

NSA Demonstrates Environmental Stewardship in their Recapitalization Efforts

Since initial planning began in 2010, the National Security Agency (NSA) has led an unprecedented multi-billion dollar Military Construction program. This major development program, known as the East Campus program, requires collaborative efforts among NSA, U.S. Cyber Command, the U.S. Marine Corps, Fort George G. Meade, and Howard County, which borders the development site. This partnership has proven instrumental in providing our nation with an unmatched ability to conduct both signals intelligence (SIGINT) and cyber operations. The program's efforts include the planning, design, and construction on a 240-acre site that supports the delivery of an Integrated Cyber Center, an NSA SIGINT operations building, a Marine Corps Forces Cyberspace Command building, and a high performance computing center.

NSA has a long history of being a good steward of the environment dating back almost 25 years. During the requirements gathering portion of the East Campus program, the Agency realized that, being one of the largest employers in the state of Maryland, there was an obligation to judiciously use natural resources so that they can continue to provide critical intelligence support to our nation. In response to E.O.13834, Efficient Federal Operations, and its intent to reduce both potable and non-potable water functions, NSA began the East Campus reclaimed water project.

The East Campus program will deliver over 4 million square feet of space once complete. The program's initial phase has delivered over 1 million square feet of operations space and a 180 megawatt substation. The substation alone has a capability to power over 64,000 homes. With a high power requirement comes an almost equal requirement for cooling, as each building's mechanical systems must provide adequate cooling for both its human and operational IT occupants. These mechanical systems require water commonly referred to as "make up" water in the mechanical process of cooling facilities. This water is evaporated in cooling towers and comprises the largest portion of a building's total water demand. It was determined during the program's planning phase that drawing over 3.2 million gallons per day (MGD) of water for cooling to support the total development was not feasible. The source water for the development site consists of drawing from ground aquifers. In a highly developed area such as the Baltimore Washington corridor, there is already a high demand for water for both residential and commercial use. The aquifers recharge at a set rate based on rainfall. If too much water is drawn from the ground aquifer systems beyond their ability to naturally recharge, water shortages will occur. The additional draw would limit the quantity of water available for the local community, as well as possible future growth at Fort Meade. It would also result in the increased migration of groundwater pollution plumes from known historical spills, which would adversely affect the local homeowners and put them at risk of exposure to the groundwater contaminants.

All of these factors led to the investigation of an alternative source of non-potable water. The local wastewater treatment plant did not possess the capacity required to support operations. Investigation revealed that the discharge from the neighboring Howard County Little Patuxent Water Reclamation Plant in Savage, Maryland was of sufficient capacity and water quality to meet the East Campus' industrial cooling needs. The Howard County waste water treatment plant was returning approximately 18 MGD of water to the Little Patuxent River, which could

satisfy the East Campus cooling water demand of 2 MGD. Reclaimed water is defined as being former wastewater that is treated to remove impurities and brought to a quality level safe for reintroduction into the environment, but still non-potable. Reclaimed water satisfied each of the team members' critical considerations:

- Environmental sustainment – The water had been treated and was releasable back to the Chesapeake Bay watershed.
- High water quality – Is of appropriate treatment quality to make this water source a viable option for the NSA East Campus industrial cooling systems.
- Independent sourcing – This non-potable water supply did not draw from existing commercial or residential potable water use.
- Good economics – Reclaimed water was available at a lower cost than potable water.

Discussions with Maryland Department of the Environment (MDE) were required to ensure approval of the plan, as this innovative type of reclaimed water project was untried. While MDE approval was a key factor enabling the use of reclaimed water, there were still several other issues that needed to be addressed. As the team's environmental members were working towards a solution that was environmentally sustainable and gaining MDE approval, the business team members were working to understand that the cost of providing potable water at such a quantity required of the East Campus could potentially be cost prohibitive.

Once the team found an optimum solution for cooling water, they navigated through the legal and administrative challenges associated with providing federal (NSA) funding to a local (county) government entity, given there was little precedent for this type of transaction within NSA corporately nor our county government partners. The team quickly established a series of legal meetings between counsels from both organizations, researched precedent projects, and arrived at a way forward that allowed the transfer of approximately \$40M from NSA to Howard County.

Additionally, management levels had peer-to-peer relationships established between NSA and Howard County at the senior executive, project, and construction management levels, establishing a solid governance structure for the duration of the project. The result was a completed project that would provide a pumping station capable of delivering up to 5 MGD of reclaimed water across 1.5 miles of water pipeline into a 1 million gallon storage tank that would serve the entire East Campus. This project will initially support the first phase of the East Campus development, which requires 2.3 MGD, and ultimately the rest of the program's development when complete, adding another 1 MGD of reclaimed water. This project was delivered at a cost that was \$3M under budget and ahead of the scheduled mission system deployment for the first phase of facilities that the project would support.

In terms of scale, the East Campus' water cooling demand for the first phase of construction is greater than the water demands of any other campus within the Intelligence Community. At over 2 MGD, this water cooling demand is the equivalent of filling two Olympic-sized swimming pools daily. It is within the future plan for NSA to eventually put all of its facilities at Fort Meade on reclaimed water, effectively eliminating the need to draw over 4 MGD of water from

our critical ground aquifer systems. This effort marked the completion of one of the largest applications of reclaimed water for industrial use within the state of Maryland and within the Intelligence Community.

The project results can be summarized primarily by the economic and environmental benefits of the effort. By using reclaimed water, there is an approximate 80% cost savings versus using potable water, saving taxpayers several million dollars over the life of the project. Specifically, NSA will be paying approximately \$1 per 1,000 gallons of reclaimed water versus \$8 per 1,000 gallons for potable water, which represents over 87% savings in the Agency's water utility bill using reclaimed water. From an environmental perspective, using reclaimed water requires no need to drill new wells or tap local aquifers to support the center's cooling needs, making it an extremely sustainable option.

The East Campus program's vision for sustainable practices goes well beyond saving several million gallons a day in water resources. Not only does the multi-billion dollar development program comprise NSA's newest facilities but it also has the Agency's largest green building complex. Throughout design, construction, and commissioning, the team successfully adhered to the Leadership in Energy and Environmental Design (LEED) requirements to meet "Silver" for the high performance computing Blum Center, the Integrated Cyber Center, and the Marine Corps Forces Cyber Building. One of the technical challenges for the East Campus team in the various projects has been the management of storm water treatment. The buildings have all been designed to meet not only the State requirements for storm water but also the requirements of EISA 438 which necessitate maintenance of the hydrology of the site. This has been met through the deployment of numerous variations of low impact design features, including bioswales, microbioretention basins, infiltration basins, and permeable pavement.

All of the buildings included Integrated Design Teams that looked at energy, water, and sustainable materials throughout the design and construction process. All of the buildings are contracted to be certified as LEED Silver; the high performance computing center has achieved this award while the remaining buildings are slated to achieve it once the applications are evaluated. This process resulted in verifiable, documented benefits of at least 75% construction waste recycling, incorporation of recycled-content materials, and enhanced building commissioning to ensure proper function and operation of the complex systems supporting the buildings.

In constructing the East Campus, the team worked with Fort Meade to ensure compliance with the functional requirements of the Maryland Forest Conservation Act. In accordance with the policy established by Fort Meade, a 20% restoration of site forest area occurred. Many of the plantings were incorporated into the design of the storm water management features. Another large portion of the reforestation effort occurred along the riparian buffer of the adjacent Midway Branch, which has resulted in a substantial improvement of the natural habitat along the stream bed.

The East Campus team has been passionate about sharing experiences and lessons learned through the development process. Many members of the team have provided briefings on lessons

learned and how to integrate sustainable building practices into a project of this scale. The team has briefed several organizations across the federal, state, and local governments as well as private (non-governmental) organizations. Notable sharing of lessons learned occurred with organizations within the Department of Defense, National Nuclear Security Administration, Institute for Defense Analysis, Office of the Director of National Intelligence, Central Intelligence Agency, and National Geospatial-Intelligence Agency.