

9 Recommended Plan

9.1 Introduction

This section describes the Task Force recommendations to mitigate flooding in the Bloomingdale and LeDroit Park area. The recommendations were developed based on an analysis of the causes of flooding, an evaluation of the alternatives, public input, and consultation with participating Task Force agencies. This section includes a description of the recommendations, proposed implementation schedule, identification of responsibility for implementation and the predicted flood mitigation benefits.

9.2 Recommended Plan

The causes of the flooding problem in Bloomingdale are the result of decisions made in the late 1800's about the size and configuration of the sewer system, combined with the conversion of farmland to the densely developed urban landscape that exists today. The sewer system built in the late 1800's is simply too small to accommodate the stormwater runoff for the area that was developed after the sewer's construction. This has resulted in a problem that will be extremely difficult, costly and time consuming to correct. Given these challenges, the Task Force developed a range of recommendations that could be implemented over the short, medium, and long term to mitigate flooding. The recommendations are divided into the following major categories:

- Engineering Components
- Regulatory Components
- Code Revision Components
- Operation and Maintenance Components

Table 9-1 lists the components, while Figures 9-1 and 9-2 show the location of the principal elements. The recommendations are described in detail after the table.

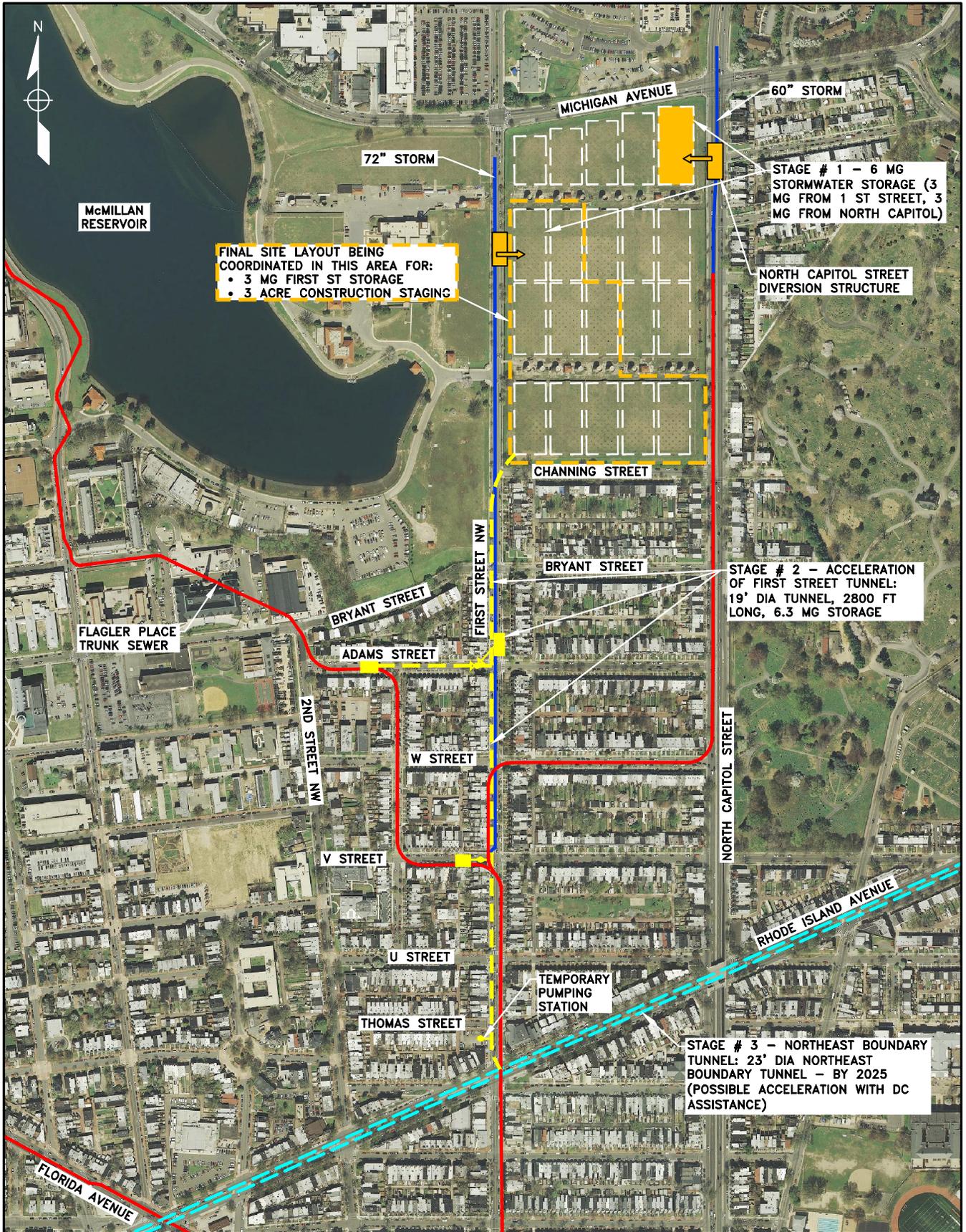
Table 9-1: Summary of Recommendations

No.	Recommendation Description	Est. Cost 2012 \$	Schedule	Responsibility	
				Admin	Fiscal
Engineering - Short Term					
1.	Backwater Valve (formerly Backflow Preventer) Program <ul style="list-style-type: none"> • For approx. 200 homes with reported backups in summer 2012 <ul style="list-style-type: none"> ○ Mandatory program ○ DC Gov to install backwater valves (“backflow preventers”) ○ Homeowner maintains & signs waiver for future flooding • Additional homes that experience backups in future <ul style="list-style-type: none"> ○ Roll into program above • Refine Bloomingdale/LeDroit Park Eligibility Area <ul style="list-style-type: none"> ○ Public outreach to encourage backwater valve installation ○ Rebate 90% up to \$5000, homeowner arranges for installation <ul style="list-style-type: none"> ○ Continue with current program approx. 1,000 homes and continue until tunnel is complete. 	\$1-\$6 M	Implement until Northeast Boundary Tunnel constructed (10+/- years)	DC Water/ DGS/ DCRA	DC Water / District (3)
2.	Rain Barrel Program <ul style="list-style-type: none"> • Current funding up to 250 barrels; program in place 	\$0.25 M	Underway	DDOE	DC Water
3.	Green Infrastructure Program - DC Water will fund GI construction at Rhode Island and First Street, to be constructed by DDOT, in accordance with MOU	\$ 1.1 M	1 yr	DDOT	DC Water
Engineering - Medium Term					
4.	Construct Temporary Stormwater Storage at McMillan – approx. 6 mg	\$ 12 M	Place in service by April 2014 ⁽¹⁾	DC Water	DC Water / District (2)
5.	Construct First St NW Tunnel <ul style="list-style-type: none"> • Construct approx. 6 million gallon, 2800’ long, 19’ inside diameter storage tunnel from Rhode Island and First St NW to southwest corner of McMillan site 	\$ 132 M	Place in service by April 2016 ⁽¹⁾	DC Water	DC Water / District (2)
6.	Rain Barrel Program <ul style="list-style-type: none"> • Increase number of barrels available to public from 250 to 1,250 (increase of 1000) through rebate of rain barrel only (no installation services provided) 	\$0.3 M	Next 3 years	DDOE	DDOE
7.	Green Infrastructure <ul style="list-style-type: none"> • GI in Bloomingdale & LeDroit Park drainage areas on public space 	\$10 M	5 yrs	DDOT	DDOT
8.	Engineering Consultations and Flood Proofing <ul style="list-style-type: none"> • Provide free engineering consultations • Provide rebate of 90% up to \$3,000 for improvements made in accordance with engineering consultation 	\$0.375 M	Next 3 years	DGS/ DCRA	DC Water / District (3)

No.	Recommendation Description	Est. Cost 2012 \$	Schedule	Responsibility	
				Admin	Fiscal
Engineering - Long Term					
9.	Advance construction of the Northeast Boundary Tunnel	\$ 500-600 M	By 2022 ⁽¹⁾	DC Water	DC Water
Regulatory					
10.	DCRA should be more proactive in investigating illegal basement apartments based on tips/complaints.	N/A	6 months	DCRA	N/A
11.	Future development in Bloomingdale/LeDroit Park sewershed (properties more than 1 acre) <ul style="list-style-type: none"> Allow sanitary discharges for future development On private and public property (new streets in new development) – require that stormwater peak discharge for post development be limited to predevelopment conditions for 25-year 24-hour storm. Return to standard DDOE stormwater regulations once Northeast Boundary Tunnel is in place. 	N/A	6 months	DCRA/ DMPED Office of Plan'g/ DDOE/ DDOT/ DC Water	N/A
12.	Insurance <ul style="list-style-type: none"> Require homeowners to provide proof that sewer backup rider has been purchased prior to reimbursing for backwater valve rebate Require real estate disclosure form when buying house acknowledging being offered or informed about sewer backup rider on insurance Require that insurance companies provide statement of additional optional coverage available, including for homeowner's and rental insurance 	N/A	6 months	DISB/ DCRA/ DGS	N/A
13.	Require licensing for home inspectors, which would include procedure for inspecting backwater valve/grinder pump/sewage ejector	N/A	6 months	DCRA	N/A
14.	Explore the need or benefit to reinstating the District of Columbia Soil and Water Conservation District.	N/A	6 months	DDOE	N/A
Code Changes					
15.	For new construction or where renovation costs exceed 50% of assessed value, require grinder pump or sewage ejector system with battery backup if lowest floor elevation is lower than manhole rim.	N/A	6 months	DCRA/ DC Water	N/A
16.	Require real estate disclosures when selling property if: <ul style="list-style-type: none"> Backwater valve or grinder pump system is present/not present and stated risks Amend existing disclosure form to include known sewer backup or surface flooding occurrences 	N/A	6 months	DCRA/ DGS	N/A
17.	Allow backwater valve to be installed on one lateral that serves properties with multiple floors (two laterals not required). Rain leaders must be disconnected.	N/A	6 months	DCRA/ DC Water	N/A
18.	Threshold must be min 12" above curb elevation for basement entrances on new construction/renovations.	N/A	6 months	DCRA	N/A
19.	Connect stairway drains to sump pump, grinder pump, or sewage ejector system for new construction / renovations.	N/A	6 months	DCRA/ DC Water	N/A

Operation & Maintenance Components					
20.	Increase catch basin cleaning frequency in Bloomingdale/LeDroit Park to quarterly.	\$20k/yr	Start Jan 2013	DC Water	DC Water
21.	Distribute sandbags to residents for advance preparation, not only in response to storm forecast.	\$55k	Start Jan 13	DPW	DPW
Public Outreach Components					
22.	Establish regular program of door-to-door flier distribution with emergency response information.	N/A	Start Jan 2013	DPW	N/A
23.	Install and operate variable message boards on RI Ave to issue flood warning and emergency response information.	\$100k	1 year	DDOT	DDOT
24.	DOH and DMH organize roundtable with residents to discuss anxiety/stress/fear.	N/A	Start Jan 13	DOH/D MH	N/A
25.	Educate homeowners about Backwater Valve installation and separate lateral requirements, including the possibility of waiver by code officials to allow single lateral connection. (Related to Recommendation 16)	N/A	Start Jan 13	DC Water	N/A

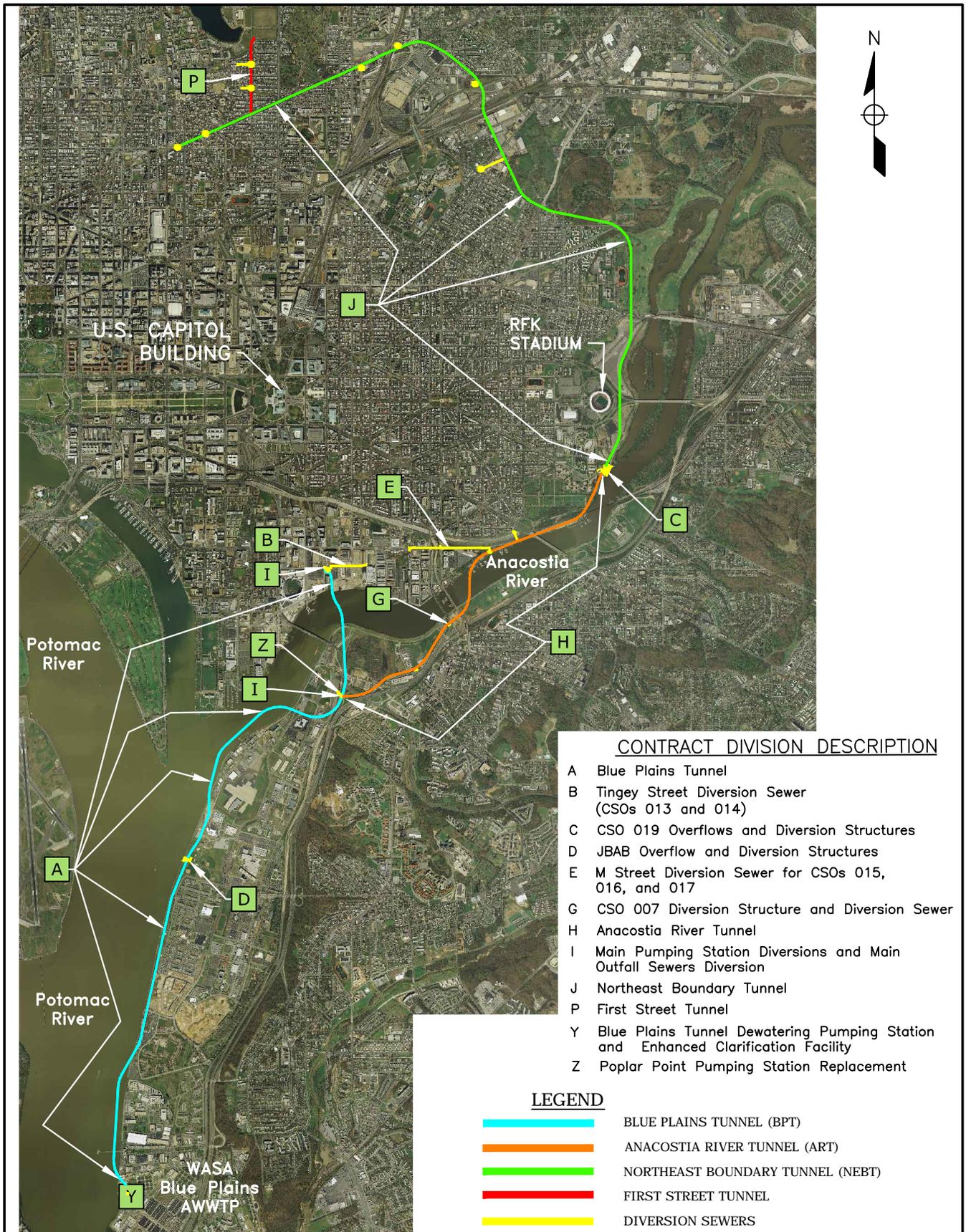
- Notes:
1. Schedules contingent upon District support as follows:
 - a. City Administrator appoints champion, heading a task force that is empowered to direct agencies
 - b. District dedicates agency staff authorized to make decisions located with DC Water project team
 - c. DC Water obtains power of Eminent Domain and District exercises power of Eminent Domain as necessary
 - d. District grants all necessary easements to DC Water
 - e. District grants necessary District property to DC Water for permanent facilities and for construction
 - f. District provides expedited permits with dedicated staff
 - g. District allows necessary street closures, work hours, etc. for construction operations.
 - h. Permit fees are waived
 2. Approximately \$40 million in additional funding required for the McMillan Stormwater Storage and an enhanced tunnel at First Street will be funded through one of the following:
 - a. Debt issuance by DC Water, with debt service payments made through transfers from the District’s annual operating budget in the amount needed to pay the additional infrastructure financing
 - b. Debt issuance by DC Water with increased rates from District ratepayers for the term of the project financing
 3. Costs identified as the fiscal responsibility of the District of Columbia government have been recognized and will be included within the Mayor’s Fiscal Year 2014 operating or capital budget submission. However, where funding is not currently identified, actual implementation of recommendations will be dependent upon funding and budget approvals.



MAYOR'S TASK FORCE REPORT
 ON THE PREVENTION OF FLOODING
 IN BLOOMINGDALE AND LeDROIT PARK
**McMILLAN STORAGE & FIRST STREET
 TUNNEL OPTION (RECOMMENDED)**

DATE: DECEMBER 2012

FIGURE 9-1



CONTRACT DIVISION DESCRIPTION

- A Blue Plains Tunnel
- B Tingey Street Diversion Sewer (CSOs 013 and 014)
- C CSO 019 Overflows and Diversion Structures
- D JBAB Overflow and Diversion Structures
- E M Street Diversion Sewer for CSOs 015, 016, and 017
- G CSO 007 Diversion Structure and Diversion Sewer
- H Anacostia River Tunnel
- I Main Pumping Station Diversions and Main Outfall Sewers Diversion
- J Northeast Boundary Tunnel
- P First Street Tunnel
- Y Blue Plains Tunnel Dewatering Pumping Station and Enhanced Clarification Facility
- Z Poplar Point Pumping Station Replacement

LEGEND

- BLUE PLAINS TUNNEL (BPT)
- ANACOSTIA RIVER TUNNEL (ART)
- NORTHEAST BOUNDARY TUNNEL (NEBT)
- FIRST STREET TUNNEL
- DIVERSION SEWERS



MAYOR'S TASK FORCE REPORT
 ON THE PREVENTION OF FLOODING
 IN BLOOMINGDALE AND LeDROIT PARK
 DC CLEAN RIVERS PROJECT
 LOCATION OF CONTRACT DIVISIONS

9.2.1 Engineering Components

Engineering components are those that involve making physical changes to the sewer system, homes, or businesses, and therefore require some type of construction. The engineering components have been divided into short, medium and long term implementation schedules and are described below:

9.2.2 Short Term

The following recommendations are specific to short term engineering alternatives presented in this report.

9.2.2.1 Backwater Valve (formerly Backflow Preventer) Program

Backwater valves (aka backflow preventers) consist of a check valve installed in the sewer lateral that prevents sewage in surcharged sewers from backing up and flooding fixtures and basements. There is an existing backwater valve program, and the Task Force recommends revising the program to include the following elements:

Mandatory backwater valve installation – For homes that reported backups in summer 2012, as well as nearby homes that likely experienced backups and could report retroactively (approximately 200 total homes), the Task Force recommends making backwater valve installation mandatory. For these properties, the District Department of General Services should retain a contractor to install backwater valves at no cost to the homeowner. Backwater valves would be certified and approved for residential use by DCRA. Restoration of finished basements should be offered to a standard level (such as concrete and drywall), with the homeowner responsible for other finishings (such as carpet, tile or wood floors). The homeowner would be required to maintain the backwater valve and sign a waiver regarding liability for future flooding.

This implementation strategy will require a legal analysis of District authority to create a mandatory program. Likely justification includes public health and compliance with DC Plumbing Code, 12F DCMR § 715. Consideration would need to be given to cases where the owner refuses backwater valve installation. For additional homes that experience backups due to rain events in Bloomingdale and LeDroit Park in the future, we recommend rolling these properties into the mandatory program described above.

Expanded program area – We recommend defining a backwater valve program eligibility area comprising the Bloomingdale/LeDroit Park neighborhoods, as well as neighborhoods within the larger area north and west of Bloomingdale and LeDroit Park that are predicted to be at risk of sewer backups during up to a 15-year storm. Additionally, properties that simply have a plumbing fixture or drain that is below the elevation of the next upstream manhole cover in the public sewer are also recommended for inclusion into the program. With eligibility, homeowners installing backwater valves would be eligible to receive a rebate of 90%, up to a maximum of \$5,000. Homeowners can volunteer to participate and have installation overseen by the master District contract. Inclusion of multi-unit and apartments or condos would be considered on a case-by-case basis.

9.2.2.2 Rain Barrel Program

Rain barrels store runoff from roof downspouts and allow property owners to use the water later for beneficial purposes. DDOE has funding for installation of up to 250 rain barrels for property owners enrolled in the program. Approximately 120 rain barrels have been distributed or are ordered to date. This component will reduce runoff and thereby mitigate flooding.

9.2.2.3 Green Infrastructure Program

DC Water provided DDOT \$1 million in funding to install selected green infrastructure measures near the intersection of Rhode Island and First St NW. These measures are designed to store and infiltrate runoff to reduce flooding. Examples include rain gardens and porous pavers. Implementation of these measures is in progress.

9.2.3 Medium Term

The following recommendations are specific to medium term engineering alternatives presented in this report.

9.2.3.1 Construct Temporary Stormwater Storage at McMillan Sand Filter Site

This component involves using the existing abandoned tanks at the McMillan site to store stormwater upstream of the Bloomingdale area during storm events to mitigate flooding. One tank with an approximate capacity of 3 million gallons would be used to store flow from the North Capitol Street storm sewer. A diversion structure and pipeline would be constructed from the existing sewer in North Capitol Street to divert stormwater to the storage tank during large rain events. Stormwater would be stored temporarily in the tank during the peak of the storm, and would be allowed to drain back into the sewer system after the rain event. Similarly, one tank with an approximate capacity of 3 million gallons would be used to store flow from the First Street Storm Sewer. The total storage volume provided would be approximately 6 million gallons. Some structural and repair work would be required on the tanks to make them suitable for temporary storage.

The abandoned tanks at the McMillan site are made of unreinforced concrete. While inspections of the tanks indicate they can be used temporarily for storage, they are not suited for permanent storage. In addition, once the Northeast Boundary Tunnel is constructed, the tanks would no longer be needed because the flood mitigation functions provided by the tanks would be provided by the new tunnel. As a result, the recommendation is to keep the tanks in service until the Northeast Boundary Tunnel is placed in operation.

9.2.3.2 Construct First Street NW Storage/Conveyance Tunnel

The DC Clean Rivers Project includes construction of the Northeast Boundary Tunnel and the First Street NW branch tunnel for flood mitigation and CSO control. This component involves constructing the First Street Tunnel in advance of the Northeast Boundary Tunnel. The tunnel would be made larger and longer such that it can be used as a storage tunnel before the Northeast Boundary Tunnel is in service. By constructing the tunnel to be roughly 19' in inside diameter and 2,800 feet long, approximately six million gallons of combined sewage can be stored in the portion of the tunnel located between Rhode Island Avenue and the southern portion of the McMillan site. Diversions would be constructed from the

existing sewers so that flows would be diverted to the tunnel for storage when the capacity of the existing sewers is exceeded. Drop shafts would convey this flow down to the tunnel. The tunnel would hold the captured combined sewage until flows subside, then empty the tunnel contents by pumping them to the existing sewers. A small pumping station would need to be constructed at the low end of the tunnel near First Street and Rhode Island Avenue. In order to construct the tunnel, approximately 3 acres will be needed for construction at the southern portion of the McMillan site. Approximately 1/3 acre of land would be required at the southern portion of the McMillan site to accommodate a permanent facility.

The First Street Tunnel will be connected to the Northeast Boundary Tunnel once the latter is constructed, at which time the First Street Tunnel will be converted to a conveyance sewer in place of a storage facility. This will allow elimination of the pumping station at the end of the tunnel.

9.2.3.3 Expand Rain Barrel Program

Rain barrels store runoff from roof downspouts and allow property owners to use the water later for beneficial purposes. This component involves expanding DDOE's existing rain barrel program from 250 units to 1,250 units, increasing the number of rain barrels by 1,000. Rebates up to 80% of the cistern cost would be provided to property owners enrolled in the program. This component will reduce runoff and thereby mitigate flooding.

9.2.3.4 Construct Green Infrastructure in Bloomingdale Drainage Area

Green infrastructure (GI) consists of measures designed to store and infiltrate runoff by mimicking natural systems. Examples include rain gardens, porous pavers, and tree planting. This recommendation is to expand and reallocate DDOT's green streets program to focus on the Bloomingdale and LeDroit Park drainage area. The Task Force recommends allocating \$10 million to GI in the Bloomingdale and LeDroit Park sewershed to reduce runoff and mitigate flooding.

9.2.3.5 Engineering Consultations and Floodproofing

Engineering consultations have been provided to residents who request them in Bloomingdale and LeDroit Park. The consultants detail possible causes of flooding and provide recommendations to prevent overland flooding based on an inspection of the outside of the home. Consultations have been offered at no charge to residents and take approximately 90 minutes. The homeowner receives suggestions in a booklet at the time of their consultation, and a detailed engineering report by mail.

The Task Force recommendation is to continue the consultation program until the medium term engineering alternatives are in service. Furthermore, the Task Force recommends expanding the program to provide rebates of 90% of eligible costs for performing floodproofing work up to \$3,000 per property. The floodproofing work would be conducted by the homeowners or their contractors. The program would establish a list of eligible costs which would include items such as downspout disconnects and installation of removable flood barriers at doorways.

9.2.4 Long Term

The following recommendations are specific to long term engineering alternatives presented in this report.

9.2.4.1 Advance Construction of Northeast Boundary Tunnel

The DC Clean Rivers Project (DCCR or Long Term Control Plan) was developed between 1999 and 2002. In 2005, a Consent Decree was submitted to the District Court and was signed by the U.S. Government, the District, and DC Water. The DCCR projects included the Northeast Boundary Tunnel, which was a storage/conveyance tunnel from approximately RFK stadium to the vicinity of 6th and Florida Avenue NW to provide control of combined sewer overflows and flood mitigation for the Northeast Boundary areas. The Consent Decree requires that the Northeast Boundary Tunnel be placed in operation by March 23, 2025. In order to provide flood relief earlier, DC Water proposes to advance construction of the Northeast Boundary Tunnel such that it can be placed in operation by 2022 instead of 2025.

The Northeast Boundary Tunnel is planned to be 23 feet in finished diameter and approximately 5 miles long. It is a major project to be constructed in a dense urban area. Identifying the right of way for the tunnel and surface facilities, obtaining the necessary property and easements, and obtaining construction staging areas and permits for construction are critical to accelerating the tunnel's schedule. The proposal to accelerate the tunnel is contingent on implementing the items identified in Section 9.2.6.

9.2.5 Regulatory Components

Regulatory recommendations address legislative or policy changes that can mitigate future flooding, or reduce the risk or magnitude of damage if enacted and implemented. Recommendations are summarized below.

Augment DCRA's Inspection Authority and Activities - Basement dwelling units are at significant risk of sewer backups and flooding in the Bloomingdale and LeDroit Park area. Regulation of the modification and/or renovation of these units can reduce the risk of flooding and the impact on residents. If a property is undergoing construction with or without a permit, DCRA has the authority to revoke the permit, issue a stop work order, and levy fines if necessary. If a citizen reports that a property is undergoing construction without a permit, then DCRA can investigate the property. An administrative warrant must be obtained to enter the structure without the homeowner's permission. The following are Task Force recommendations to augment DCRA's authority such that:

- DCRA can cite the property owner for illegal construction and can cite contractors.
- DCRA should be proactive using its investigative authority (including administrative warrants) to make sure basement dwelling units and the creation of such units meets building codes

Modify Storm Water Regulations for Future Development –There are large tracts of land in the Bloomingdale sewershed that may be developed in the future. If not controlled in an appropriate manner, storm water runoff from these newly developed areas has the potential to exacerbate the magnitude, frequency and duration of flooding in Bloomingdale. Until the Northeast Boundary Tunnel System is in service, the task force recommends that a higher degree of storm water control be required of developments/redevelopments in Bloomingdale as follows:

- Require that stormwater peak discharge for post development be limited to predevelopment conditions for 25-year 24-hour storms.
- Relaxed to standard DDOE stormwater regulations once tunnel is in place.
- Apply to all developments in Bloomingdale sewershed of 1 acre or more

Reinforcing the regulations in this manner will offer a higher degree of protection for properties downstream of development for larger storm events. The intense rainfall events of 2012 demonstrated the cyclical nature of storms, which can produce heavy rainfalls at a frequency greater than the average predicted return period. In 2012, Bloomingdale and LeDroit Park experienced multiple 5-year and 10-year events. Storms having a return period of 15 or more years could also occur with a greater frequency, and strengthening the stormwater regulations as proposed until the tunnel project is in place will offer additional protection from flooding. Also, by applying the regulation to streets, which are currently exempt, these regulations would reduce stormwater runoff from future development to below that of existing conditions. The flood protection benefits are actually greater under the proposed regulation than if development were not allowed to occur.

A number of issues will need to be addressed during implementation of this proposed regulation. The regulation needs to be included in DDOE's next round of public input for the proposed stormwater management guidelines, which are currently undergoing revision. DC Water and DCRA will need to work together on the delineation of the regulated area within the Bloomingdale and LeDroit Park sewershed, which may involve creation of a development zone. Also, review authority for approving site development plans needs to be established so that DDOE has the ability to review the development for compliance with the new standard.

Insurance Revisions – While insurance provisions will not prevent flooding, they can mitigate the financial impact on homeowners in the event of flooding. We recommend:

- For homeowners in the backwater valve program, require homeowners to provide proof that sewer backup rider has been purchased prior to issuing a rebate for a backwater valve installed by the homeowner.
- Require real estate disclosure form when houses are purchased acknowledging that buyers are offered or informed about sewer backup rider insurance.
- Require that closing documents include a statement signed by the homeowner acknowledging that optional coverage for basement backups is available, including for homeowner's and rental insurance.

Establish Licensing Requirements for Home Inspectors – There are currently no licensing requirements for home inspectors in the District. Consider establishing licensing requirements similar to those in other states, and include requirements regarding inspection of backwater valves and grinder pumps.

Improve Real Estate Disclosures when Selling Property – Require real estate disclosures when selling property if a backwater valve or grinder pump system is present, and if the lowest floor elevation is lower than the upstream manhole rim on the street.

Explore the Need or Benefit to Reinstating the District of Columbia Soil and Water Conservation District – This group disbanded several years ago due to perceived overlap with other District and regional agencies that carried more authority. There may be a renewed purpose for such an agency to be reinstated

as it relates to recent flooding in Bloomingdale and LeDroit Park. Refer to Appendix 9 for the District's charter.

9.2.6 Code Revision Components

Revisions to building and plumbing codes can mitigate the risk of future flooding and reduce the magnitude of damage if implemented. Recommendations are summarized below.

Require Grinder Pumps for Basements for New Construction– For new construction or when renovation costs exceed 50% of assessed value, require a grinder pump system with battery backup for fixtures on the lowest floor, if the lowest floor elevation is lower than the upstream manhole rim. Floors above the basement floor level would not be required to use the grinder pump system, and instead could be discharged by gravity to the sewer system. This approach is recommended because backwater valve systems are not as reliable as grinder pumps because they can clog and prohibit the use of upstream fixtures when closed.

Allow Backwater Valves for Multi-Level Single Family Installations– The current code does not allow a backwater valve to be installed on one lateral that serves properties with multiple floors. Revise the code such that backwater valves may be installed on one lateral that serves a single family dwelling with multiple floors so that two laterals are not required. In the event of such an installation, the code should require that rain leaders be disconnected and that no separate basement apartment is allowed.

Require 12" Threshold for Basement Entrances– Many properties have stairs leading down to a basement entrance from the sidewalk. If there is ponding in the street, water can crest the sidewalk elevation and run down the steps, flooding the basement. To prevent this, many properties include a set of steps up from the sidewalk prior to descending to the basement. This provides a barrier to floodwaters and helps mitigate basement flooding. For new construction or renovations exceeding 50% of the property's value, the Task Force recommends requiring a threshold at least 12" higher than the top of the curb prior to basement steps.

Require Building Subdrains to be Connected to Sump Pump or Grinder System– The current code requires building subdrains (such as stairwell drains at the basement entrance) to be connected to a sump pump if the drain is below the sewer elevation. If the sewer surcharges similar to what occurred in Bloomingdale and LeDroit Park, then the drains can back up and flood basements or other areas. The Task Force recommends that stairway drains connect to sump pump or grinder pump systems for new construction and renovations.

9.2.7 Operation and Maintenance Components

Increase Catch Basin Cleaning Frequency in Bloomingdale– When there is a forecast for heavy rain, DC Water dispatches crews to inspect and clean catch basins in the Bloomingdale and LeDroit Park areas as needed. This has been standard practice since the storms in July 2012, and DC Water will continue the program until the medium term engineering alternatives are in service.

Distribute Sandbags in Advance of Storms– Distributing sand bags during or immediately before storm events can be a logistical and practical challenge due to the limited time available. The Task Force

recommends that DPW distribute sand bags to residents requesting them at defined times during the year and that residents store these bags for use at their property.

9.2.8 Public Outreach Components

Because there is a potential for flooding even with implementation of the program outlined herein, a regular public outreach program to advise residents of the risks of flooding is recommended. Detailed recommendations are:

- Establish regular program of door-to-door flier distribution with emergency response information
- Install and operate variable message boards on Rhode Island Avenue to issue flood warning and emergency response information when significant rain is predicted
- Organize an H and DMH organize roundtable with residents to discuss anxiety/stress/fear.

9.2.9 Critical Items Needed for Success

The medium and long term engineering solutions include the following major construction projects with extremely aggressive schedules:

- Temporary Stormwater Storage at McMillan – by Spring 2014
- First Street NW branch Tunnel – by Spring 2016
- Northeast Boundary Storage Tunnel – by 2022

These are major projects with an estimated cost of more than \$700 M that will be constructed in a dense urban area. Identifying the right of way for the tunnel and surface facilities, obtaining the necessary property and easements, and obtaining construction staging areas and permits for construction are critical to being able to construct the project in accordance with the schedules shown.

These projects cannot be constructed according to the schedules shown without the commitment from District agencies acting as project stakeholders, and by providing the following:

- City Administrator appoints a champion. The champion assembles and leads a Task Force of key officials from District agencies, and is empowered to direct agencies on project-related issues.
- District agencies dedicate staff to support the project, and who are authorized to make decisions on behalf of the agency. The agency representatives may be located with the project design team to facilitate close coordination.
- DC Water obtains power of Eminent Domain and District exercises power of Eminent Domain as necessary to obtain land for the project.
- District grants all necessary easements to DC Water.
- District grants necessary District property to DC Water for permanent facilities and for construction.
- District provides expedited permits with dedicated staff.
- District allows necessary street closures, work hours, etc. for construction operations.
- Permit fees are waived.
- District allows street closures, reasonable work hour restrictions, and other coordination for construction operations.
- District provides financial assistance, including waiving permit fees and helping to secure Federal funding to limit water and sewer rate increases.

9.3 Predicted Benefits

The flooding problem in Bloomingdale and LeDroit Park is a problem that has developed since the 1880s. This has resulted in a problem that will be extremely difficult, costly, and time consuming to correct. Prior engineering studies and this Task Force have determined that the Northeast Boundary Tunnel is the most practical and cost effective solution for bringing the carrying capacity of the sewer system up to the current design standard adopted by DC Water.

Table 9-2 shows the predicted ponding level (depth of water in the street) and the predicted water surface elevation in the major trunk sewers in Bloomingdale and LeDroit Park. The table shows that even during a 5-year storm, significant ponding and basement backups are predicted.

Implementation of the short term improvements is predicted are not predicted to affect the ponding level or possibility of basement backups. However, residences that have installed backwater valves and performed floodproofing would be protected from these conditions.

Implementation of the medium term improvements is predicted to mitigate much of the surface ponding and basement backups during a 5-year storm. During larger storms, surface ponding and basement backups will be reduced, but are not predicted to be eliminated by the medium term improvements.

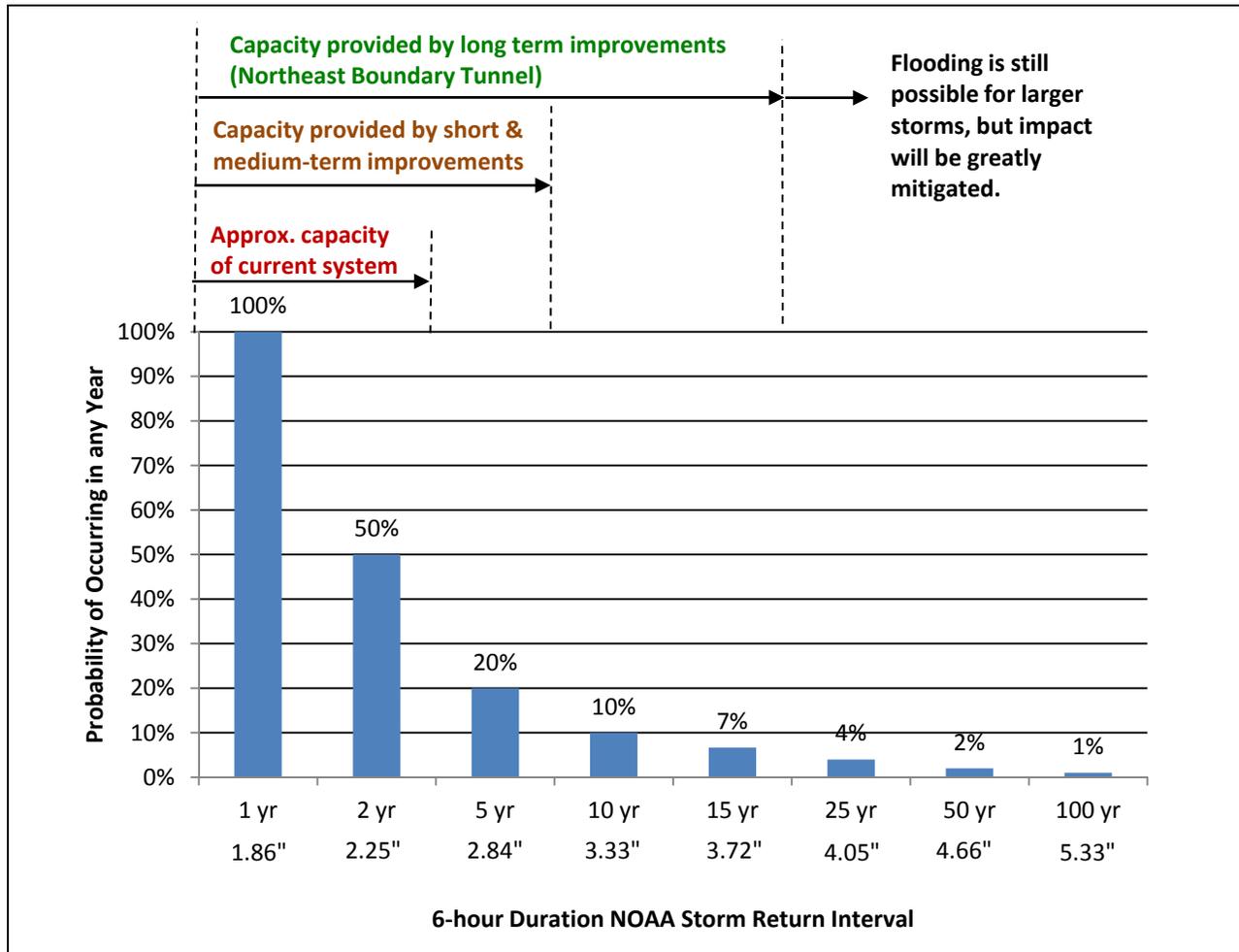
Implementation of the Northeast Boundary Tunnel is predicted to relieve surface ponding and basement backups up to the 15-year design storm, which is the design standard for the system.

After construction of the Northeast Boundary Tunnel, the majority of storms will be contained within the tunnel system. However, low spots in the area may still flood if nature delivers a storm beyond the design capacity of the system, although the severity of flooding will be greatly reduced. This is illustrated in Figure 9-3. Homes and businesses that are susceptible to flooding should consider retaining backwater valves, grinder pumps, and building floodproofing even after construction of the Northeast Boundary Tunnel.

Table 9-2: Predicted Benefits of Recommendations

Condition	Design Storm (6-hour duration)	Major Components	Average Ponding Depth (inches)			HGL Depth Above (+) or Below(-) Grade (feet)			Mitigates Sewer Backups	Mitigates Surface Flooding
			RI Ave Bet 1 st & 2nd	Flagler Place & V St.	U St & 1 st St	RI Ave & 1 st St	Flagler Place & V St	U St & 1 st St		
Existing Conditions	5-year	Existing Conditions	22"	8"	4"	-2.4'	3.2'	-1.2'	4"	-2.4'
Short Term Improvements	5-year	<ul style="list-style-type: none"> • Backwater Valve and Floodproofing Program • Rain Barrel Program • Green Infrastructure Program 	Some improvement, difficult to quantify			Some improvement, difficult to quantify			Yes, for properties with backwater valves	Yes for properties with Flood-proofing
Medium Term Improvements	5-year	Short Term Improvements Plus: <ul style="list-style-type: none"> • 6 million gallons stormwater storage at McMillan Sand Filter Site • First Street NW Storage /Conveyance Tunnel • Rain Barrel Program • Green Infrastructure Program 	<2"	<2"	3"	-5.7'	-7.6'	-8.6'	Yes	Yes
Long Term Improvements	15- Year Storm	Short and Medium Term Improvements Plus: <ul style="list-style-type: none"> • Northeast Boundary Tunnel 	< 2"			Runoff and combined sewage contained within sewers			Yes	Yes

Figure 9-3: Northeast Boundary Tunnel System Capacity



9.4 Schedule

The recommended plan has been developed at this stage to a conceptual level. Basic capacities have been established for the facilities, general locations have been selected and appurtenant and support facilities have been identified. Also, the general hydraulic operation of the system has been formulated, interfaces with existing facilities have been considered and potential construction sequencing has been reviewed.

Time requirements in the implementation schedule have been based on information compiled during the planning process, experience with similar projects, and estimates of future and field conditions. There are a number of uncertainties associated with the time requirements included in the implementation plan and schedules. As the implementation process moves forward, it will be necessary to identify and resolve such uncertainties and to adjust time requirements.

The following stages of project execution have been considered when developing schedules:

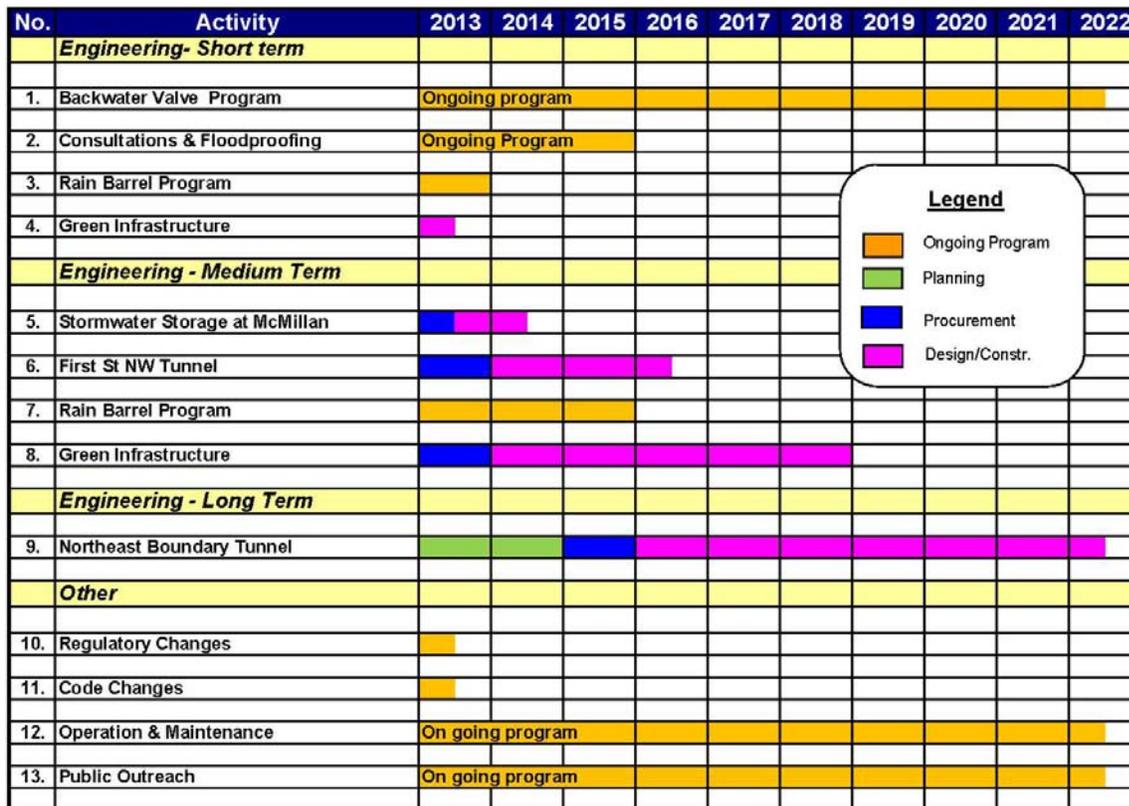
- *Planning* – This step comprises the next activity following approval of the recommended plan, and includes developing additional definition of the project necessary for detailed design.

Examples would include performing planning-level geotechnical investigations and developing proposed alignments for the tunnels, setting bases for design, establishing system hydraulics, siting shafts, diversion structures and pumping stations, and other elements needed to define the function and interaction of the system.

- *Design* – This step consists of preparing contract documents (plans and specifications) to obtain bids for construction.
- *Permitting, Approvals, Land Acquisitions* – this step entails obtaining the necessary permits and approvals required for construction. It also includes acquiring land or obtaining easements necessary for construction.
- *Construction* - this includes the building of the facility.
- *Place in Operation* – at this milestone, the facility is operational and performs the function for which it is intended. Construction may extend beyond this milestone for such items as landscaping, final cleanup, punch list items, or to address claims arising during construction.

Figure 9-4 shows the proposed schedule for the recommended plan.

Figure 9-4: Recommended Plan Schedule



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