

**UB00**  
**Maryland Environmental Service**

***Capital Budget Summary***

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***State-owned Capital Improvement Program***  
**(\$ in Millions)**

<b>Projects</b>	<b>Prior Auth.</b>	<b>2018 Request</b>	<b>2019 Est.</b>	<b>2020 Est.</b>	<b>2021 Est.</b>	<b>2022 Est.</b>	<b>Beyond CIP</b>
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State Water and Sewer Infrastructure Improvement Fund	\$94.289	\$21.332	\$21.229	\$19.890	\$15.360	\$11.250	\$0.000
<b>Total</b>	<b>\$94.289</b>	<b>\$21.332</b>	<b>\$21.229</b>	<b>\$19.890</b>	<b>\$15.360</b>	<b>\$11.250</b>	<b>\$0.000</b>

<b>Fund Source</b>	<b>Prior Auth.</b>	<b>2018 Request</b>	<b>2019 Est.</b>	<b>2020 Est.</b>	<b>2021 Est.</b>	<b>2022 Est.</b>	<b>Beyond CIP</b>
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GO Bonds	\$94.289	\$21.332	\$21.229	\$19.890	\$15.360	\$11.250	\$0.000
<b>Total</b>	<b>\$94.289</b>	<b>\$21.332</b>	<b>\$21.229</b>	<b>\$19.890</b>	<b>\$15.360</b>	<b>\$11.250</b>	<b>\$0.000</b>

CIP: *Capital Improvement Program*  
 GO: general obligation

## ***Summary of Issues***

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***Project Cost Estimation Challenges:*** Maryland Environmental Services (MES) has been experiencing cost estimation challenges in recent years. Anecdotal evidence suggests the following reasons for the challenges, which primarily relate to construction cost increases: the highly specialized nature of water and wastewater treatment plant construction; and the high demand for wastewater treatment plant design and construction firms as a result of the upgrade of the State’s 67 major wastewater treatment plants to enhanced nutrient removal (ENR) technology. MES is considering the use of the construction manager-at-risk procurement model in order to control costs. The idea is to work with the construction manager collaboratively in order to attain fixed price projects. **The Department of Legislative Services (DLS) recommends that MES comment on what types of projects it anticipates using the construction manager at-risk procurement model, what efficiencies and tradeoffs are anticipated as a result of using this model, and whether the model can fully compensate for the lack of competition or improve MES’s cost estimating.**

## ***Summary of Updates***

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***Master Plan Updated:*** MES completed a revision of its Water and Wastewater Master Plan in September 2011. Staff was planning to complete an update and distribute a revised plan in January 2014. MES now notes that the 2014 Master Plan update was sent to the Department of Budget and Management (DBM) on February 26, 2016, and that it will be forwarded to DLS for review.

## ***Summary of Recommended Bond Actions***

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	<b><u>Funds</u></b>
1. Infrastructure Improvement Fund	\$1,600,000 GO
Reduce authorization for the New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities project.	
2. SECTION 12 – Maryland Environmental Service – Infrastructure Improvement Fund	-\$1,600,000 P1
Add \$1.6 million for New Department of Juvenile Services Female Detention Center.	

3. SECTION 13 – Maryland Environmental Service – Infrastructure Improvement Fund

Approve the \$5,000,000 general obligation bond pre-authorization in fiscal 2020 for a split-funded State Water and Sewer Infrastructure Improvement Fund construction project.

<b>Total De-authorization Reductions/Additions</b>	<b>\$0</b>
<b>Total General Obligation Reductions</b>	<b>\$1,600,000</b>
<b>Total Pre-authorization Additions</b>	<b>\$1,600,000</b>

### ***Program Description***

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MES was created by statute (Chapter 240 of 1970) as an independent agency. Executive Order 01.01.1971.11 stipulated that MES has responsibility for the operation and maintenance of all State-owned sewage treatment and solid waste disposal facilities. MES then became incorporated into the Department of Natural Resources (DNR) in 1972. During the 1993 session, the General Assembly adopted legislation (Chapter 196 of 1993) that created MES as an instrumentality of the State and a public corporation independent of DNR. MES provides technical services including engineering, design, financing, construction, and operation of water supply and wastewater treatment facilities, among other activities.

The State Water and Sewer Infrastructure Improvement Fund was established to provide for capital improvements of State-owned and operated water treatment and wastewater treatment plants (WWTP); water distribution and sewer collection systems; and water towers. Since fiscal 1992, funding for capital maintenance projects relating to water and WWTPs has been budgeted under MES. Prior to this, the State budgeted capital maintenance funds for these projects in the Department of General Services' (DGS) Facilities Renewal Program. Facilities renewal funds pay for major rehabilitation activities at State-owned facilities. This change was made in order to display more clearly the capital cost of MES-operated State facilities. As of January 2017, MES operates and maintains 974 projects. An individual facility may have multiple projects going on at any given time. Some of the 974 projects are at 263 State-owned facilities, such as the Poplar Island Environmental Restoration Project; the Hart-Miller Island Dredged Material Containment Facility; Cox Creek Dredged Material Containment Facility; recyclable material processing facilities in Baltimore, Montgomery, and Prince George's counties; two municipal solid waste transfer facilities in Baltimore County; yard waste composting facilities in Montgomery and Prince George's counties; the Midshore I and II regional landfills; and the Hawkins Point Hazardous Waste Landfill (now in post-closure monitoring phase).

### ***Performance Measures and Outputs***

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The MES performance measures relate to four goals, one of which is to improve the environment through MES activities. One output for this goal is a reduction in the number of

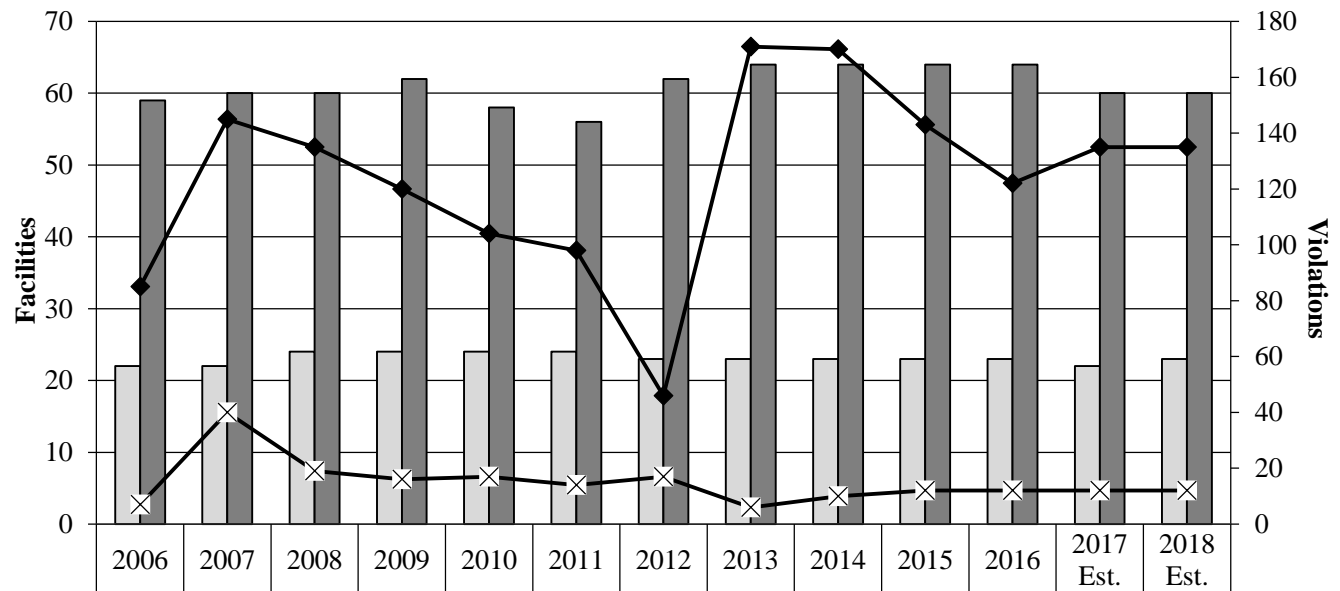
local/corporate and State National Pollutant Discharge Elimination System violations. In addition, while not necessarily a performance measure, the discharge permits for the WWTPs that MES operates is a critical factor in its capital budget plan.

## **State National Pollutant Discharge Elimination System Violations**

**Exhibit 1** shows that MES has a greater number of local/corporate clients than State clients and that, in general, local/corporate discharge permit violations are a higher percentage of overall violations than would be indicated by their share of the total number of facilities. Previously, this measure specified National Pollutant Discharge Elimination System violations, but MES notes that the violations include groundwater discharges as well and so the more general category of discharge permits is used instead. The number of local/corporate facility violations increased substantially between fiscal 2012 (46) and 2013 (171). MES indicates that the increase in the number of local/corporate facility violations in recent years is primarily due to two troublesome facilities. MES notes that construction was completed at one of the troublesome facilities and the other facility is no longer being operated by MES. As a result, the number of local/corporate facility violations has decreased in fiscal 2015 (143) and again in fiscal 2016 (122). Of note, the compliance level is directly related to the large number of potential violations, or permits, and does not necessarily reflect the severity of any one violation.

Between fiscal 2006 and the 2018 estimate, State facilities have averaged 11% of the total violations, while accounting for 27% of the facilities handled by MES. MES has indicated in the past that the reason for this low percentage of violations at State facilities is MES's ability to use State funding to make improvements at State treatment facilities. In contrast, MES is dependent upon its corporate clients, including small municipalities, to fund improvements, which they may not always have the resources to do.

**Exhibit 1  
Local/Corporate and State Discharge Permit Violations  
Fiscal 2006-2018 Est.**



State Facilities	22	22	24	24	24	24	23	23	23	23	23	22	23
Local/Corporate Facilities	59	60	60	62	58	56	62	64	64	64	64	60	60
Discharge Permit Violations for State Facilities	7	40	19	16	17	14	17	6	10	12	12	12	12
Discharge Permit Violations for Local/Corporate Facilities	85	145	135	120	104	98	46	171	170	143	122	135	135
Compliance Level							99.9%	99.8%	99.8%	99.8%	99.8%	99.9%	99.9%

Note: The fiscal 2017 and 2018 estimates for the discharge permit violations for local corporate facilities are based on the estimates provided for last year's analysis.

Source: Department of Budget and Management; Maryland Environmental Service; Governor's Budget Books, Fiscal 2007-2016

## ***Budget Overview***

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The *Capital Improvement Program* (CIP) has changed between the 2016 and 2017 editions, as shown in **Exhibit 2**.

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**Exhibit 2**  
**2016 and 2017 Capital Improvement Program Comparison**  
 (\$ in Millions)

<b>Projects</b>	<b>2018 Request</b>	<b>2019 Est.</b>	<b>2020 Est.</b>	<b>2021 Est.</b>	<b>2022 Est.</b>
2017 CIP	\$21.332	\$21.229	\$19.890	\$15.360	\$11.250
2016 CIP	18.105	13.702	16.046	13.360	0.000
<b>Difference</b>	<b>\$3.227</b>	<b>\$7.527</b>	<b>\$3.844</b>	<b>\$2.000</b>	<b>\$11.250</b>

CIP: *Capital Improvement Program*

Note: The State Water and Sewer Infrastructure Improvement Fund is funded by general obligation bonds. No funding is reflected beyond the CIP because that is the five-year planning period used by the Administration. Estimates for programmed funding for fiscal 2022 for the 2016 CIP are outside the five-year planning period.

Source: *Capital Improvement Program*, 2016 and 2017

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As shown in **Appendix 1**, the 2016 CIP amount programmed for fiscal 2018 was \$18.1 million, which has been increased to \$21.3 million in the 2017 CIP. This is primarily due to an increase of \$3.5 million for the Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade due to the ineligibility of solids handling, grit removal equipment, and other components for Bay Restoration Fund ENR technology funding. In addition, the Rocky Gap State Park – Wastewater Treatment Plant Improvements project requires an additional \$700,000 for an enclosure to protect the new process equipment (membrane bioreactor system) from extreme weather conditions. **Exhibit 3** reflects the overall cost changes for projects between the 2016 and 2017 CIPs.

**Exhibit 3**  
**Project Cost Estimate Differences for Fiscal 2018 Projects**  
**2016 and 2017 CIP**  
**(\$ in Thousands)**

<u>Subdivision</u>	<u>Title</u>	<u>2016 CIP</u>	<u>2017 CIP</u>	<u>Difference</u>
Allegany	Rocky Gap State Park – Wastewater Treatment Plant Improvements	\$4,514,000	\$5,214,000	\$700,000
Anne Arundel	State Water Tower – Crownsville Front Tank	430,000	430,000	0
Baltimore County	Camp Fretterd – Water and Wastewater Treatment Plants and Water Distribution System Upgrades	2,670,000	2,998,000	328,000
Carroll	New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities	4,600,000	4,538,000	-62,000
Cecil	Fair Hill Natural Resources Management Area – Water Treatment Plant and Distribution System Upgrade	1,963,000	2,763,000	800,000
Frederick	Cunningham Falls State Park – Water Treatment Plant	4,000,000	4,000,000	0
Garrett	State Well Upgrades	1,660,000	1,660,000	0
Prince George’s	Cheltenham Youth Center – Wastewater Treatment Plant	7,115,000	8,315,000	1,200,000
Queen Anne’s	Eastern Pre-Release – Wastewater Treatment Plant	4,450,000	4,582,000	132,000
Somerset	Eastern Correctional Institution – Cogeneration Plant Upgrades	4,321,000	4,321,000	0
Somerset	Eastern Correctional Institution – Wastewater Treatment Plant Upgrade	26,730,000	36,730,000	10,000,000
Washington	Maryland Correctional Institution – Hagerstown – Wastewater – Treatment Plant Upgrade	13,582,000	17,141,000	3,559,000
<b>Totals</b>		<b>\$76,035,000</b>	<b>\$92,692,000</b>	<b>\$16,657,000</b>

CIP: *Capital Improvement Program*

Note: The exhibit reflects a difference of \$3,559,000 for the Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade project, and consequently an overall difference of \$16,657,000, which is \$59,000 greater than the difference shown in Appendix 1. This is because the Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade project includes Bay Restoration Fund enhanced nutrient removal technology funding that increases from \$6.492 million to \$6.551 million but is not reflected in either the 2016 or 2017 CIPs.

Source: Maryland Environmental Service; Department of Legislative Services

## **Fiscal 2018 Funding and Projects**

The MES fiscal 2018 authorization includes \$21,332,000 in general obligation (GO) bonds for 12 projects in 11 jurisdictions, including State well upgrades. As introduced, the 2017 session capital budget bill includes pre-authorizations for fiscal 2019 and 2020 to provide the funding authority for the Board of Public Works (BPW) to approve construction contracts without all of the funds authorized in fiscal 2018. The 12 projects included in the fiscal 2018 allowance are shown in **Exhibit 4**, which reflects the 6 projects that are completed with fiscal 2018 funding, the 4 projects that are in the construction phase that need fiscal 2019 pre-authorizations to be completed, the 1 project that requires fiscal 2020 funding to be completed – Eastern Correctional Institution (ECI) – WWTP Upgrade, and 1 State well upgrade project category that includes a well that is anticipated to be completed in the current year and thus does not need pre-authorized funding to bid out construction contracts.



**Exhibit 4  
Fiscal 2018 Project Funding**

<u>State Unit</u>	<u>Project</u>	<u>Jurisdiction</u>	<u>Est. Cost</u>	<u>Prior Approp.</u>	<u>2018 Request</u>	<u>Phase</u>	<u>Future Req.</u>
<i>Projects Completed in Fiscal 2018</i>							
Rocky Gap State Park	WWTP Improvements	Allegany	\$5,214,000	\$4,514,000	\$700,000	Construction	\$0
State Water Tower	Crownsville Front Tank	Anne Arundel	430,000	0	430,000	Construction	0
Camp Fretterd	W&WWTP and Water Distribution System Upgrades	Baltimore County	2,998,000	1,670,000	1,328,000	Planning and Construction	0
New DJS Female Detention Center	Water and Sewer Utilities	Carroll	4,538,000	500,000	4,038,000	Construction	0
Cunningham Falls State Park	WTP	Frederick	4,000,000	2,905,000	1,095,000	Construction	0
Maryland Correctional Institution – Hagerstown	WWTP Upgrade	Washington	17,141,000	7,090,000	3,500,000	Planning and Construction	0
<i>Projects Receiving Fiscal 2019 Pre-Authorization</i>							
Fair Hill Natural Resources Management Area	WTP and Distribution System Upgrades	Cecil	2,763,000	180,000	1,000,000	Construction	1,583,000

<u>State Unit</u>	<u>Project</u>	<u>Jurisdiction</u>	<u>Est. Cost</u>	<u>Prior Approp.</u>	<u>2018 Request</u>	<u>Phase</u>	<u>Future Req.</u>
Cheltenham Youth Center	WWTP	Prince George's	8,315,000	705,000	4,400,000	Construction	3,210,000
Eastern Pre-Release	WWTP	Queen Anne's	4,582,000	3,350,000	1,100,000	Construction	132,000
Eastern Correctional Institution	Cogeneration Plant Upgrades	Somerset	4,321,000	2,819,000	744,000	Planning and Construction	758,000
<b><i>Projects Receiving Fiscal 2019 and 2020 Pre-Authorization</i></b>							
Eastern Correctional Institution	WWTP Upgrade	Somerset	36,730,000	23,958,000	2,772,000	Planning and Construction	10,000,000
<b><i>Projects Not Receiving Pre-Authorizations</i></b>							
State Well Upgrades	State Well Upgrades	Garrett	1,660,000	335,000	225,000	Construction	1,100,000
<b>Total</b>			<b>\$92,692,000</b>	<b>\$48,026,000</b>	<b>\$21,332,000</b>		<b>\$16,783,000</b>

DJS: Department of Juvenile Services  
WTP: water treatment plant  
W&WWTP: water and wastewater treatment plants  
WWTP: wastewater treatment plant

Source: Department of Budget and Management Capital Budget Worksheets



## Projects

- **Rocky Gap State Park – WWTP Improvements:** The current WWTP was constructed in 1973 and is difficult to repair. In addition, wastewater flows have increased at Rocky Gap Casino Resort as a result of increased attendance from the introduction of video lottery terminals, and the wastewater collection system pipes are old. In combination, these issues support the following improvements: constructing a new flow equalization tank, headworks system, and treatment process, and upgrading the existing filters and collection and distribution system. The overall capacity of the plant will expand from 120,000 gallons per day to 150,000 to gallons per day. It was noted in last year's analysis that the Rocky Gap Casino Resort would not pay for the upgrade, but will pay for its share of the operating costs. MES has opted to upgrade the WWTP to ENR technology because the plant is on MDE's list of facilities that eventually would be upgraded and therefore upgrading it now will save time and money. The July 2016 bids for construction were greater than the available funding and so components were separated as additive alternates and the construction contract was rebid in October 2016. The \$700,000 in GO bonds authorized for fiscal 2018 reflects the funding of the additive alternates that were separated from the October 2016 construction contract. While Bay Restoration Fund money is available for the upgrade to ENR technology, the funding comes with the requirement that MES look at three different treatment options. MES has already determined that a membrane bio-reactor is necessary due to the limited room for additional tanks and does not want to risk a break in service that might occur if the design process is restarted. In addition, a meeting with the Maryland Department of the Environment (MDE) that might have clarified MES's position was canceled due to snow. Therefore, MES will not be pursuing Bay Restoration Fund funding for the project.
- **State Water Tower – Crownsville Front Tank:** The State Water Tower – Crownsville Front Tank project involves removing the existing coating from the surface of the steel structure, providing a new protective coating, and installing Occupational Safety and Health Administration compliant safety cables, safety rails, pad locks on the roof hatch, and an extra 24-inch diameter access hatch opposite the riser pipe. The repairs are intended to extend the water storage tank's life another 15 to 20 years. The fiscal 2018 funding of \$430,000 in GO bonds would provide for design and construction of the project.
- **Camp Fretterd – Water and Wastewater Treatment Plants and Water Distribution System Upgrades:** The Camp Fretterd Water and WWTPs and Water Distribution System project last received funding in fiscal 2017. Design was initially anticipated to begin in July 2014 but MES had difficulty locating utility and other records for the facilities at the project site and also had to wait until the Maryland Military Department had completed an evaluation of the proposed expansion of their facilities. The evaluation is complete and the revised flow projections are included in the design of this project. Water source, distribution, treatment deficiencies, and wastewater treatment deficiencies support the following improvements: constructing a new backup well and new elevated water tank or a booster station with automated controls and installing an advanced onsite wastewater treatment system and miscellaneous improvements. The fiscal 2018 authorization includes \$1,328,000 in GO bonds to complete construction. The

new discharge permit for the facility was issued in July 2015 and requires total nitrogen be reduced to a yearly maximum loading of 320 pounds with a monthly average total nitrogen concentration of 20 milligrams per liter that must be met by July 2017. MES notes that wastewater is being hauled off-site for disposal at another facility, so meeting the permit is not an issue because they are not discharging. The funding need has increased by \$328,000 for fiscal 2018 because it was determined in fiscal 2017 that additional funds are necessary to provide sufficient power to the booster pump station. This additional cost meant that the whole project could not be bid out at one time. MES notes that the upgrades to the water system are in procurement.

- ***New Department of Juvenile Services (DJS) Female Detention Center – Water and Sewer Utilities:*** DJS is constructing a new detention center on the site of the former Thomas O’Farrell Youth Center in Carroll County. New water and sewer utilities are needed because the previous service deteriorated to the point that it needed to be abandoned. For fiscal 2018, \$4,038,000 in construction funding is authorized. The project design has been evaluated by Brudis and Associates, which reflected five scenarios with a preferred alternative of running water and sewer lines along a roadway to the nearest water and sewer connections for \$2.5 million; the cost has been updated by George, Miles and Buhr, LLC (GMB) to be \$4,038,000. MES notes that the design is 95% complete but there are complications with the utility easements needed for the project and thus the negotiations to obtain easements are taking longer than expected. Assuming the current plan holds, DGS estimates that utility easement appraisals will be ready in July 2017 and the easements purchased by December 2017. This would allow for advertising for construction in September 2017, with a construction award possible in January 2018, which is approximately five months later than the current schedule. **DLS recommends that the fiscal 2018 authorization for the New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities project be reduced by \$1.6 million to reflect the utilities easement acquisition complications and that the funding instead be pre-authorized for fiscal 2019.**
- ***Cunningham Falls State Park – Water Treatment Plant:*** The electrical system is unsafe and the deteriorated condition of the existing water treatment plant (WTP) has required the purchase of water; between June 16, 2014, and July 12, 2014, water purchase costs were \$11,784. In order to resolve the unreliable systems, MES intends to install a WTP system, upgrade the electrical system and controls, modify piping and valves to allow flexible operation, and install an appropriately sized clear well to ensure sufficient water to clear the filter of particles through a process called backwashing. MES notes that the construction schedule has slipped less than a month: the construction contract was approved by BPW on February 22, 2017, and MES’s Board of Directors is expected to approve it on March 6, 2017, with the contract being awarded immediately thereafter. The fiscal 2018 funding is 1,095,000 in GO bonds for completing construction.
- ***Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade:*** The requirement to upgrade to ENR technology as 1 of the 67 major WWTPs and the need to provide for other upgrades to support the following improvements: installing denitrification filters, an ultraviolet disinfection system, a plant effluent supply line to the press building, a

carbon source for further denitrification, a lime silo, an automated control system, and a new belt filter press; rehabilitating the headworks; and upgrading two clarifiers and launder covers for the remaining two clarifiers. The fiscal 2018 allowance includes \$3,500,000 in GO bonds for construction for the fourth year of four years of split funding. It is noted in MDE's fiscal 2018 capital analysis that the project may not be completed by the June 30, 2017 deadline for the upgrade of the State's 67 major WWTPs to ENR technology. The overall project cost has increased by \$3,500,000, from \$13,641,000 to \$17,141,000 due to the ineligibility of Bay Restoration Fund ENR funding for the following: wastewater screening and grit removal systems in the headworks building, lime storage silo; feed systems for control of wastewater alkalinity; sludge dewatering and handling systems, and a new maintenance building. Of note, according to the capital budget worksheets, the overall project cost reflects \$6,551,000 million in water quality program funding from MDE, which is \$59,000 more than the \$6.492 million reflected in last year's analysis. MES notes that the Bay Restoration Fund ENR grant is \$6,504,691.

- ***Fair Hill Natural Resources Management Area – Water Treatment Plant and Distribution System Upgrades:*** The water treatment system at Fair Hill Natural Resources Management Area has deficiencies as follows: the water treatment plant lacks a heating and ventilation system, the water storage tank is corroded and must be drained every year or it will freeze, and the water distribution system is in poor condition and does not have an adequate amount of control/isolation valves or fire hydrants. The overall project scope includes the construction of the following: a new water treatment building with a laboratory area, a heating and ventilation system, and room for chemical storage; new water lines throughout the complex and fire hydrants for water distribution; and an elevated water storage tank. The fiscal 2018 funding of \$1,000,000 will begin construction of the project. The overall project cost has increased by \$800,000 due to the need to add an elevated water storage tank and relocate the construction site across Maryland Route 275, which will involve boring and jacking. There is a pre-authorization of \$1,583,000 in GO bonds for fiscal 2019 to complete construction.
- ***Cheltenham Youth Center – Wastewater Treatment Plant:*** The new DJS detention center installed low-flow water fixtures that were anticipated to generate elevated ammonia levels due to the concentration of urine. This supported the following improvements: replacing the existing rotating biological contactors; upgrading the chemical storage and feed system; upgrading the sanitary collection system; upgrading the electrical, communication, and supervisory control and data acquisition systems; and upgrading the control building to provide adequate office space, laboratory space, and lockers in accordance with the latest building codes. During the design phase, MDE indicated that the plant should be upgraded to ENR technology, which has increased the project cost by \$1,200,000. The fiscal 2018 allowance includes \$4,400,000 in GO bonds for beginning construction of the project. There is a pre-authorization of \$3,210,000 in GO bonds for fiscal 2019. MES notes that design is not on track to be completed in March 2017 because there has been a significant reduction in flow – rated at 70,000 gallons per day but the plant is only experiencing approximately 12,000 gallons per day – since the new youth center has come on line. MES is in the process of reassessing the capacity needed because it does not want to oversize the plant and reduce the effectiveness of the treatment process. MES notes that the cost increase of \$1,200,000 in fiscal 2019 for

upgrading to ENR technology may not occur and that the fiscal 2019 pre-authorization may be overstated by as much as \$1.5 million. Of note, MES indicates that it filed an application with MDE for Bay Restoration Fund ENR funding in February 29, 2016, but has not heard back from MDE about the application, perhaps due to the small size of the plant and thus a low priority ranking for funding.

- ***Eastern Pre-Release – Wastewater Treatment Plant:*** The Eastern Pre-Release WWTP is not capable of meeting its discharge permit, issued in November 2013. Construction components include adding a new facility consisting of an equalization tank, wastewater screens, a new treatment process, a new ultraviolet disinfection system, and expanding the treatment capacity from 20,000 gallons per day to 40,000 gallons per day. Of note, MES was required to submit a Wastewater Capacity Management Plan to MDE because flow at the WWTP has exceeded 80% of its capacity for more than three years. Subsequently, MDE required the proposed expansion of the plant to be included in the Queen Anne’s County Water and Sewer Master Plan. The upgrade of the capacity was approved by the County Commissioners on November 22, 2016, and the county submitted its amended Water and Sewer Master Plan to MDE in December 2016 where it is still under review. Therefore, construction could not start in February 2017 as originally anticipated. The fiscal 2018 funding of \$1,100,000 in GO bonds is programmed to continue construction. There is a pre-authorization of \$132,000 in GO bonds for fiscal 2019 in order to pave the existing access road to the facility.
- ***Eastern Correctional Institution – Cogeneration Plant Upgrades:*** The upgrade is necessitated by the wear and tear on the cogeneration plant and the frequent power lapses because the plant is only able to generate 78% of the ECI’s electricity needs. The project’s four task cost was reduced from \$21,345,000 to \$4,321,000 in last year’s submission due to the elimination of a third boiler, three of the four planned boiler feed pump replacements, and other components. The fiscal 2018 authorization of \$744,000 in GO bonds is split between design (\$100,000) and construction (\$644,000) funding for Task 3 of the project. Task 3 includes the upgrade of the following: the boiler and turbine plant’s auto-steam control, pressure reducing valve and steam regulators, bucket elevator numbers 1 and 2, and the boiler insulation and condensate tank. However, the utility yard upgrade, which began on January 30, 2017, but was originally part of Task 2 and involved the replacement of oil cooled breakers and the utility yard transformer, is now estimated to cost more and so fiscal 2018 funding will be used for this purpose. There is a pre-authorization of \$758,000 in GO bonds for fiscal 2019 that will fund Task 3 components as long as the utility yard upgrade is complete and otherwise the Task 3 components will need to be pushed out to later years given the critical importance of the utility yard upgrade for guaranteeing the reliability of power to the Eastern Correctional Institution complex.
- ***Eastern Correctional Institution – Wastewater Treatment Plant Upgrade:*** Funding is needed for the ECI – WWTP upgrade project in order to meet a discharge permit issued on March 1, 2012, that will be effective on January 1, 2018. MES notes that MDE has recognized the design and bidding challenges experienced by the project and that MDE has indicated that a consent decree may be limited to the treatment of the reverse osmosis reject stream. The overall project has been divided into four phases. To date, the project has received funding as follows: \$269,000 in fiscal 2008, \$6,961,000 in fiscal 2009, \$1,514,000 in fiscal 2013,

\$6,271,000 in fiscal 2016, and \$8,943,000 in fiscal 2017. Fiscal 2018 funding of \$2,772,000 includes additional planning and construction funding for the third phase as pre-authorized in the fiscal 2017 capital budget bill. There is a pre-authorization of \$4,587,000 in GO bonds for fiscal 2019, and a pre-authorization of \$5,000,000 in GO bonds for fiscal 2020. The pre-authorizations do not account for the total project cost because \$413,000 in future planning funding is not pre-authorized since it is not required to allow construction contracts to be bid. MES hired a value-engineering contractor to help reduce the project's cost. The decision was made to reduce the proposed expansion from 1.14 million gallons per day to 0.9 million gallons per day, which is possible given that the Somerset Sanitary district will not be using the water treatment plant and thus only ECI will be using the water treatment plant. The water treatment plant is the source of the reverse osmosis reject water that has to be treated before it can be discharged. MES is waiting for a revised facility National Pollutant Discharge Elimination System permit from MDE. The overall project price has increased by \$10.0 million due to the need to cover the funding shortfall and implement the phase 2 work after splitting the project into two phases when bid prices exceeded the estimated budget in early 2016.

- ***State Well Upgrades:*** Fiscal 2018 funding of \$225,000 in GO bonds is programmed for the construction of two new wells at Savage Mountain Youth Center in Garrett County. Three of the seven wells have been abandoned and only one well can be relied on for production, and iron bacteria are leading to a gradual decline in water production from the wells. The Savage Mountain Youth Center needs water for fire protection, meal preparation and clean up, showers, drinking, bathroom flushing, and cleaning. The fiscal 2018 funding will provide for an architect/engineer to review available hydrogeological data and perform hydrogeological surveys, test borings, and possible surface geophysical methods and the installation of two complete potable water wells and piping connections to the treatment facilities. MES notes that the Savage Mountain Youth Center well project design is 60% complete and the engineer's construction cost estimate is \$233,178.

## ***Issues***

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### **1. Project Cost Estimation Challenges**

MES has been experiencing cost estimation challenges in recent years. Anecdotal evidence suggests the following reasons for the challenges, which primarily relate to construction cost increases: the highly specialized nature of water and wastewater treatment plant construction; and the high demand for WWTP design and construction firms as a result of the upgrade of the State's 67 major WWTP to ENR technology. MES notes that it has had to delete items from the scope and rebid several projects over the past few years, which delays project completion. In response, MES is considering the use of the construction manager-at-risk procurement model in order to control costs.

The construction manager-at-risk model is on the spectrum of procurement models that range from the traditional design-bid-build model all the way to the collaborative design-build model. The construction manager-at-risk model has been used principally by the University of Maryland for over

20 years. What makes the construction manager-at-risk model attractive is the collaborative nature of working with a construction manager to develop a fixed-price project cost. The construction manager in turn is incentivized by a built-in contingency that is only shared if the project comes in at the fixed price. The collaboration involves both the design processes chosen and the actual equipment to be purchased, and so that MES can learn from the construction manager at the same time that it has oversight of ongoing costs and can hold the construction manager accountable for cost increases. However, the construction manager is an added cost and there is no guarantee that the fixed project price will be met. **DLS recommends that MES comment on what types of projects it anticipates using the construction manager-at-risk procurement model, what efficiencies and tradeoffs are anticipated as a result of using this model, and whether the model can fully compensate for the lack of competition or improve MES's cost estimating.**

## *Updates*

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### **1. Master Plan Updated**

MES completed a revision of its Water and Wastewater Master Plan in September 2011. Staff was planning to complete an update and distribute a revised plan in January 2014. MES now notes that the 2014 Master Plan update was sent to DBM on February 26, 2016, and that it will be forwarded to DLS for review.



## ***Operating Budget Impact Statement***

### **Executive’s Operating Budget Impact Statement – State-owned Projects (\$ in Millions)**

	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b>Estimated Operating Cost</b>	<b>-\$0.020</b>	<b>-\$0.034</b>	<b>-\$0.019</b>	<b>-\$0.034</b>	<b>-\$0.034</b>
<b>Estimated Staffing</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

The primary reason for the decrease in the operating budget impact is the savings from no longer needing to transport wastewater for offsite treatment from the Camp Fretterd – Water Treatment Plant, Wastewater Treatment Plant, and Water Distribution System Upgrades project. There are slight increases for operating budget impacts as a result of increased power, chemical, and supplies use for some of the other projects in the fiscal 2018 project list.

### **Consolidated Administrative Expenses – All Programs (\$ in Millions)**

	<b>FY 2016 Actual</b>	<b>FY 2017 Estimated</b>	<b>FY 2018 Estimated</b>
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<b>Sources:</b>			
Special Funds			
DNR – Maryland Park Service	\$0.175	\$0.164	\$0.200
<b>Subtotal – Special Funds</b>	<b>\$0.892</b>	<b>\$0.746</b>	<b>\$0.908</b>
General Funds (Other State Reimbursable Projects)	0.717	0.582	0.708
<b>Total Funds</b>	<b>\$0.000</b>	<b>\$0.000</b>	<b>0</b>

<b>Uses:</b>			
Direct Expenses	\$0.850	\$0.727	\$0.889
Indirect Expenses (legal, marketing, asset management)	0.042	0.019	\$0.019
<b>Total Direct and Indirect Expenses</b>	<b>\$0.892</b>	<b>\$0.746</b>	<b>\$0.908</b>

DNR: Department of Natural Resources

MES’s administrative expenses are divided into (1) work on capital improvement projects that have been funded; and (2) work developing capital programs and budgets, including master plans. The main reason for the increase in administrative expenses between fiscal 2017 and 2018 is increased labor for work on capital improvement projects. Of note, in last year’s analysis MES’s administrative expenses for fiscal 2016 were estimated to be \$776,071 but have since increased to a fiscal 2016 actual of \$892,314, an increase of \$116,243 which is comprised of approximately \$13,000 in special funds and approximately \$103,000 in general funds.

## ***Summary of Other Projects in the Capital Improvement Program***

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### **Projects Deferred in Fiscal 2018**

As shown in **Exhibit 5**, the Elk Neck State Park – Wastewater Treatment Plant Upgrades project is shifted later in the 2017 CIP. In the 2016 CIP, the project was programmed to receive \$400,000 in planning funding in fiscal 2018, \$2,300,000 in construction funding in fiscal 2019, and \$2,000,000 in construction funding in fiscal 2020. The 2017 CIP shifts the funding out by one year.

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#### **Exhibit 5 Projects Deferred Fiscal 2018**

<b><u>Project</u></b>	<b><u>Description</u></b>	<b><u>Reason for Deferral</u></b>
Elk Neck State Park – Wastewater Treatment Plant Upgrades	Upgrades to the wastewater treatment plant.	Shift the project schedule one year later.

Source: Department of Budget and Management, 2017 *Capital Improvement Program*

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## ***Pre-authorizations and De-authorizations***

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The fiscal 2018 capital budget bill includes the pre-authorization of \$10,270,000 for fiscal 2019 and \$5,000,000 for fiscal 2020, as reflected in **Exhibit 6**. **DLS recommends that the pre-authorization of \$10,270,000 for fiscal 2019 be increased by \$1,600,000 and the pre-authorization of \$5,000,000 for fiscal 2020 be approved.**

**Exhibit 6  
Pre-authorizations and De-authorizations**

**Pre-authorizations**

<b><u>Project</u></b>	<b><u>FY 19</u></b>	<b><u>FY 20</u></b>	<b><u>FY 21</u></b>	<b><u>FY 22</u></b>	<b><u>Reason</u></b>
Cheltenham Youth Center – Wastewater Treatment Plant	\$3,210,000	\$0	\$0	\$0	Allow for split funding of construction over fiscal 2018 and 2019.
Eastern Correctional Institution – Cogeneration Plant Upgrades	758,000	0	0	0	Allow for split funding of construction over fiscal 2018 and 2019.
Eastern Correctional Institution – Wastewater Treatment Plant Upgrade	4,587,000	5,000,000	0	0	Allow for split funding of construction over fiscal 2018, 2019, and 2020.
Eastern Pre-Release – Wastewater Treatment Plant	132,000	0	0	0	Allow for split funding of construction over fiscal 2018 and 2019.
Fair Hill Natural Resources Management Area – Water Treatment Plant and Distribution System Upgrade	1,583,000	0	0	0	Allow for split funding of construction over fiscal 2018 and 2019.
<b>Total</b>	<b>\$10,270,000</b>	<b>\$5,000,0000</b>	<b>\$0</b>	<b>\$0</b>	

Source: Department of Budget and Management, 2017 *Capital Improvement Program*

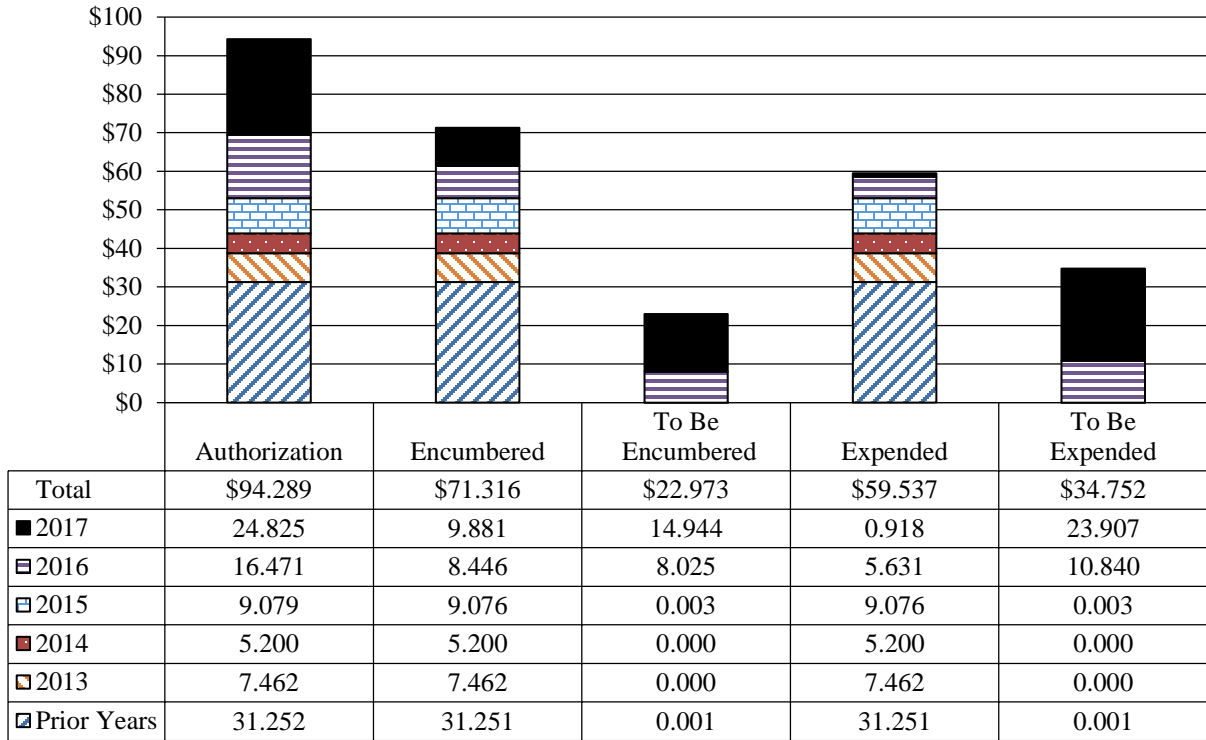
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***Encumbrances and Expenditures***

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The MES encumbrance and expenditure history for the State Water and Sewer Infrastructure Improvement Fund is shown in **Exhibit 7**. Overall, \$94.3 million in GO bonds have been authorized. Of this amount, MES has encumbered \$71.3 million; \$23.0 million remains to be encumbered. The majority of the funding remaining to be encumbered was authorized in fiscal 2016 and 2017.

**Exhibit 7**  
**Infrastructure Improvement Fund Encumbrances and Expenditures**  
**Program Inception through January 2017**  
**(\$ in Millions)**



Note: No funding was provided in either fiscal 2011 or 2012.

Source: Maryland Environmental Service

**Fiscal 2017 Project Status**

MES’s plan is to encumber \$32,045,751 in fiscal 2017. The current encumbrance status is shown in **Exhibit 8**. MES notes that it has \$22,973,000 still to be encumbered as of January 2017 and that \$15,107,709 of this amount is allocated for the construction of the Eastern Correctional Institution – Wastewater Treatment Plant Upgrade. In addition, \$3,116,000 is still to be encumbered for the Eastern Pre-Release – Wastewater Treatment Plant, which is delayed due to the need to obtain approval for the project from Queen Anne’s County and to receive concurrence from MDE, and there are two projects waiting for MDE construction permits: Camp Fretterd – Water and Wastewater Treatment Plants and Water Distribution System Upgrades (\$1,437,000) and State Well Upgrades (\$285,000).

**Exhibit 8  
Status of Encumbering Project Funding  
Fiscal 2017**

<u>Subdivision</u>	<u>Project</u>	<u>Current Activity</u>	<u>2017 (Planned)</u>	<u>Est. Cost</u>	<u>Status</u>
Allegany	Rocky Gap Wastewater Treatment Plant Upgrade	Construction	\$1,353,706	\$5,214,001	Construction underway.
Baltimore County	Camp Fretterd – Water and Wastewater Treatment Plants and Water Distribution System Upgrades	Construction	1,473,000	2,998,000	Design of both systems is 100% complete and water system improvements are in procurement; waiting for MDE construction permit to be issued and additional funding for the wastewater treatment plant improvements.
Baltimore County	Woodstock – Wastewater Treatment Plant Upgrades	Planning	356,000	4,077,000	Preliminary design underway.
Cecil	Fair Hill Natural Resources Management Area – Water Treatment Plant and Distribution System Upgrade	Planning	180,000	2,163,000	Project design 40% complete.
Charles	Southern Pre-Release Unit – Wastewater Treatment Plant Improvements	Construction	367,336	4,198,000	Construction completed.
Frederick	Cunningham Falls State Park – Water Treatment Plant	Construction	2,654,000	4,000,000	Contract approved by Board of Public Works; notice to proceed issuance is pending Board of Directors approval.
Frederick	Victor Cullen Wastewater Treatment Plant Upgrades	Planning	373,000	4,742,000	Design 30% complete.
Garrett	State Well Upgrades	Planning and Construction	285,000	1,060,000	Design of Dan’s Mountain 100% complete and waiting for MDE erosion and sediment control permit; and Savage 60% design complete.

*UB00 – Maryland Environmental Service*

<u>Subdivision</u>	<u>Project</u>	<u>Current Activity</u>	<u>2017 (Planned)</u>	<u>Est. Cost</u>	<u>Status</u>
Prince George's	Cheltenham Youth Center – Wastewater Treatment Plant	Planning	426,000	8,315,000	Design 30% complete.
Queen Anne's	Eastern Pre-Release – Wastewater Treatment Plant	Construction	3,116,000	4,582,000	Design 90% complete; waiting for MDE construction permit.
Somerset	Eastern Correctional Institution – Cogeneration Plant Upgrades	Planning and Construction	2,533,000	4,321,590	Construction of utility yard improvements underway; boiler feed pump on site awaiting installation; and valve replacement design 100% complete.
Somerset	Eastern Correctional Institution – Wastewater Treatment Plant Upgrade	Construction	15,107,709	36,730,000	Construction bids came in higher than estimated; recently completed value engineering study and planning to implement construction through alternative collaborative delivery method.
St. Mary's	Charlotte Hall Veteran's Home Wastewater Treatment Plant	Construction	341,000	4,100,000	Construction of the wastewater treatment plant completed. Lagoon dewatering, sludge removal and spray field modifications are in planning.
Washington	Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade	Construction	341,000	17,141,000	Construction 50% complete.
Statewide	Cash Flow Adjustment	Construction	2,800,000		Not applicable.
<b>Total</b>			<b>\$32,045,751</b>	<b>\$103,980,591</b>	

MDE: Maryland Department of the Environment

Note: The estimated cost for the Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade project reflects funding from the Bay Restoration Fund through MDE that is not in the 2017 *Capital Improvement Plan* for the Maryland Environmental Service. Funding for the Western Correctional Institution – Wastewater Pump Station Improvements project was encumbered in fiscal 2016 and the project completed and therefore it is not reflected on the list of fiscal 2017 projects provided in the fiscal 2018 capital budget worksheets.

Source: Department of Budget and Management; Maryland Environmental Service

**GO Bond Recommended Actions**

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1. Reduce authorization for the New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities project.

UB00A                      Infrastructure Improvement Fund .....                      \$ 19,732,000

<u>Allowance</u>	<u>Change</u>	<u>Authorization</u>
21,332,000	-1,600,000	19,732,000

**Explanation:** The New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities project has experienced utility easement acquisition complications. This action reduces the fiscal 2018 authorization by \$1,600,000 in general obligation bonds. A companion action adds \$1,600,000 in general obligation bonds for this project to the fiscal 2019 pre-authorization for the State Water and Sewer Infrastructure Improvement Fund.

2. Add \$1.6 million for New Department of Juvenile Services Female Detention Center for fiscal 2019.

ZF3700                      SECTION 12 – Maryland Environmental Service –  
Infrastructure Improvement Fund .....                      \$ 11,870,000

Add the following language:

UB00                      MARYLAND ENVIRONMENTAL SERVICE

- (A) Infrastructure Improvement Fund. Provide funds to design, construct, and equip water and wastewater facility improvements for State institutions. Expenditures for any of the following projects may not exceed the amount listed below by more than 7.5% without notification to the General Assembly. Funds may only be spent on the projects listed below or on prior or future authorized projects. Expenditure of any part of this appropriation for a prior or future authorized project shall also require notification to the General Assembly .....
- |  |                   |
|--|-------------------|
|  | 10,270,000        |
|  | <u>11,870,000</u> |
- (6)                      New Department of Juvenile Services  
Female Detention Center – Water and  
Sewer Utilities (Carroll County) .....                      1,600,000

*UB00 – Maryland Environmental Service*

**Explanation:** The New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities project has been delayed by utility easement acquisition complications. This action pre-authorizes \$1,600,000 in general obligation bonds for the project in fiscal 2019 in order to provide for the completion of the project. There is a companion reduction of \$1,600,000 in general obligation bonds for the fiscal 2018 authorization.

3. Approve the \$5,000,000 general bond pre-authorization in fiscal 2020 for a split-funded State Water and Sewer Infrastructure Improvement Fund construction project – Eastern Correctional Institution – Wastewater Treatment Plant Upgrade.

<b>Total General Obligation Bonds Reductions</b>	<b>\$1,600,000</b>
<b>Total Pre-authorization (2017) Additions</b>	<b>\$1,600,000</b>



**Appendix 1**  
**Project Cost Estimate and Timing Changes**  
**2016 and 2017 Capital Improvement Program Change for Fiscal 2018-2021**

<u>Subdivision</u>	<u>Project</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>Total</u>	<u>Explanation</u>
Allegany	Rocky Gap State Park – Wastewater Treatment Plant Improvements	\$700,000	\$0	\$0	\$0	\$700,000	Added an enclosure to protect the new process equipment (Membrane bioreactor system) from extreme weather conditions.
Baltimore County	Camp Fretterd – Water and Wastewater Treatment Plants and Water Distribution System Upgrades	328,000	0	0	0	328,000	Separated the project into two phases which extends the total construction duration.
Carroll	New Department of Juvenile Services Female Detention Center – Water and Sewer Utilities	-62,000	0	0	0	-62,000	Changed the proposed bid date, which affected the reference midpoint in the cost estimate worksheet.
Cecil	Fair Hill Natural Resources Management Area – Water Treatment Plant and Distribution System Upgrade	-783,000	1,583,000	0	0	800,000	Added an elevated storage tank and relocated the construction site across Maryland Route 275, which will involve boring and jacking.
Cecil	Elk Neck State Park – Wastewater Treatment Plant Upgrades	-400,000	-1,900,000	300,000	2,000,000	0	Shift project later.

<u>Subdivision</u>	<u>Project</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>Total</u>	<u>Explanation</u>
Frederick	Victor Cullen – Wastewater Treatment Plant Upgrades	0	1,456,000	-1,456,000	0	0	Shift project earlier.
Prince George's	Cheltenham Youth Center – Wastewater Treatment Plant	0	1,200,000	0	0	1,200,000	Decreased flow at the plant may mean the cost increase will not occur.
Queen Anne's	Eastern Pre-Release – Wastewater Treatment Plant	0	132,000	0	0	132,000	Construct a new access road to the water and wastewater treatment plants after installation of new security around the facility.
Somerset	Eastern Correctional Institution – Cogeneration Plant Upgrades	-56,000	56,000	0	0	0	Shift project later.
Somerset	Eastern Correctional Institution – Wastewater Treatment Plant Upgrade	0	5,000,000	5,000,000	0	10,000,000	Cover the funding shortfall and implement the Phase 2 work after splitting the project into two phases when bid prices exceeded the estimated budget in early 2016.
Washington	Maryland Correctional Institution – Hagerstown – Wastewater Treatment Plant Upgrade	3,500,000	0	0	0	3,500,000	Construct non-Enhanced Nutrient Removal eligible components including solids handling, grit removal equipment, and others.
<b>Total</b>		<b>\$3,227,000</b>	<b>\$7,527,000</b>	<b>\$3,844,000</b>	<b>\$2,000,000</b>	<b>\$16,598,000</b>	

Source: Maryland Environmental Service