Annual Report

To

Alexandria City Council

April 30, 2023

Ad Hoc Stormwater Utility and Flood Mitigation

Advisory Group

Councilman John Chapman

Mr. John Hill, Chair

Ms. Katherine Waynick, Vice Chair

Mr. Brian Sands

Ms. Cheryl Leonard

Ms. Christine Thuot

Mr. Dino Drudi

Mr. Howard “Skip” Maginniss

Ms. Janette Shew

Summary Statement of the Committee

The rainstorms that have flooded our neighborhoods in recent years have changed how Alexandrians think about water. We watch rain forecasts with more trepidation. We are more attentive to how the City maintains the storm sewers and creeks by our homes and businesses. We invest more in improvements that will keep water out of our basements and away from our businesses when the floods do come.

Alexandria's Flood Action program and the Ad Hoc Stormwater Committee that oversees it is a response to residents' increased concern about neighborhood flooding. The Committee plays a key role in helping fellow residents learn about Alexandria's efforts to combat stormwater flooding. In listening to residents and business owners, the Committee's annual report addresses their three questions concerning Alexandria's response to stormwater flooding:

1. **Is the City's investment in stormwater mitigation directed to the most urgent problems?**
   The 10-year Capital Improvement Plan for stormwater and the wet weather mitigation projects planned for the combined sewer area of Old Town contain twelve large capacity-building projects and forty-nine smaller spot projects. *The current inventory of projects is properly focused on the most urgent areas of stormwater flooding – with one exception*. The intersection of Braddock Road and West Street is an area of chronic flooding during severe rain events. None of the currently planned large capacity-building projects appear to address this flooding problem directly.

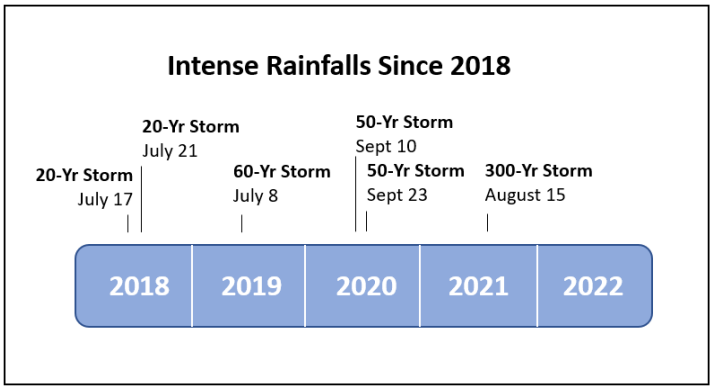
2. **Are the planned expenditures adequate to address the stormwater flooding problem?**
   The $264 million price tag of the 10-year Capital Improvement Program for stormwater reflects today's best estimates of the major projects to address the areas with the most urgent flooding problems. However, none of these projects have completed sufficient design to allow accurate cost estimation. *City Council should be prepared for potential cost changes as the detailed designs of the major stormwater projects are completed over the next few years. Another area where cost projections may change is the Flood Mitigation Grant program*. The program provides partial relief for flood-impacted residents and businesses who may not see the benefit of the large projects that are several years away. As the program evolves, the City should review whether it is serving all impacted communities equitably.

3. **Is the City making sufficient progress in addressing the problem?**
   Alexandria has made more progress in the fight against stormwater flooding in the past few years than ever before. The rapid completion of spot improvements, the launch of major capacity-building projects and an effective outreach program are examples of this progress. *While the Committee wholeheartedly applauds the progress to date, it recognizes that creating a more flood-resilient Alexandria will require at least a decade of sustained investment and effort. The true measure of progress will be when the City has proven its ability to build the large infrastructure projects that fundamentally increase Alexandria's capacity to move stormwater*.

The past two years have confirmed the need for the Ad Hoc Committee to guide – and help communicate – Alexandria's Flood Action program. *As the large projects get underway Alexandria needs a permanent, standing committee to engage residents in project design and communication*. Over the next decade, the Committee should annually report to City Council on the progress toward answering the above three questions that most concern Alexandria residents about stormwater flooding in their neighborhoods.

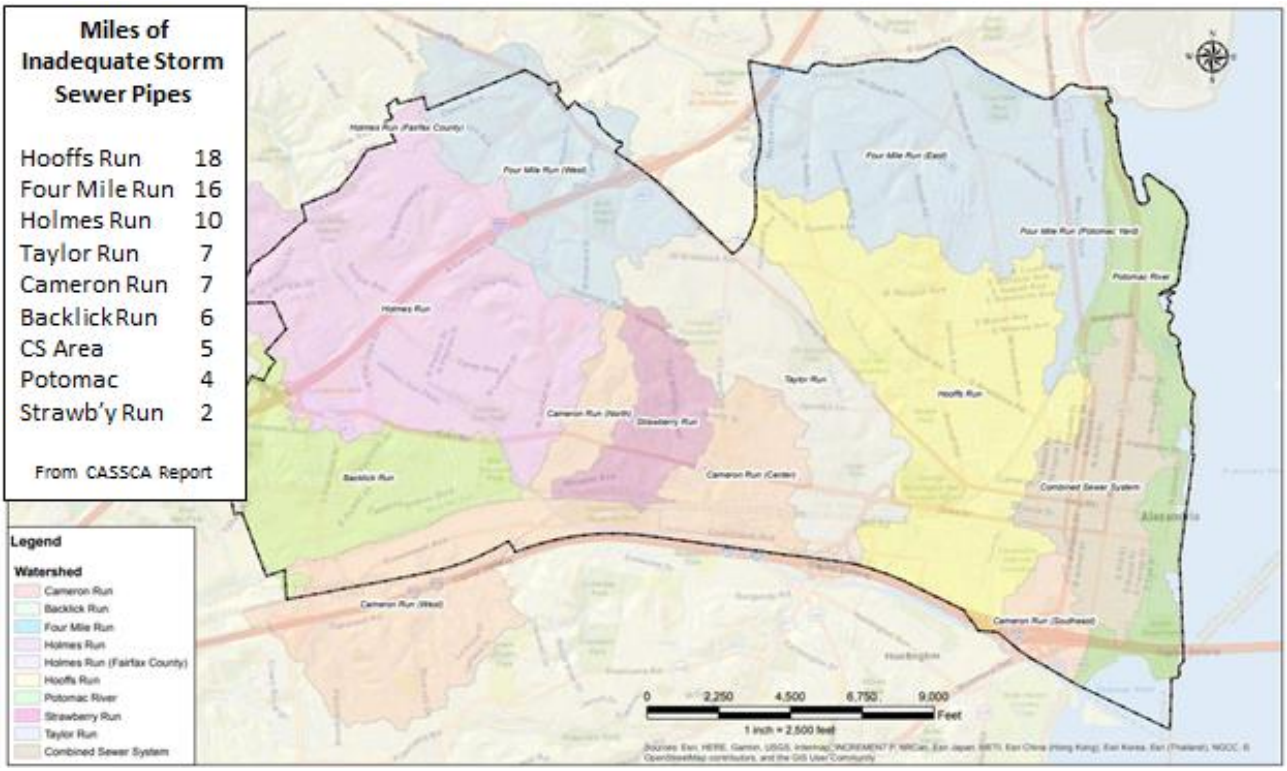
I. Flooding Causes and Problems

The flooding problem in Alexandria is the result of increasingly severe rainstorms colliding with older, inadequate stormwater infrastructure. Severe storms that meteorologists predicted should occur only once every ten years -- or even less frequently -- now occur almost every year.



In the four years from 2018 to 2021, Alexandria saw six such rainstorms. What characterizes these storms is not just the amount of rainfall – but their intensity. They brought a deluge of rain – as much as five inches in an hour – that exceeds our storm sewers' capacity to move it. And our neighborhoods flood.

Alexandria's stormwater infrastructure is a network of over 189 miles of storm sewer pipe underneath the streets of the city. An extensive engineering study* included modeling for 150 miles of storm sewer pipes and revealed that at least 75 miles of those pipes are inadequately sized to handle the runoff produced by the City's standard 10-year design storm.



Although sewer pipe diameter is a very rough indicator of where the system potentially needs to be upgraded, the experience of the past four years confirms that the watersheds with the most inadequate pipes in older neighborhoods built out prior to stormwater management standards are where stormwater flooding is most severe.

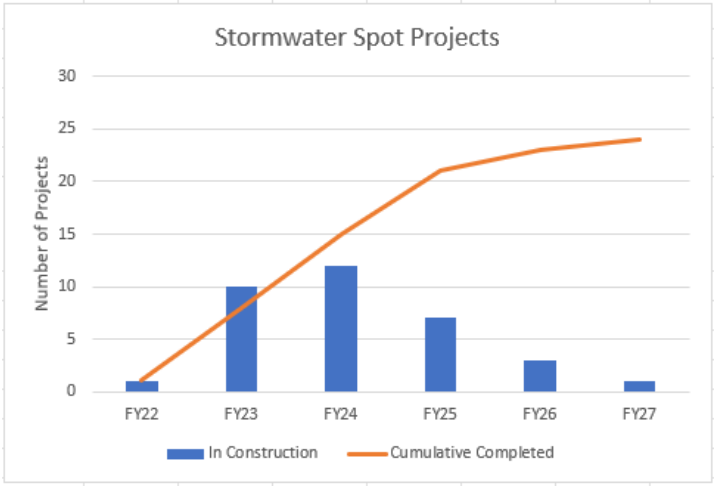
**City of Alexandria Storm Sewer Capacity Analysis (CASSCA)*, 2016. This analysis did not consider the stormwater infrastructure in the combined sewer area of Old Town. The *Tanyard Ditch Modeling Final Report*, 2022, considered flooding in the combined sewer area.

II. Overview of the Flood Action Program and Progress To-date

Alexandria's program to reduce stormwater flooding has three components:

1. Spot Projects that require less than a year of some level of design and construction, such as expanding a street-level inlet to increase the capture of stormwater runoff.
2. Large Capacity-building Projects that require years of design and construction are the second component of Alexandria's Flood Action Alexandria stormwater program. In addition, "wet weather mitigation" projects in the combined sewer area of Old Town as well as the creation of green infrastructure are included in this category.
3. On-going Maintenance of existing culverts, streams, and other waterways, to remove blockages that might impede the flow of stormwater away from residences and businesses. Also, inspection and maintenance, including cleaning and repairs, of the storm sewer pipes and appurtenant structures.

As of March 2023, six "spot" projects in the flood-prone watersheds of Hooff's Run and Four Mile Run were completed during this annual report period. City staff are currently working on the plans and designs for a long list of spot projects. Ten projects are expected to be in active construction in FY 2023 and 12 in FY 2024. These require some level of design and can often be constructed using an on-call contractor, to expedite delivery.



The large capacity-building projects require considerably more time for planning, design, and construction. Typically, they can span about five years from initial planning to completion and cost tens of millions of dollars.

In FY 2023, Alexandria awarded the design contracts for two of the largest projects that were combined into one project to address the flooding around the intersection and properties of Commonwealth Avenue and E. Glebe Road, and Ashby Street and E. Glebe Road at the northern end of Commonwealth Avenue. In addition, planning is well underway for two large projects in the combined sewer area of Old Town: one at the intersection of Pitt and Gibbon Streets, and another in the Nethergate neighborhood. The City also awarded the design for the Hooff's Run Culvert Bypass large capacity-building project, the second largest flooding capacity project.

Stormwater Large Capacity Projects

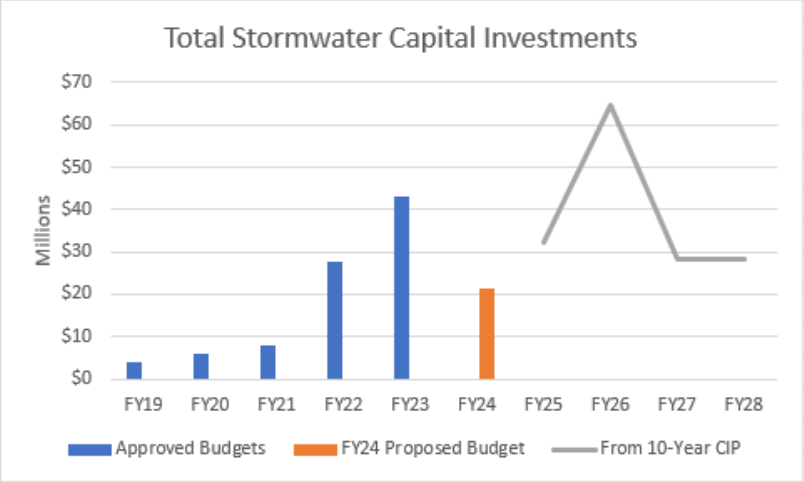
Project	Total Cost ($M)	FY22 Jul-Dec	FY22 Jan-Jun	FY23 Jul-Dec	FY23 Jan-Jun	FY24 Jul-Dec	FY24 Jan-Jun	FY25 Jul-Dec	FY25 Jan-Jun	FY26 Jul-Dec	FY26 Jan-Jun	FY27 Jul-Dec	FY27 Jan-Jun	FY28 Jul-Dec	FY28 Jan-Jun	FY29 Jul-Dec	FY29 Jan-Jun	FY30 Jul-Dec	FY30 Jan-Jun	FY31 Jul-Dec	FY31 Jan-Jun	FY32 Jul-Dec	FY32 Jan-Jun	FY33 Jul-Dec	FY33 Jan-Jun
Commwlth/Ashby/Glebe	$50																								
Hooffs Run Culvert	$60																								
Pitt&Gibbon (CS Area)	$12																								
Nethergate (CS Area)	$5																								
E Mason Storage	$1																								
Edison Store&Convey	$13																								
DeWitt Store&Convey	$15																								
E Monroe&Wayne	$3																								
MtVernon/Glendale/Luray	$10																								
Notabene&Old Dominion	$4																								
Russell&Rosemont Convey	$6																								
Russell&Rosemont Store	$8																								
Total	$187																								

LEGEND: Planning | Design | Construction

Concurrent with the "spot" and large construction projects, a heightened level of maintenance is planned. Most notably, the inspection and heavy cleaning of the Hooff's Run culvert was recently completed, removing hundreds of tons of water-blocking debris. Recent reports from the neighborhood around the open culvert at Linden Street seem to confirm that the capacity of the stream has increased. City staff has also identified minor maintenance repairs for the culvert.

III. The Proposed FY2024 Capital Budget: Overview

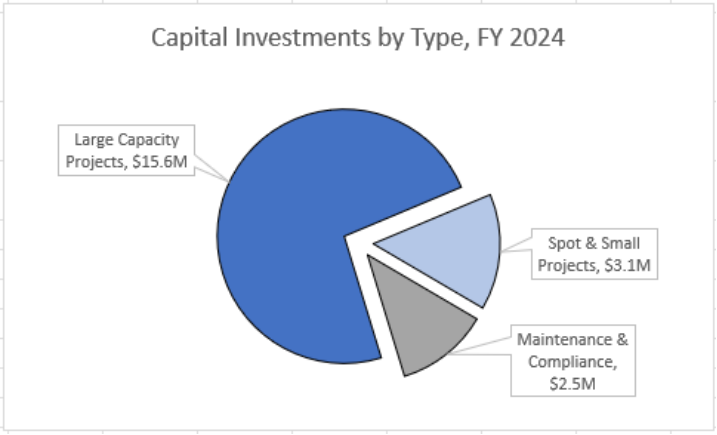
A city's stormwater infrastructure will last for decades, perhaps centuries. The large capacity projects that create additional stormwater infrastructure require years of design, planning, and construction. For this reason, Alexandria's investment in stormwater infrastructure must be viewed not in the context of a single year – but over a span of many years.



Alexandria began an aggressive program to combat stormwater flooding in FY 2022 under the Flood Action Alexandria program. The capital budget for stormwater management for that year was three times the previous year, and in FY 2023 the capital budget grew by another $15 million.

Although necessary, this enormous increase in funding has not been fully obligated due to the long lead-time required to plan and launch large construction projects. The most recent accounting data indicates that the Stormwater Capital Improvement Program had an unexpended balance of $47 million as of the end of FY 2022, mostly associated with the larger capital projects.

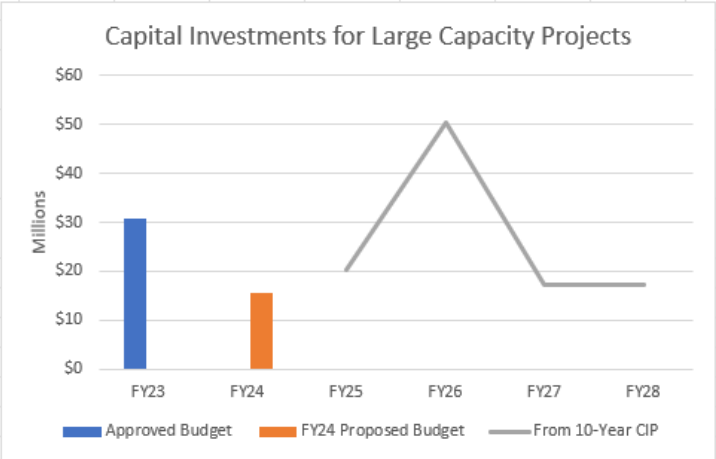
The proposed capital budget for FY 2024 aligns with a more realistic timeline for launching large construction projects. The FY 2024 capital budget is $21 million (*this includes $3 million in "wet weather mitigation" projects that appear in the FY2024 capital budget for sanitary sewers*). This combined investment is $20 million below the previous year – thus enabling the unexpended funds from previous years to be obligated as large projects get underway. Note that the 10-year Capital Improvement Program for stormwater forecasts that the largest expenditures will occur in FY 2026 when the large capacity building projects are under active construction.



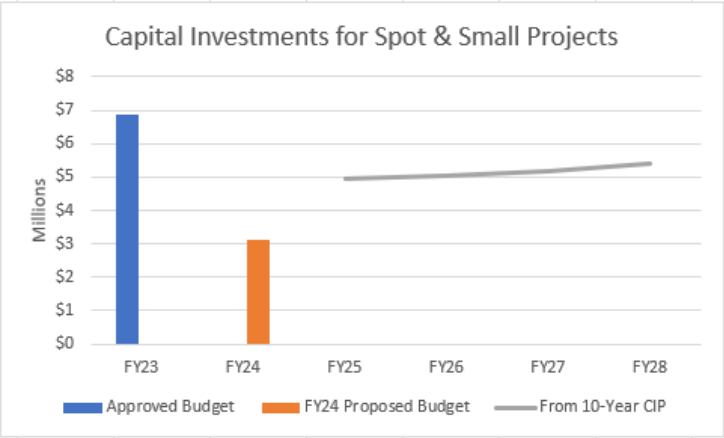
The figure at left illustrates that almost 75% of the FY 2024 capital budget is targeted to long-term capacity-building projects, and another 15% intended for near-term projects and activities, including the Flood Mitigation Grant

Program. The final 10% will be spent on important maintenance activities to keep the growing base of stormwater infrastructure performing optimally.

IV. The Proposed FY2024 Capital Budget: Specific Projects

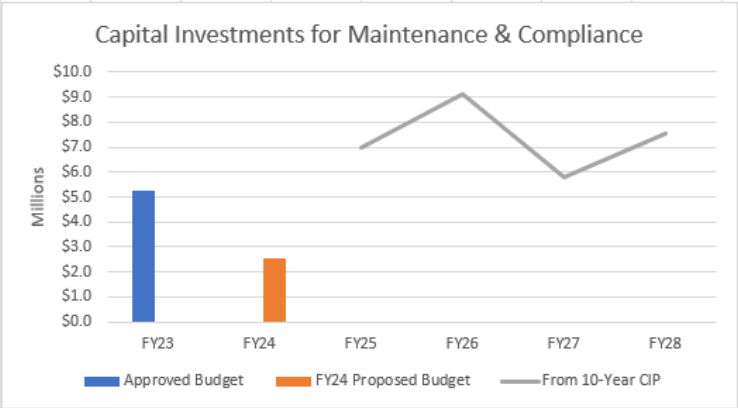


A significant portion of the FY 2024 capital budget for large capacity-building projects will address stormwater flooding along the northern end of Commonwealth Avenue at its intersections with Glebe Road and Ashby Street. The Capital Improvement Program for the subsequent two years forecasts that almost $50 million will be required for large capacity projects along Hooff's Run. Also included is a $1.6 million investment in Green Infrastructure in FY 2025. Although not part of the Stormwater CIP, "wet weather mitigation" projects that appear in the capital budget for sanitary sewers, account for another $3 million in FY 2024 and $8 million in subsequent years. These projects in the combined sewer area of Old Town address sanitary sewer backups that occur during periods of heavy rain. After FY 2026, the Stormwater CIP forecasts an annual expenditure of about $15 million for as-yet unspecified large capacity projects.



Slightly over $3 million of the FY 2024 capital budget is directed toward a variety of activities and projects. Spot projects, that can generally be designed and completed within a year, constitute $2.4 million of the total. The Flood Mitigation Grant Program ($800,000) partially reimburses residents and businesses for their corrective measures to address persistent stormwater flooding on their property.

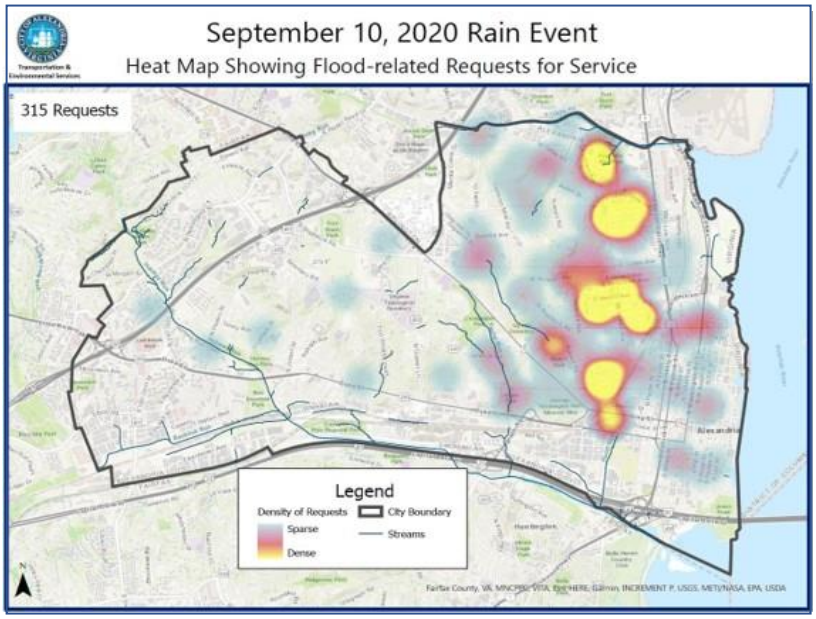
Alexandria's stormwater sewer network is comprised of 189 miles of pipe and thousands of access points. The various streams, or runs, that crisscross our neighborhoods are part of that system. This portion of the capital budget finances the activities to inspect and remove blockages that impede the outflow of stormwater during heavy rain events. Also included are Alexandria's efforts to reduce nutrients contained in stormwater outflow.



V. Are the proposed stormwater expenditures directed to the right places?

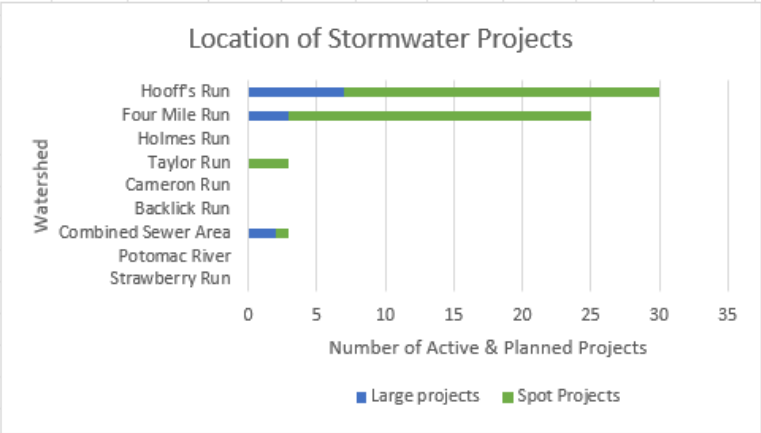
The CASSCA Study modeling exercise identified the locations of potentially inadequate stormwater infrastructure by analyzing the capacity of sewer pipes against the City's 10-year design storm based on the City's Intensity-Duration-Frequency (IDF) curves which are more conservative, or protective, than state requirements; meaning it predicts more intense storms more frequently. Resident reports from Alexandria 311 data during the high intensity storm on September 10, 2020, confirm the CASSCA findings. That is, the Four Mile Run (East) and Hooff's Run watersheds, as well as parts of Old Town, are the areas in most urgent need of upgrades in their stormwater infrastructure.

The diagram at right pertains to all Alexandria 311 service requests coinciding with the September 2020 rainstorm where, according to the National Weather Service between two and five inches of rain fell in two hours.



The yellow and red spots show the origin of the most requests for service to Alexandria 311. They encircle the areas at:

1. The intersections of Commonwealth Avenue with Glebe Road and Ashby Street (Four Mile Run – East watershed)
2. Along Hooff's Run from Braddock Road to King Street (Hooff's Run watershed),
3. The intersection of Braddock Road and West Street (Hooff's Run watershed),
4. North Old Town near Nether gate (Combined sewer area), and
5. The intersection of Pitt and Gibbon Streets (Combined sewer area).



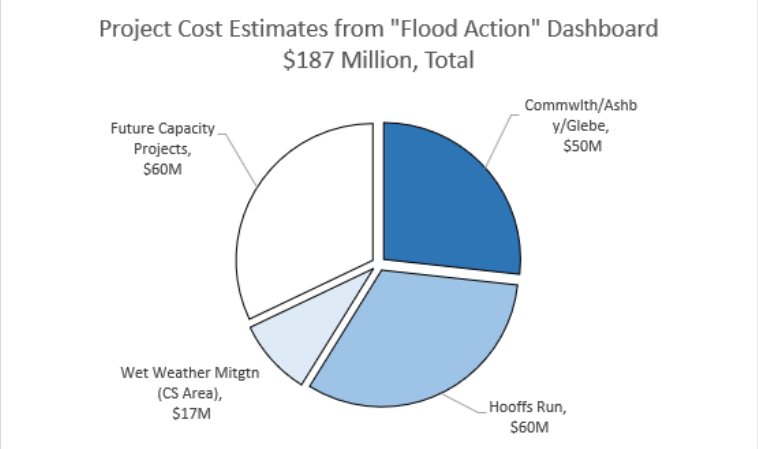
The 10-year Capital Improvement Plan for stormwater, the wet weather mitigation projects planned for the combined sewer area of Old Town, and the project dashboard from the "Flood Action Alexandria" website describe 12 large capacity projects and 49 smaller spot projects. The chart, at left, shows where they are located.

For the most part, the current inventory of projects appears to be properly focused on the most urgent areas of stormwater flooding. There is one exception. The intersection of Braddock Road and West Street is an area of chronic flooding during extreme rain events. Although this location is in the Hooff's Run watershed, none of the currently planned large capacity projects appear to address its flooding problem directly. However, the FY 2023 CIP included funding for the Braddock Road and West Street Study to look at those flooding issues.

VI. Do the planned expenditures adequately address stormwater flooding?

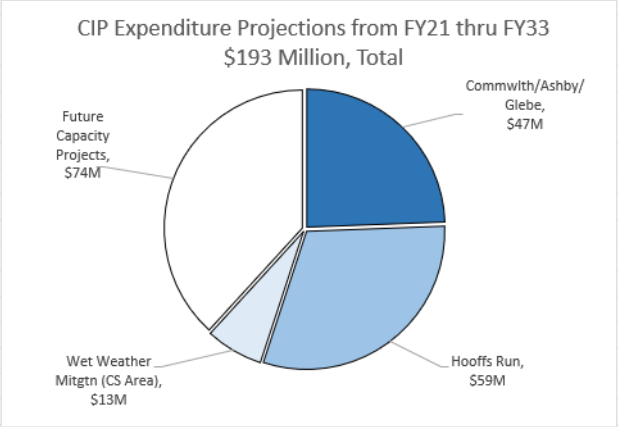
The twelve large capacity-building projects described on page two of this report comprise over 70% of the stormwater budget. These projects will be under construction for the next decade and will fundamentally enhance Alexandria's ability to manage stormwater. Each was developed to address the major areas of concerns identified in the 2016 CASSCA report.

As with all large construction projects, the true costs of these projects will not be accurately known until their design is complete and the construction contract is in place. To-date, only two of these projects have begun the formal design process – and their designs are projected to be complete in 2026. The next two large capacity projects will not begin design until later in 2023, with anticipated design completion in 2025 and 2027. For the remaining eight large projects, the design process does not begin until 2027 will not be completed until after 2030 in all cases.



The estimates in the diagram at left are from "Flood Action Alexandria Project Dashboard." They represent the best judgment of city engineers based on their understanding of capacity requirements and site conditions. But, like any cost estimate made in the absence of a detailed design, the possible range of project cost may be plus-or-minus 50%.

The 10-year Capital Improvement Program for large stormwater and related sanitary sewer wet weather projects was developed from the estimates described above. The total funds already allocated to these projects in FY 2021 through FY 2023 (about $47 M) plus the projected amounts from the proposed FY 2024-33 CIP (about $146 M) closely matches the total cost estimates from the project dashboard.



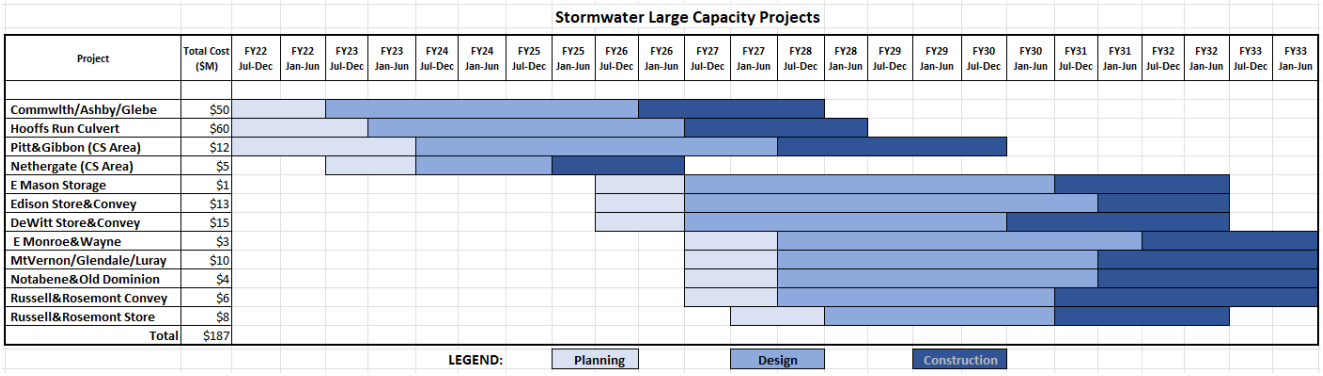
In sum, Alexandria has developed a ten-year Capital Improvement Program for stormwater management that reflects today's best estimates for the cost of the major projects to address stormwater flooding. Recognizing, of course, that cost estimates will change as the detailed designs of these projects are completed over the next few years.

It should be noted that the 10-year Capital Improvement Program is not an all-inclusive list of every project to solve the flooding problem throughout the city. Even when these projects are complete, there will be some areas of Alexandria that still experience stormwater flooding. For these areas, the Flood Mitigation Grant Program partially reimburses residents and businesses for corrective measures to address persistent stormwater flooding on their property. The program has completed its pilot year. At this time, it is unclear whether the proposed budget for the program is adequate. The data has not been reviewed regarding the full costs borne by residents and businesses for flood mitigation on their property. The committee has heard repeatedly from impacted residents who believe the reimbursement formula does not adequately consider the cost of flood mitigation improvements in multi-family buildings.

VII. Is the City making sufficient progress in addressing the problem?

Residents understand that Alexandria's stormwater flooding problem cannot be solved overnight. The problem grew silently over past decades as storms became more severe while aging infrastructure was neither adequately maintained nor sufficiently upgraded to handle this new norm. The remedy, likewise, will take years.

The enormous increase in stormwater funding in FY 2021 was a bold and necessary first step. In the two years since, Alexandria has moved quickly to execute an effective maintenance program that has improved the capacity of the existing culverts that were clogged with debris and continues to perform routine stream and channel maintenance such as the dredging of Four Mile Run. The city has begun to work through a list of



over 35 “spot” projects to address areas of localized flooding. Some of these small projects have languished for years prior to the increase in funding and staff resources. A vigorous public information program now keeps residents more aware and involved in Alexandria’s stormwater program by providing real-time access to the status of stormwater projects in their neighborhoods. All of this is good progress.

This progress, however, is not enough. To realize the greatest gains in the fight against the growing problem of stormwater flooding will require the completion of the large capacity-building projects that comprise almost 75% of the capital budget for stormwater. According to the current project schedule (below), construction of the first large project will not begin until early 2025 – two years from now. The most flooding complaints from residents come from the areas around the intersection of Commonwealth Avenue, Glebe Road, and Ashby Street, near Summer’s Drive and Glendale, and Hooff’s Run Park; and the intersection of Pitt and Gibbon Streets. The construction of the large projects in these areas will not start until 2026 and 2027. The remaining eight large projects will not begin construction until after 2030. However, the City has leveraged state Community Flood Preparedness Fund grant funding to accelerate portions of the large capacity project at Edison Street to start work now instead ahead of the project FY 2026 CIP funding for this project.

The average length of time between the beginning of design and the beginning of construction for the largest projects (those over $10 million) is greater than three years given the complexity of these projects. Although some of this time is required for the award of the construction contract, it seems disproportionately long for projects involving well-established technologies and methods of construction. These delays in starting construction are not due to lack of funding – the program currently has a large unexpended balance of funds. Moreover, the capital funding planned for FY 2025 and FY 2026 are even higher than the FY 2024 level.

To maintain public support for Alexandria’s stormwater program, residents need to see the constructive activity that their stormwater fee is financing. Ultimately, they expect to see a reduction in the flooding that damages their neighborhoods. Waiting for years to see construction – and perhaps decades to see a solution – will weaken public support for the stormwater program.

APPENDIX – Summary of FY 2024 Capital Improvement Program for Stormwater to FY 2028

	Approved	---------- Proposed in FY 2024 CIP ----------				
	FY23	FY24	FY25	FY26	FY27	FY28
Large Capacity	72%	73%	63%	78%	61%	54%
Large Capacity (Commnwlth&Glebe)	$26.41	$12.63	$0.00	$0.00	$0.00	$0.00
Large Capacity (Hoofs Run Culvert)	$0.00	$0.00	$16.18	$32.35	$0.00	$0.00
Combined Sewer Wet Weather Mitigation*	$1.50	$2.50	$1.00	$1.00	$1.00	$1.00
Sanitary Sewer Wet Weather Mitigation*	$3.00	$0.50	$1.50	$1.00	$1.00	$0.50
Storm Sewer Capacity Projects	$0.00	$0.00	$0.00	$15.95	$15.20	$13.68
Green Infrastructure	$0.00	$0.00	$1.55	$0.00	$0.00	$0.00
Sub-Total	**$30.91**	**$15.63**	**$20.23**	**$50.30**	**$17.20**	**$15.18**
Spot&Small Projects	16%	15%	15%	8%	18%	19%
Storm Sewer Spot Improvements	$5.91	$2.35	$4.12	$4.22	$4.34	$4.54
Flood Mitigation Grant Program	$0.77	$0.79	$0.81	$0.83	$0.85	$0.87
Braddock&West Flood Management	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00
Sub-Total	**$6.87**	**$3.14**	**$4.93**	**$5.05**	**$5.19**	**$5.41**
Maintainence & Compliance	12%	12%	22%	14%	21%	27%
Hooffs Run Culvert Inspect & Clean	$0.00	$0.00	$0.00	$1.62	$0.00	$0.00
Stormwater BMP Maintnce CFMP	$0.29	$0.30	$1.56	$1.62	$0.32	$0.33
Small-Midsize Stormwater Mntnce	$0.58	$0.61	$0.65	$0.69	$0.72	$0.77
Stream & Channel Maintenance	$0.88	$0.30	$0.93	$0.96	$0.99	$1.02
Four Mile Run Channel Maintenance	$0.94	$0.00	$0.30	$0.30	$0.00	$1.25
Inspection & Cleaning CFMP	$1.27	$0.50	$1.58	$1.70	$1.84	$2.01
MS4 - TMDL Compliance Improvements	$1.30	$0.80	$1.80	$2.05	$1.75	$2.00
NPDES/MS4 Permit	$0.00	$0.00	$0.17	$0.17	$0.18	$0.18
Sub-Total	**$5.25**	**$2.52**	**$6.99**	**$9.11**	**$5.79**	**$7.55**
all $ in Millions						
Grand Total	**$43.03**	**$21.30**	**$32.15**	**$64.46**	**$28.18**	**$28.13**

*from FY 2024 CIP for Sanitary Sewers