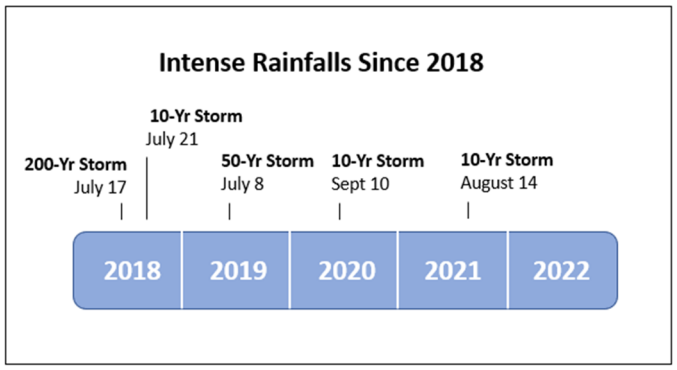
Annual Report of the Ad Hoc Stormwater and Flood Mitigation Advisory Group

April 7, 2023 – Reflects Committee Input to-date

Issues to include in Summary Statement appear in red

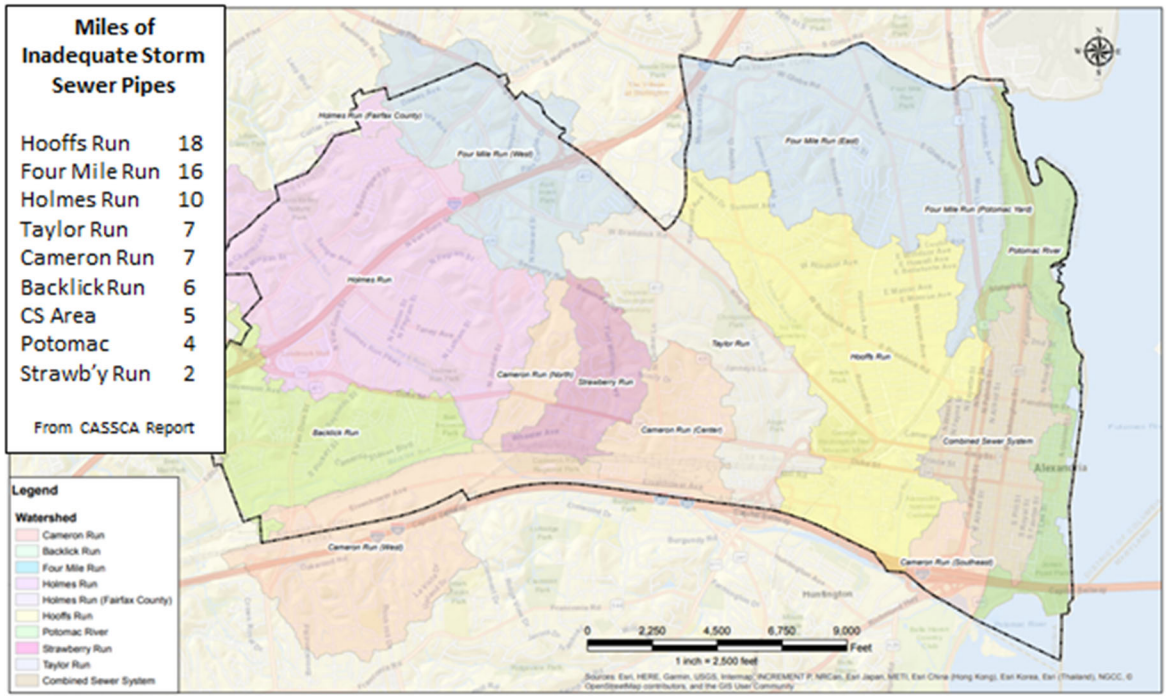
I. Flooding Causes and Problems

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



In the four years from 2018 to 2021, Alexandria saw five 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 overrun our storm sewers' capacity to move it. And our neighborhoods flood.

Alexandria's stormwater infrastructure is a network of over 150 miles of sewer pipe underneath the streets of the city. An extensive engineering study* revealed that at least 75 miles of those pipes are



inadequately sized to handle the runoff produced by a 10-year storm. Although sewer pipe diameter is a very rough indicator of where the system needs to be upgraded, the experience of the past four years confirms that the watersheds with the most inadequate pipes are where stormwater flooding is most severe.

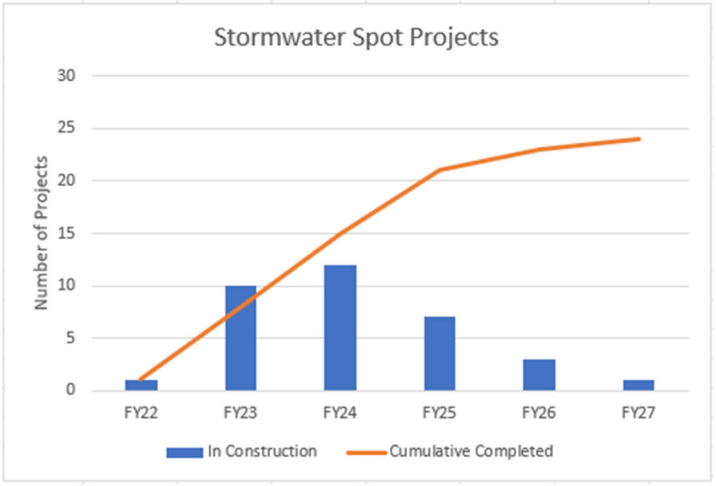
**City of Alexandria Storm Sewer Capacity Analysis (CASSCA)*, 2016. This analysis did not consider the stormwater infrastructure in the combined sewer area of Old Town.

II. Overview of the Stormwater Mitigation Program and Progress To-date

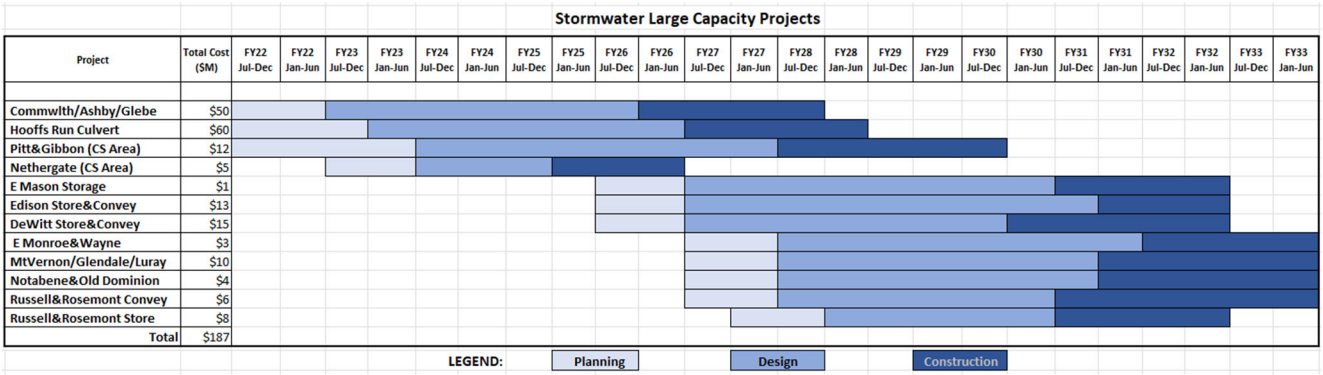
Alexandria's program to reduce stormwater flooding has three components:

1. Spot Projects that require less than a year of 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 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.

As of March 2023, six "spot" projects in the flood-prone watersheds of Hooff's Run and Four Mile Run were completed. 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.



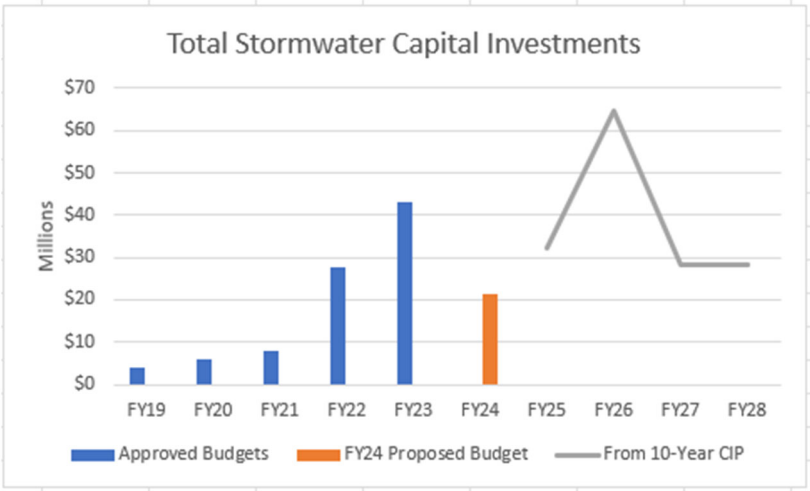
The large capacity projects require considerably more time for planning and design. Typically, they can span five years from initial planning to completion and cost tens of millions of dollars. In FY 2023, Alexandria awarded the design contracts for two of the largest projects to address the flooding around the intersection of Commonwealth Avenue and Glebe Road, and at the southern 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.



Concurrent with the "spot" and large construction projects, a heightened level of maintenance is planned. Most notably, the cleaning of the Hooff's Run culvert was recently completed, removing several 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.

III. The Proposed FY2024 Capital Budget: Overview

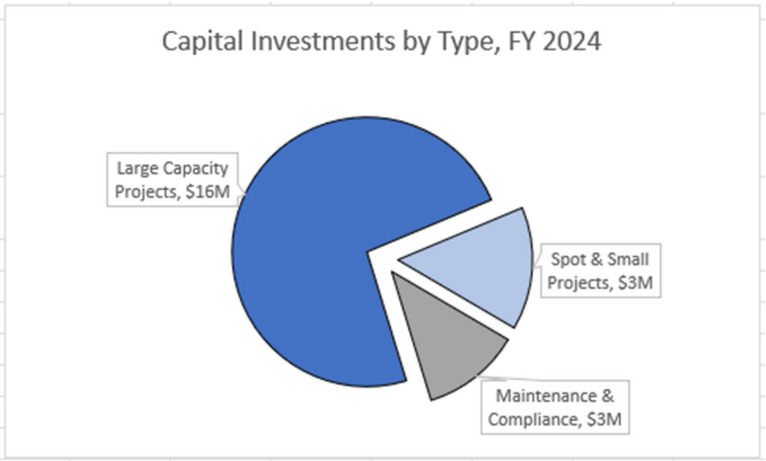
A city's stormwater infrastructure will last for decades, perhaps centuries. The large capacity projects that create additional stormwater infrastructure require years of design, planning, and construction. For this reason, Alexandria's investment in stormwater infrastructure must be viewed not in the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



Alexandria began an aggressive program to combat stormwater flooding in FY 2022. 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.

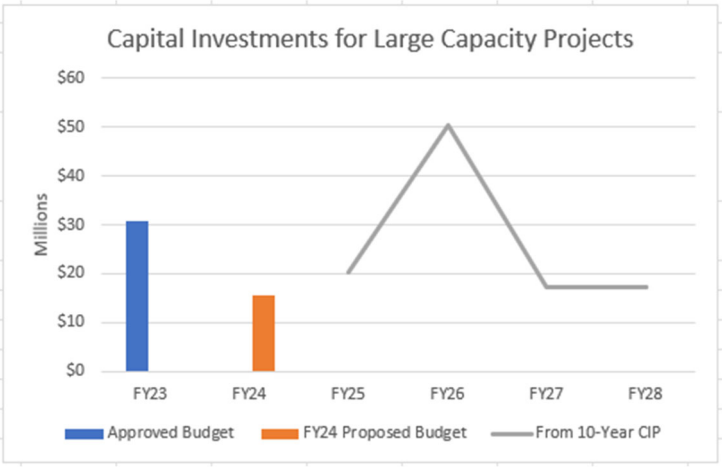
Although necessary, this enormous increase in funding has not been fully obligated due to the long lead-time required to plan and launch large construction projects. The most recent accounting data indicates that the Stormwater Capital Improvement Program had an unexpended balance of $47 million as of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

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.

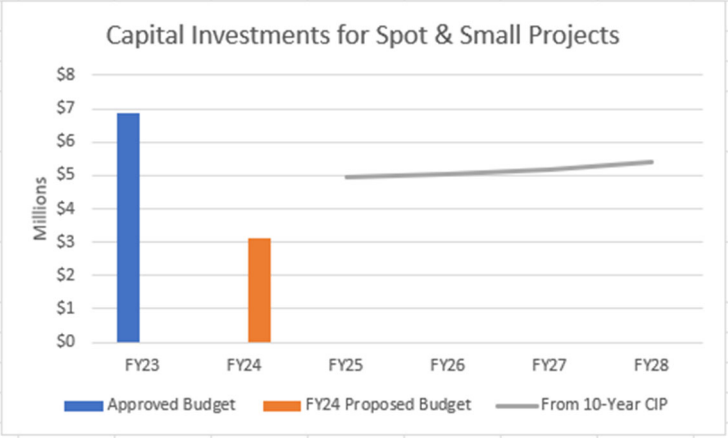


The figure at left illustrates that almost 75% of the FY 2024 capital budget is targeted to long-term capacity-building projects, and another 15% intended for near-term projects and activities, including the Flood Proofing Grant Program. The final 10% will be spent on important maintenance activities to keep the growing base of stormwater infrastructure performing optimally.

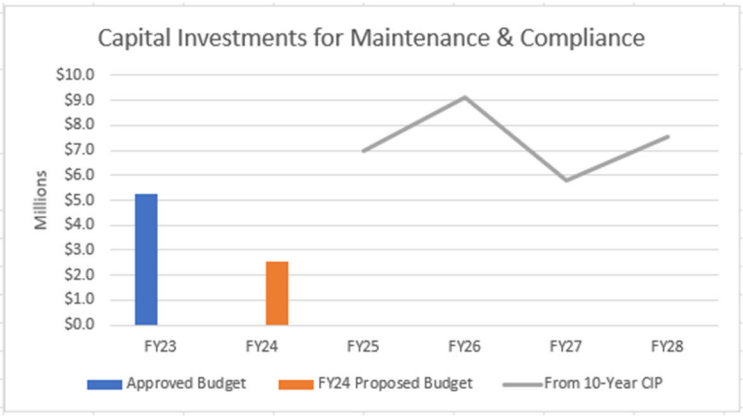
IV. The Proposed FY2024 Capital Budget: Specific Projects



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.



About $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 $2.5 million of the total. The Flood Proofing Grant Program ($800,000) reimburses residents and businesses for corrective measures that they undertake to address persistent stormwater flooding on their property. Because the Flood Proofing program is in its first full year of operation, it is unclear whether the proposed budget for this program is adequate.

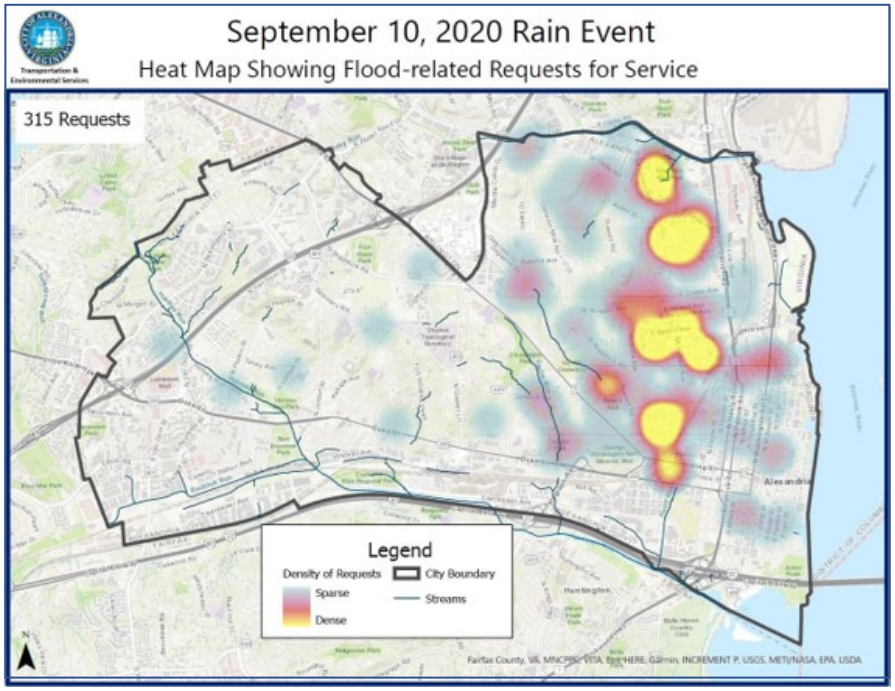


Alexandria's stormwater sewer network is comprised of 189 miles of pipe and thousands of access points. The various streams, or runs, that crisscross our neighborhoods are part of that system. This portion of the capital budget finances the activities to inspect and remove blockages that impede the outflow 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?

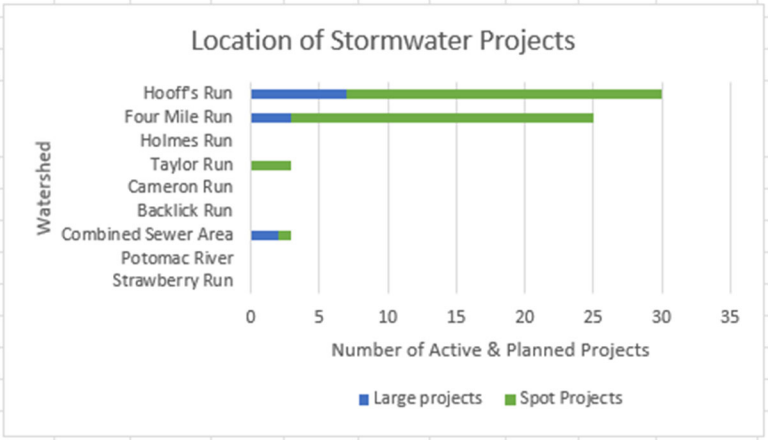
The CASSCA Study identified the locations of inadequate stormwater infrastructure by analyzing the capacity of sewer pipes against the requirements of a ten-year storm. Resident reports from Alexandria 311 data during the ten-year storm of September 2020 confirm the CASSCA findings. That is, the Four 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 the September 2020 rainstorm where over four inches of rain fell in an extremely brief period. One of the city's rain gauges measured 3 inches of rain in just 10 minutes.



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 Nethergate (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.

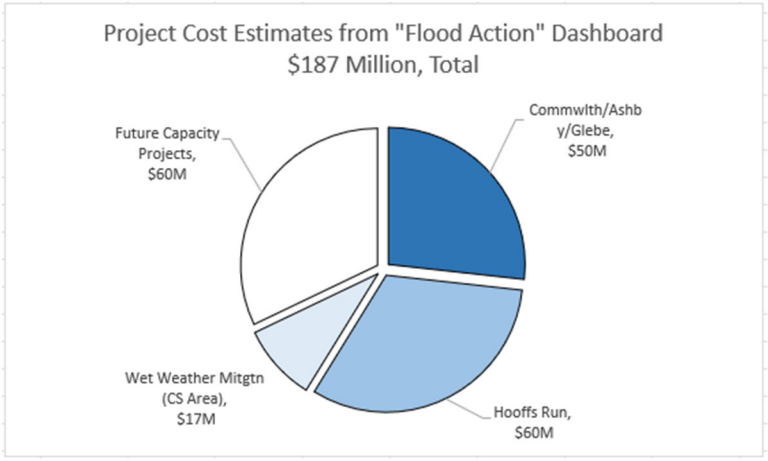
For the most part, the current inventory of projects appears to be properly focused on the most urgent areas of stormwater flooding. There is one exception. The intersection of Braddock Road and West Street is an area of chronic flooding during extreme rain events. Although this

location is in the Hooff's Run watershed, none of the currently planned large capacity projects appear to address its flooding problem directly.

VI. Are the planned expenditures adequate to solve the stormwater flooding problem?

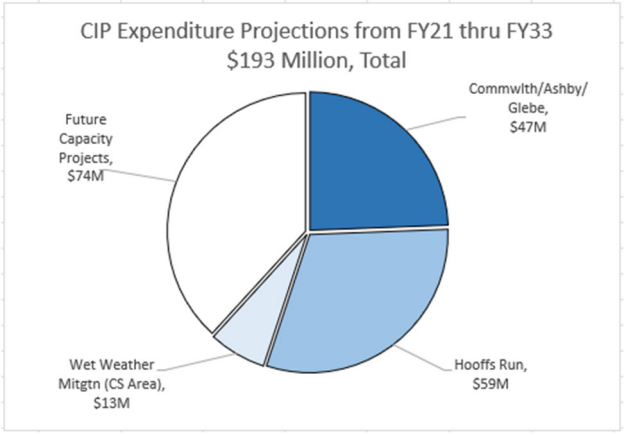
The twelve large capacity-building projects described on page two of this report comprise over 70% of the stormwater budget. These projects will be under construction for the next decade and will fundamentally enhance Alexandria's ability to manage stormwater. Each was developed to address the major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

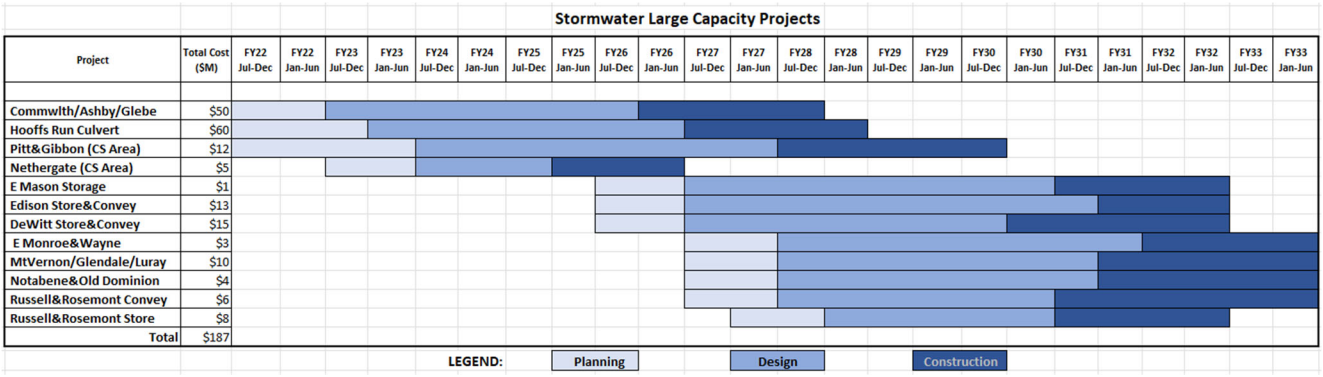
It should be noted that the 10-year Capital Improvement Program is not an all-inclusive list of every project to solve the flooding problem throughout the city. The flooding challenge will be an on-going concern that requires long-term planning beyond the scope of the 10-year CIP.

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 infrastructure was neither adequately maintained nor sufficiently upgraded. 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 and streams that were clogged with debris. 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. 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 storm water 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 won't begin until early 2025 – two years from now. The most flooding complaints from residents come from the areas around the intersection of Commonwealth Avenue and Glebe Road, Hooff's Run Park, and the intersection of Pitt and Gibbon Streets. The construction of the large projects in these three areas won't start until 2026 and 2027. The remaining eight large projects won't begin construction until after 2030.



The average time between the beginning of design and the beginning of construction for the largest projects (those over $10 million) is greater than three years. 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.

VIII. Summary Statement of the Committee

Hello committee members,

This is the section we will write together at our April meeting. It will represent our consensus opinion.

We may consider putting this section at the FRONT of the report. Or in a cover memo with all of our signatures.

Ideally, the opinion – or directive language – in Section VIII should be based on the fact-based analysis that is presented in Sections I through VII.

To get you thinking, here are some sample points we may want to make:

1. Commend the council for increasing stormwater investment by a factor of 4 back in FY 2021 … and planning an ambitious ten-year construction program.

2. Acknowledge that the maintenance, "spot" project, and outreach, programs seem to off to a good start.

3. Acknowledge that the initial investments seem to be in the right places and the overall program appears to address the biggest problem areas from CASSCA – with one exception: the intersection of Braddock and West in the "bowl" by the Braddock Metro.

4. Urge council to commit to the higher funding levels for FY25 and FY26 that appear in the CIP.

5. Emphasize the need for the flood-proofing grant program because it will be a long time before many residents see actual projects completed…or their neighborhood is not the site of the planned projects.

6. Urge the city to explore ways to reduce the over-long design phases for the large projects.

7. Other points that the committee will want to make…

John

APPENDIX – Summary of CIP Numbers (for use by committee members only, not in final report)

	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-proofing 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