it will offset the combustion of natural gas that is currently used for heating at the Anacostia Depot.

The Asset Health and Optimization project is expected to reduce the need for frequent replacement of pump parts and pumps as well as the loss of production. The Microgrid project at Potomac WFP will provide resiliency to a critical infrastructure that cannot be allowed to fail in the event of a grid failure. Carbon stripping technology has the potential to generate elemental carbon, which is an important component of products such as paints, etc.

	2025-2030 reductions		2025-2050 reductions	
	Commutative metric tons CO2e	Average metric tons CO2e/year	Commutative metric tons CO2e	Average metric tons CO2/year
Total	**94,511**	**15,752**	**969,693**	**37,296**

b. Performance Measures and Plan

WSSC Water will leverage the existing GHG Action Plan update process as the mechanism to track, measure, report, and disclose progress toward achieving the expected outputs and outcomes for each GHG reduction measure.

Starting in 2012, WSSC Water has developed annual inventories of GHG emissions for its operations. The inventories quantify the GHG emissions that result from the energy-intensive processes required to treat and distribute drinking water for public use and to collect and treat wastewater before discharge and are the basis for the GHG Action Plan. Accounting protocols published by The Climate Registry, the Intergovernmental Panel on Climate Change (IPCC), and the International Council for Local Environmental Initiatives, are used to complete the inventory with the most recently updated methodology and emissions factors.

Each annual update to the GHG Action Plan includes a summary of completed, in-progress, and new planned projects at WSSC that will impact the GHG inventory and the measures/projects in this grant application will be captured in those Action Plan updates.

c. Authorities, Implementation Timeline, and Milestones

WSSC Water will be responsible for developing the projects/measures proposed in this application. WSSC Water relies on design, engineering, construction, and other technical contractors to develop the capital projects and has years of experience procuring and managing projects using this mechanism. For context, expenditures for FY 2025 Capital Budget are estimated at $813.4 million and the proposed FY2025-2030 Capital Improvements Program has approximately 68 projects, therefore WSSC Water is a desirable client of most major engineering consulting companies, and it has a very active procurement pipeline.

The projects/measures presented in this application are all within the authority of WSSC Water.

The table below shows the approximate implementation timeline for each GHG reduction measure included in the application, including milestones for completing specific tasks.

Measure/Project	Design	Bidding and Procurement	Installation and Construction	Reporting
Advanced Aeration Control	Oct 2026-Sept 2027	Sep 2027-Dec 2027	Dec 2027-Sep 2029	Ongoing
Pump Optimization[1]	Oct 2024-Sep 2029			Ongoing
Microgrid	Oct 2024-Sep 2025	Oct 2025-Sep 2026	Oct 2026-Sep 2029	Ongoing
Anacostia Depot Sewer Thermal and Solar[2]	Oct 2024-July 2025	Aug 2024-Sep 2025	Sep 2025-Mar 2027	Ongoing

1. Pump Optimization 20 pumps per year for five years
2. Schedule is driven by the Sewer Thermal component. The Solar installation is scheduled between October 2024 and March 2026

4. Low-Income and Disadvantaged Communities

a. Community Benefits

Intentionality is key in addressing equity and environmental justice issues within WSSC Water's jurisdiction; while WSSC Water serves two generally affluent counties, both these counties have pockets of historically disadvantaged communities. The differences between, and within, the counties can lead to inequities in service for residents. This application highlights WSSC Water's commitment to serving disadvantaged communities in a manner that drives equity and environmental justice for all.

WSSC Water serves all residents of Prince Georges and Montgomery Counties with vital water and wastewater services. WSSC Water serves both Montgomery (Congressional Election Districts MD-06 and MD-08) and Prince George's (Congressional Election Districts MD-04 and MD-05) counties. Prince Georges County, per CEIST, is home to 43 disadvantaged jurisdictions and Montgomery County is home to 25 disadvantaged jurisdictions. Please see attached list of disadvantaged communities (by census tract numbers) in the two counties per CEJST.

Census Tract Numbers for Disadvantage Communities per CEJST				
Montgomery County		Prince George's County		
24031700832	24031703501	24033800210	24033803402	24033805202
24031700833	24031703213	24033800211	24033803509	24033805500
24031700834	24031703214	24033801405	24033803612	24033805601
24031700721	24031703215	24033801500	24033803613	24033805602
24031700713	24031703207	24033801704	24033803801	24033805700
24031700719	24031701509	24033801707	24033803900	24033805801
24031700724	24031701602	24033801906	24033804001	24033805802
24031700717	24031702101	24033802301	24033804002	24033805904
24031700704	24031702301	24033802404	24033804300	24033805906
24031701102	24031701702	24033802600	24033804801	24033805907
24031700904	24031701900	24033802700	24033804802	24033805908
24031701219	24031702000	24033802901	24033804900	24033806000

Census Tract Numbers for Disadvantage Communities per CEJST				
Montgomery County		Prince George's County		
24031703301		24033803100	24033805000	24033806501
		24033803200	24033805101	
		24033803401	24033805201	

In particular, the Anacostia Depot project location straddles two census tracts (#24033804300 and #24033804002 in Prince George's County, Maryland) which are designated as disadvantaged per the Climate and Economic Justice Screening Tool (see figures 3 and 4 below) and addresses WSSC Water's mission to integrate Environmental Justice and Equity in its Capital Improvements Plan. One of the greatest environmental benefits of the Anacostia Sewer Thermal and Solar project is the ability to offset the combustion of natural gas in the middle of two disadvantaged census tracks.

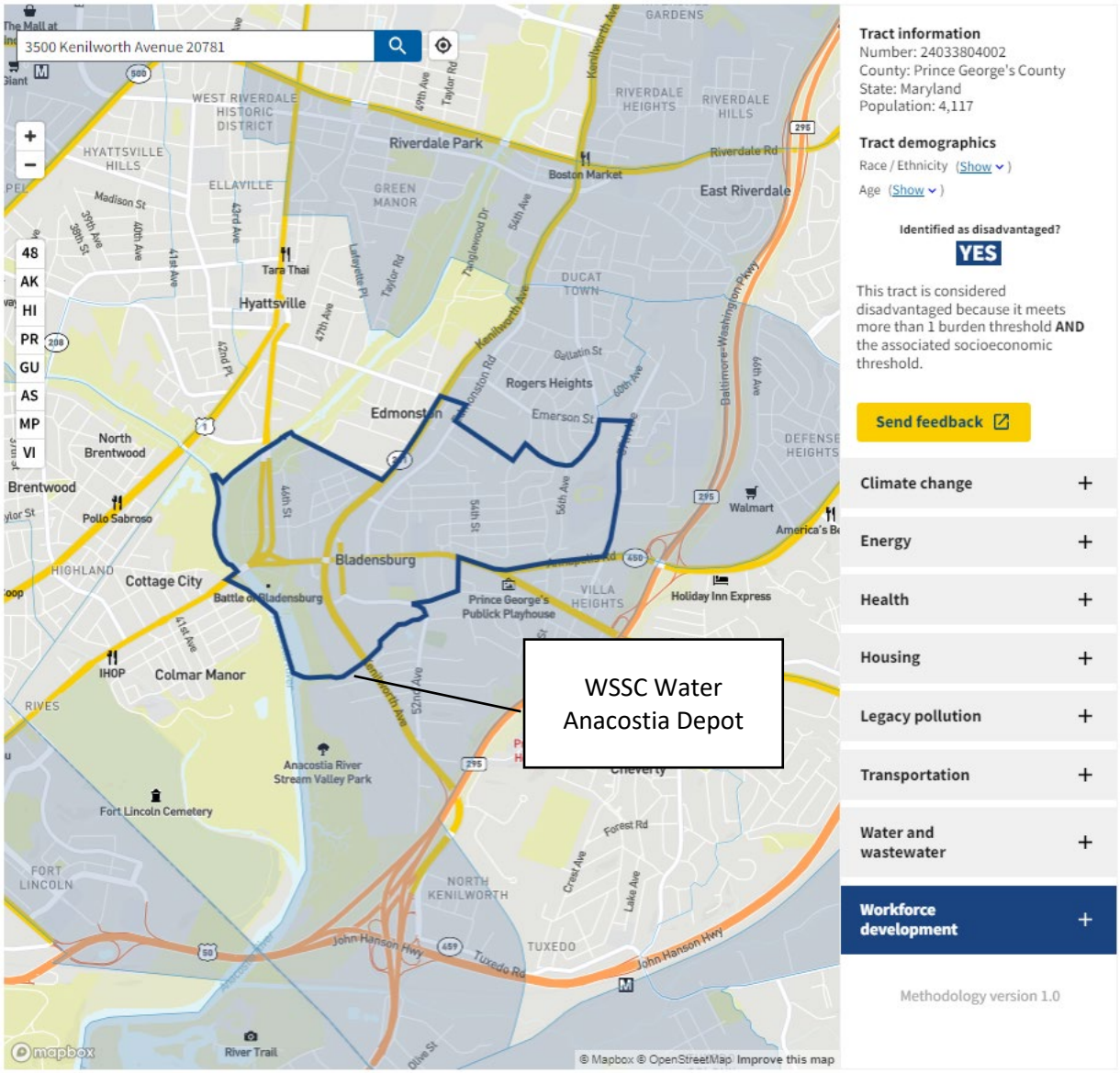

Figure 3. Anacostia Depot location in relation to disadvantaged census track 24033804002

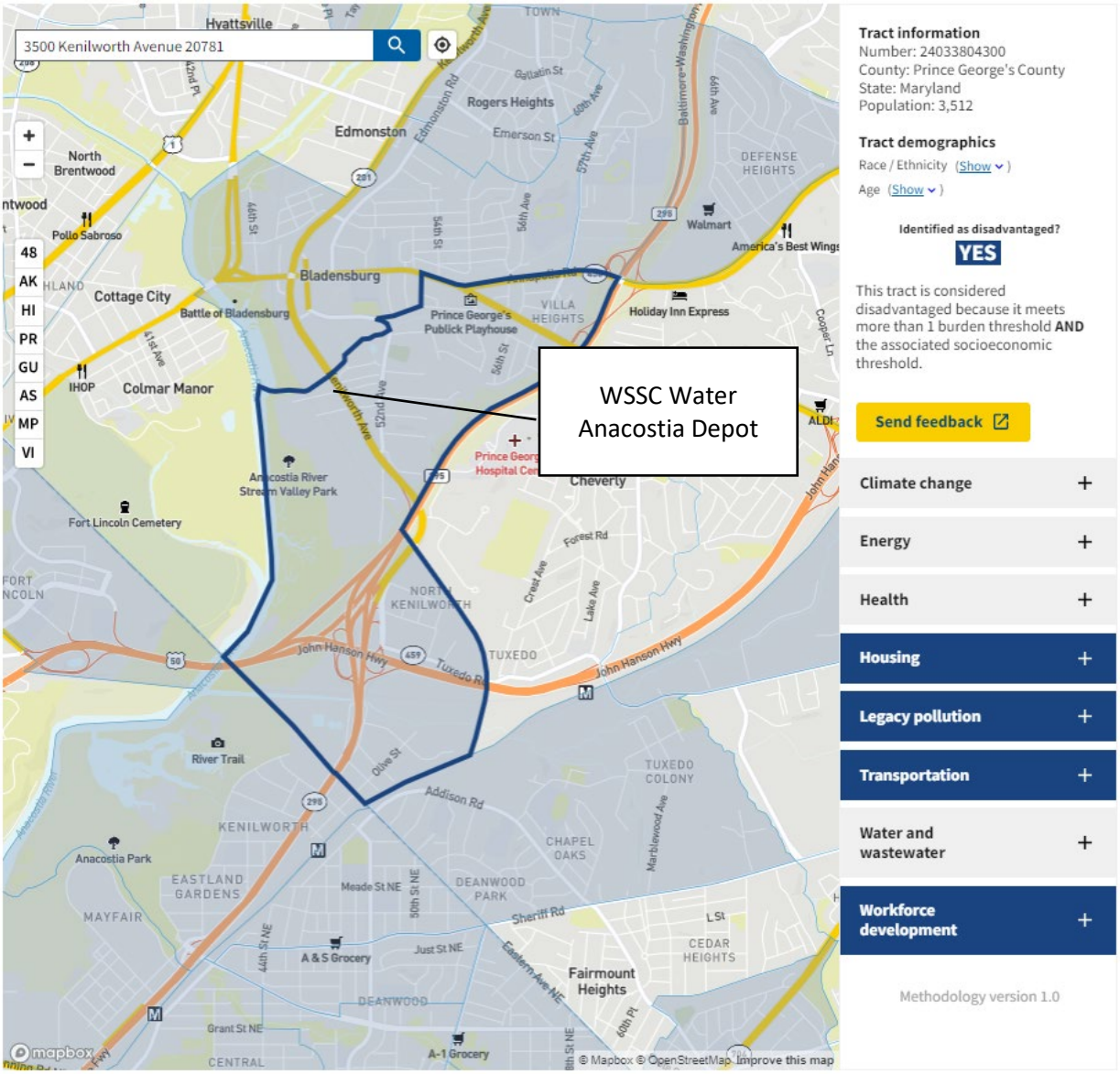

Figure 4. Anacostia Depot location in relation to disadvantaged census track 24033804300

Community benefits of the projects presented in this application should not just be viewed with a GHG or air quality lens. Developing once-in-a-generation projects should benefit low-income and disadvantaged communities in a wide range of aspects, including increased access to economic opportunities resulting from the projects. WSSC Water's Office of Supplier Diversity & Inclusion operates a Small Local Business Enterprise (SLBE) Program and an MBE Program. We focus our efforts in four key areas to maximize contracting participation for diverse and small businesses: Supplier Advocacy, Supplier Development, Outreach and Compliance.

Supplier Advocacy	Compliance	Extensive Outreach	Supplier Development
• Promote fair and equitable access to WSSC Water-funded Contracting • Establish contract-specific MBE and SLBE goals for solicitations	• Administer WSSC Water's web-based compliance system • Track, monitor and report contract awards and payments to MBE, WBE and SLBE firms (Prime and Subcontractor)	• Create awareness about the MBE and SLBE Programs' benefits and features • Facilitate workshops, clinics, one-on-one sessions and contract specific Special Outreach events	• Educate diverse firms on business development topics, including capacity building and access capital • Facilitate WSSC Water's Supplier Training Series

In Fiscal Year 2022, WSSC Water spent $140 Million (28%) with MBE and WBE firms and awarded $358 Million (28%) in contracts to MBE and WBE Firms. African American firms received the most MBE payments at 34%, followed by Asian American firms at 22%, Hispanic American firms at 19%, Women-owned firms at 18% and Native American firms at 7%. Over the past five years, WSSC Water has spent more than $730 million with minority- and women-owned firms.

As we reflect on the past 45 years of supplier inclusion, our future is intentionally focused on contract equity. Program and policy improvements have been identified and are listed below to help us achieve our equity goals:

- Establishing targeted subcontracting goals to advance equity for specific minority groups based on data from the 2022 Disparity Study;
- Creating an Emerging Prime Program that will allow small businesses to obtain contracts at a Prime contracting level;
- Targeting 40% of minority contracting to be spent with businesses located in our service area of Prince George's and Montgomery counties;
- Creating policy that will assist MBE and WBE firms in becoming Prime vendors through price preference considerations and self-performance of 50% of subcontracting goals;
- Recognizing second-tier subcontracting of MBE and WBE firms, to encourage economic inclusion of smaller minority- and women-owned firms in our contracting process; and
- Establishing a Veteran Small Business Enterprise program, for further supplier equity in contracting.

Another benefit of some of the projects in this application is the reduced vulnerability of a large swathe of disadvantaged areas that depend on our water and sewer services. The pump optimization project is distributed throughout all our service area and will benefit 43 disadvantages jurisdictions as explained above. Moreover, the Potomac Microgrid will reduce the vulnerability of disadvantaged areas that depend on the water from the Potomac Water Filtration Plant and that currently has no backup power alternative. While located in Montgomery County, the Potomac WFP serves both Montgomery and Prince George's counties. The figure below shows the distribution of water from the Potomac WFP and the Patuxent WFP when both plants are working at full production rates, and demonstrates the significant number of disadvantaged areas that depend (fully or partially) on the Potomac plant, and this CPRG grant would increase the resilience of this plant and therefore the communities it serves.

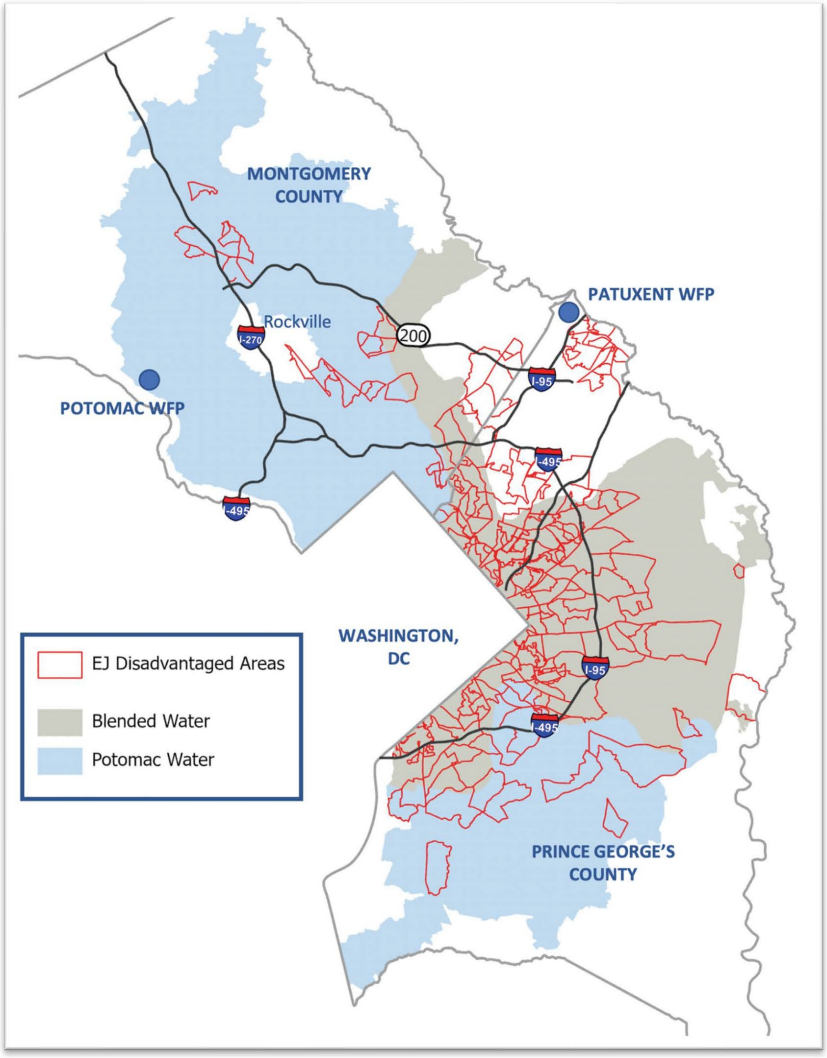

Figure 5. Potomac WFP and disadvantages jurisdictions served

WSSC Water supports community workforce development in many ways as part of our Community Benefits and these are described in detail on Section 5 below.

b. Community Engagement

Over the past 10 to 15 years, WSSC Water has invested in the assessment of our water and wastewater systems throughout the service area to utilize an asset management-based project selection approach. While this approach has resulted in significant investments being made in disadvantaged communities, WSSC Water recognizes the need for greater intention in aligning investment prioritization with the needs in disadvantaged communities and the equity focus in the region. In many ways, equity and environmental justice are disrupters to the conventional norms of asset management. Planning to achieve equity and environmental justice must extend beyond risk-based scoring and asset condition to an understanding of the outcomes that are needed for impacted communities.

The way WSSC Water has integrated equity and environmental justice considerations into prioritization of its Capital Improvements Program (CIP) is, in part, a response to initiatives that have been taken by

the two counties that we serve. Montgomery County has designated 56 census tracts as Equity Focus Areas (EFAs), which are intended to encourage investment in areas characterized by concentrations of minority populations, low-income households, or people with limited English proficiency. Prince George's County has designated 120 census tracts as Revitalization Tax Credit Districts (RTCs) that are intended to attract investment into areas that are disadvantaged based on consideration of factors like household income, residential density, land use, economic factors, and unemployment rates – but consideration is not limited to these factors.

In 2021, WSSC Water initiated an effort to track previously defined asset management performance measures within smaller boundary areas such as County Council Districts and zip codes. This effort provided a more focused look at our performance measures and was used to compare our performance with specific county equity focus areas, areas the county has identified as disadvantaged due to state designation or county determined factors, because they shared similar boundaries.

Every approved CIP project is provided a prioritization score divided into six categories: contribution to the level of service; project execution status; project impact on cost; project impact on business risk exposure; cost-effectiveness; and alignment with the plans and policies of the counties or regional entities, organizational priorities, and regulatory and consent decree requirements. These include county initiatives to encourage investment in areas with high concentrations of minorities, low-income households, or people five and older who speak less English.

When these factors were applied to the project prioritization, a number of the projects were given a higher priority and the schedule was advanced faster to address the equity issues. Continuing evaluation of the project prioritization is occurring to determine if even more aggressive prioritization should be applied to projects in disadvantaged communities.

WSSC Water contacts the community through customer notification letters and door hangers, involves customer advocates, has meetings with impacted property owners to provide project details, and hosts community outreach meetings. We strive to minimize customer impact by completing planned construction with a neighborhood approach, modifying daily construction start times, coordinating construction dates to avoid conflicting with community events and minimizing the impact on schools and area businesses.

Two public hearings are held annually on the proposed budget (including proposed rates and charges), and two additional hearings on a Capital Improvements Program (CIP) document detailing capital spending plans for the next six years. Hearings are publicized through newspaper advertisements, social media, bill inserts mailed to customers, and the website. Customers may participate directly in public hearings or via a livestream, and they are represented in the budget process by their county executives and county councils.

Our strategic outreach also includes using the NextDoor social media platform, placing ads on transit in specified zip codes, and partnering with community-based organizations already serving the most vulnerable to connect our neighbors needing financial and emergency assistance to various programs and resources. Meeting people where they live and fostering relationships with community partners has proven to be an effective strategy for engaging with hard-to-reach or otherwise typically underrepresented community members.

Community involvement also plays a key during construction. A cross-representative group of WSSC Water employees meets regularly with residents, elected officials and municipal managers. The meetings are used to gather information from residents and provide them with feedback and updates on our efforts to provide solutions.

5. JOB QUALITY

WSSC Water is a learning organization that provides opportunities for employees that align with its strategic priorities and focus on skills development—upskilling, reskilling, and retooling for the future of work. We champion the enhancement of WSSC Water's culture and values by designing and implementing training and development strategies and programs focused on motivating, engaging, and educating a committed and high performing workforce.

Under Maryland law, WSSC Water workers are legally permitted to unionize under the Maryland Annotated Code, Public Utilities Article, Section 18-201. Those rights to collective bargaining have robust protection under state law from unfair labor practices, civil rights, and prohibitions on management interfering in the rights outlined in State law. WSSC Water employees are currently organized and represented by two unions: 1) for office classification and paraprofessional classifications, and 2) for service, labor, and trade classifications.

WSSC Water is committed to a safe, healthy, and accessible workplace - standards that are enforced by law, regulation, policy, and custom. For 2023, WSSC Water's Total Recordable Incident Rate and Lost time incident were below the Board of Labor Statistics (BLS) national average for Local Government Water/Wastewater Utilities. WSSC Water's Total Recordable Incident Rate is 2.4 with less than half the average rate reported by BLS of 5.4. The Lost time incident Rate is, similarly, below the BLS average of 2.1 at 1.9.

WSSC Water pays competitive wages well above federal and local minimum wages. Even positions on the lowest tier of WSSC Water's wage scale are 20-25% higher than the local minimum wage standard of $15/hour and greater than twice the rate of the federal minimum wage. WSSC Water employees are protected by civil service protections available to all state government employees in Maryland. This includes strong wage and job protections, protections from retaliation, and robust equity and discrimination protections in law, regulation, policy, procedure, and custom. WSSC Water wages are competitive within the water/wastewater industry and, in fact, are under review as WSSC Water seeks to continue to lead the market in our sector.

In 2008, WSSC Water established a Talent Development Division in Human Resources consisting of 4 trainers to build the knowledge, skills and abilities of employees by helping them develop and achieve their potential so that WSSC Water succeeds and grows. This division also provides custom content development, instructor facilitation and delivery, LMS administration, LMS operation/hosting, and leader/learner support. The Operations Team – Production and Utility Services have skills trainers to provide technical hands-on training towards operational licenses for the State, operational specific training certified by the Maryland Board of Waterworks Systems Operators. (technical, electrical, mechanical, etc.) to their employees. The Customer Service team has their own skill-based trainers as well.

After a leadership change in January 2023, WSSC Water developed a 90-day transition plan to assess the organization and establish the path forward with priorities for the following five years: Building a Strong

Workforce; Service Delivery; Financial Stewardship; Regulatory Challenges and Operational Reliability & Resilience, with Diversity, Equity, Inclusion and Environmental Justice (DEI&EJ) underpinning everything WSSC Water does. The Building a Strong Workforce priority focuses on the recruitment, retention and engagement to maintain and attract top talent. WSSC Water understands that in order to drive diversity, equity and inclusion as well as focus on environmental justice externally, the internal culture must reflect the purpose and intention. The table below highlights pathways to driving diversity, equity and inclusion in workforce development.

Driving Equity in the Workforce

Retention	Recruitment	Engagement
• Focus on Equity • Total Rewards • Compensation – leading market • Improve culture and focus on One Team and One Water • Policy changes • Improve workforce development programs and focus • Implement Succession planning/knowledge management • Establish WIIFM • Budget for training	• Changes to entry level positions • Remove disqualification for pre-screening questions • Develop workforce pipelines: ○ High School ○ Area Colleges/Universities ○ Resource programs for Women • Apprenticeship programs • Internship students • Competitive pay and benefits • "Pursue Your Passion" Series	• Employee experience mapping • Transition team • Future water leaders • All hands meetings and monthly livestream events • Participation in Working groups to facilitate changes • Resource groups for employees • Association engagement at regional and national level • "Pursue Your Passion" Series

WSSC Water supports community workforce development in many ways. We partner with Employ Prince George's, a workforce development program in Prince George's County. We support this program by participating in community job fairs focused on underserved populations: youth, seniors, and citizens seeking training/re-skilling. We also assist with development and evaluation of training programs, and we deliver presentations that showcase careers available within WSSC Water. WSSC Water has a similar partnership with WorkSource Montgomery, the workforce development program serving residents of Montgomery County. We support this program through our participation in community job fairs that are focused on underserved populations (the Hispanic community, youth, and citizens seeking reskilling/upskilling), as well as through a direct partnership to attract candidates for meter reader jobs.

To help develop the TeamBuilders Academy at Prince George's Community College, WSSC Water staff evaluated training programs in information technology and construction (welding, carpentry, electrical). Our staff also helped develop programs to prepare students for solar panel installation jobs. WSSC Water also has a paid 10-week student internship program that typically attracts dozens of students each year. This program recruits diverse students from several HBCUs (Bowie State, Morgan State, and Coppin State) and other colleges and universities.

6. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

a. Past Performance

WSSC Water currently receives federal assistance through two sources:

- The Maryland Department of the Environment's Drinking Water Revolving Loan Fund and Clean Water Revolving Loan Fund, which are funded primarily through EPA capitalization grants.

- Maryland's Water System Assistance Program, which is funded by the American Rescue Plan Act.

In addition, WSSC Water is currently negotiating a $2.5 million grant with the U.S. Department of Energy.

During the last three fiscal years, WSSC Water received assistance allocations of $222 million, including concessional (low interest) loans, principal forgiveness, and grants. During the same period, WSSC Water received drawdowns of $190 million.

	New Funding Allocations to WSSC Water	Drawdowns Received
FY 21	$52,458,240	$51,118,313
FY 22	$62,496,696	$63,800,345
FY 23	$107,031,035	$74,999,554
Totals	$221,985,971	$189,918,212

During the last three fiscal years, WSSC Water completed performance on assistance instruments that supported (1) the Piscataway Bio-energy program, which will process bio-solids removed from wastewater into pathogen-free Class A bio-solids and recover methane for use in energy generation, (2) nitrogen removal at its Water Resource Recovery Facilities (wastewater treatment plants), and (3) forgiveness of water/sewer bill arrearages related to the COVID-19 pandemic for low-income customers. All of these assistance agreements, as well as agreements that are still in the process of completion, were successfully managed and completed.

b. Reporting Requirements

On the Piscataway Bio-energy program, WSSC Water met all requirements associated with the funding provided by the Maryland Department of the Environment. It provided the Preliminary Environmental Screening Checklist required by the State Environmental Review Process, which was developed to meet EPA requirements. It presented project plans and specifications for review by the Department of the Environment, which determined that the plans and specifications were in accordance with the approved scope of work. To obtain approval to move forward with its construction contracts, WSSC Water provided documents demonstrating compliance with the Department's procurement requirements, including updated budgets, evidence of advertisement, certified bid tabulations, bid bonds, assurances for compliance with federal laws and regulations, drawdown plans, and plans for small, minority, and women's business enterprise participation with good faith checklists and supporting documentation. Reimbursements were requested using Department-provided templates and included the construction manager's or inspector's estimate of percentage completion as well as invoices from contractors and evidence of payment. For each paid invoice, WSSC Water provided notice to the Department so that it could arrange independent inspections of work performed and independent estimates of percentage completion. The project is nearing completion, and the plant is expected to begin operations in December 2024.

WSSC Water also received operating grants from the Maryland Department of the Environment in each of the last three fiscal years. The decisions to provide these grants, and the amounts, are based on the performance of WSSC Water's six Water Resource Recovery Facilities in removing nitrogen and phosphorous from wastewater during the previous fiscal year. Since the grants are provided in

recognition of past performance, there are no additional reporting requirements associated with the grants, which are used as a source of funds for WSSC Water's operating fund.

Finally, WSSC Water completed performance on a grant from Maryland's Water System Assistance Program, which supports forgiveness of debt incurred by low-income customers during the COCID-19 pandemic. WSSC Water completely disbursed this grant within 90 days after receiving the funds in June 2023. Reporting was provided to the State of Maryland's Office of Management and Budget, using the required template, to indicate the use of funds and identify the customers who benefitted from debt forgiveness.

Confirmation of WSSC Water's ability to successfully manage awards is provided by single audits. WSSC Water's single audits consistently provide unqualified opinions on its statements of expenditures of federal awards, unqualified opinions on compliance, and have not included any internal control observations or management letter items. WSSC Water's careful stewardship of the assistance funds it has used to serve its customers and protect the environment place it in an elite group of recipients.

c. Staff Expertise

WSSC Water has a dynamic and diverse workforce of approximately 1,700 staff committed to supporting the mission and vision of WSSC Water: to provide safe and reliable water, life's most precious resource, and return clean water to our environment, all in an ethical, sustainable, and financially responsible manner. Almost 70% of our total workforce is assigned to our Production, Utility Services and Engineering and Construction departments and will play a pivotal role in delivering the projects included in this grant application. We are also a desirable client of most major engineering consulting companies and have a very active procurement pipeline and an experienced Procurement department with approximately 20 team members. Both these things guarantee that we will have access to the best human capital to develop the measures/projects presented in this grant application.

Spearheading the Maryland National Capital Region One Water Cycle Decarbonization and GHG Reduction initiative will be Robert Taylor P.E., C.E.M. Mr. Taylor has been the Energy Manager for the WSSC Water since 2000. Mr. Taylor is responsible for managing a $28 million annual energy budget by optimizing supply and demand side energy optimization strategies, including upgrading inefficient equipment, load shifting, renewable energy, distributed generation, and financial hedging in a real-time wholesale electricity and natural gas market. Mr. Taylor is the author of numerous energy papers in the field of energy management and has been awarded several awards from the Association of Energy Engineers including Energy Engineer of the Year, Corporate Energy Manager of the Year, and Environmental Project of the Year, as well as EPA's Climate Change Leadership Award and WSSC Water's General Manager Award. He holds a B.S. in Civil Engineering from Lehigh University and an M.B.A. from the University of Connecticut. He is a Registered Professional Engineer in Maryland, and a Certified Energy Manager (CEM).

Mr. Taylor will be supported by Diane McGahagan, C.E.M. and Dr. Caroline Nguyen, P.E. in managing the development and execution of the measures/projects in this application. Their biographical sketches are included in Appendix 3 to this narrative as requested in the NOFO.

7. BUDGET

The budget for the measures/projects that are part of this Maryland National Capital Region One Water Cycle Decarbonization and GHG Reduction initiative is presented in the table below. Please see Appendix 2 to this Application for the Budget Narrative.

Measure/Project	Cost
Advanced Aeration Control (Seneca and Western Branch)	$11,110,150
Pump Optimization	$575,000
Microgrid	$25,111,400
Anacostia Depot Sewer Thermal and Solar	$13,091,542
Total	**$49,888,092**