General Overview

Purpose

The DC Silver Jackets interagency flood risk management team recently hosted two workshops to learn about and discuss the flood risk in the Federal Triangle Area (FTA). The FTA experienced severe flooding in June 2006 resulting in millions of dollars in damages to buildings, utilities and the Metro system. It also caused major disruption in operations to agencies and businesses.

The first workshop, which focused on understanding the flooding problem, was held on June 6, 2018 at the University of the District of Columbia. This document summarizes the second workshop that was held at the same location on September 5, 2018 and was attended by 83 stakeholders. The purpose of the second workshop was to discuss the types of potential projects that could be further evaluated to reduce the FTA flood risk. General types of solutions being implemented in our nation and in other countries were presented, along with two specific concepts for this area. However, these concepts are very preliminary, still require a lot of analysis and do not yet have approval from the key stakeholders and landowners.

The workshop was attended by facility managers, planners, engineers, environmental specialists, emergency managers and more representing federal and District agencies, international embassies, non-profit organizations, and academia. A list of participants is attached.

The goal of these two workshops and subsequent meetings with the stakeholder leadership is to achieve consensus on a path forward for further mitigating flood risk in the FTA. The workshops are not to identify which particular project should be implemented, but to discuss the types of projects that could be further evaluated and obtain support in further pursuing a system-wide solution.

The Progression of the Workshop

After welcoming comments from Stacey Underwood, U.S. Army Corps of Engineers (USACE), Baltimore District, the morning session involved presentations regarding types of potential flood risk management solutions that could be considered for the FTA.

Morning Presentations

Federal Triangle Stormwater Drainage Study Alternatives - Brandon Flora, DC Water (Greeley and Hansen), presented the findings from the 2011 Federal Triangle Stormwater Drainage Study. He provided information on the following preliminary solutions: low impact development/green practices (not a viable standalone solution), storage upstream of the Federal Triangle (not a viable standalone solution), using the GSA condensate line (not a viable solution), storage under the National Mall (viable solution), pumping station serving the Mall (viable solution), and a tunnel to Main and O Pumping Stations (no longer viable due to recent construction projects).
National Mall Underground - Judy Feldman and Arthur Cotton Moore, from the non-profit organization National Mall Coalition, gave a presentation on a concept they are developing called the National Mall Underground. The concept includes constructing a multi-use facility under the National Mall, between 9th and 12th Street tunnels that would include flood storage, car and bus parking, and a visitor center. The tour bus parking level would also be used for flood storage during a flood and the buses would have to be evacuated. Other features of the concept plan include cisterns for irrigation and a geo-thermal energy field. The National Mall Coalition funded USACE Baltimore District to conduct a technical review of the concept. USACE identified various technical issues, such as life safety and operation/evacuation procedures and connecting to the DC stormwater system. Further analysis and design and coordination with the various stakeholders is necessary for this concept.

Integrated Resiliency Planning: A Catchment-Wide Approach to Flood Protection and Multi-Functional Measures - John Stewart Frey, Ramboll, who consults for the City of Copenhagen, Denmark, gave a presentation on catchment-wide approaches and multi-function measures that are working in the City of Copenhagen and in other areas around the world to reduce flood risk. He showed innovative examples of upstream detention techniques, including using roads, open space, and recreation areas for flood storage and conveyance. He also presented examples of restoring concrete canals and reconnecting green space and green buildings and using rainfall as a resource.

Restoring the Role of Tiber Creek: Flood Adaptation for the Federal Triangle - Karolina Kawiaka, from Dartmouth College, gave a presentation on a concept that she is developing to restore the role of Tiber Creek. Tiber Creek (previously Goose Creek) once flowed through the area that is now Constitution Avenue and the Federal Triangle. Tiber Creek was converted into a canal in the 1800’s and was eventually filled in and replaced with the current storm drain system. Her concept plan includes constructing a bioswale adjacent to Constitution Avenue in front of the museums to mimic the original role of Tiber Creek and a normally dry flood retention area near Constitution Avenue north of the Washington Monument. Further analysis and design and coordination with the various stakeholders is necessary for this concept.

Dutch Inspiration on Urban Resilience - Edgar Westerhof, ARCADIS, who consults for the Embassy of the Kingdom of the Netherlands, shared some of their experiences in the Netherlands regarding flood risk management and urban resilience. An integrated approach is used in the Netherlands and a variety of solutions are implemented to reduce flood risk such as “artificial urban floodplains,” underground water storage and other recreational water storage opportunities. They strive to combine functions in their projects. His conclusion stated that you must 1) understand your climate risk, vulnerability and interdependencies, 2) design a collaborative process and plan for the long term and 3) seek and invent new rules.

Following the five morning presentations, the workshop took a break for lunch. Following lunch, an interactive breakout session was held.
Breakout Session

During the breakout session, each table/group was asked to answer the three questions below:

1. Identify potential advantages/co-benefits and challenges for each type of project below, based on the various morning presentations. Each table was assigned one type of project to start with, but was encouraged to try to discuss 2-3 of the types of projects.
   a. Underground storage and/or conveyance out of Federal Triangle
   b. Underground storage with parking
   c. Upstream detention techniques
   d. Restoration of natural drainage
   e. Flood proofing buildings

2. Identify potential funding opportunities and partnerships for implementing any type of flood risk management solution for the FTA (for study, design, construction, and/or operation).

3. Identify any short-term actions that could be taken in the interim to reduce the flood risk in the FTA

Following the breakout session, the facilitator provided an opportunity for the participants to report out on some of their responses. All of the written responses to the questions were compiled and are included as an attachment.

Afternoon Presentations

Following the breakout session and report out, the workshop concluded with two flood related presentations.

District of Columbia Levee Risk Communication - Mark Baker (National Park Service), Jehu Johnson (U.S. Army Corps of Engineers Baltimore District), and Nickea Bradley (DC Homeland Security and Emergency Management Agency (HSEMA)) presented information regarding the DC levee system risk assessment. The DC levee system was constructed by USACE in 1939 and is operated and maintained by the National Park Service. The Federal Triangle is located on the landward side of the levee and receives flood risk reduction benefits from the levee. The levee system was designed to reduce the risk of Potomac River flooding (riverine and tidal surge); however, it does not reduce the risk from interior/stormwater drainage flooding. During the risk assessment, it was determined that the levee is in good condition and is designed to hold back major Potomac River floods. However, extreme floods or levee failure could cause loss of life, billions of dollars in damages and major disruption to the national government. HSEMA also provided information regarding emergency and evacuation planning and the existing online flood inundation mapping tool.

DC Hazard Mitigation Plan – Nickea Bradley (DC HSEMA), provided information regarding DC’s Hazard Mitigation Plan, funding opportunities and types of projects.
Looking Forward
The next step of this project is for the team leaders, with support from the project working group, to meet with the stakeholder leaders to present information learned during these two workshops and to try to achieve consensus on a path forward for mitigating flood risk in the Federal Triangle area.

If you wish to access the presentations from the September workshop please follow this link: https://silverjackets.nfrmp.us/State-Teams/Washington-DC. All of the presentations are available except for the Dutch Inspiration slides which cannot be made available to the public for privacy/rights reasons.

Attachments

- September 5th - Workshop Agenda
- September 5th - Workshop List of Attendees
- September 5th - Workshop Responses
Federal Triangle Area Flood Workshop #2

Agenda

University of the District of Columbia
4200 Connecticut Ave, NW, Washington DC
Student Center Ballroom
September 5, 2018

9:30 - 9:50  Welcome and Overview of First Workshop
Stacey Underwood, Silver Jackets Coordinator
U.S. Army Corps of Engineers, Baltimore District

Kevin Bluhm, Facilitator
U.S. Army Corps of Engineers, New Orleans District

9:50 - 10:10  Federal Triangle Stormwater Drainage Study Alternatives
Brandon Flora, Project Manager
DC Water (Greeley and Hansen)

10:10 – 10:30  National Mall Underground
Judy Feldman, Chair, National Mall Coalition

Arthur Cotton Moore, Vice Chair and Project Architect
National Mall Coalition

10:30 – 11:00  Integrated Resiliency Planning: A Catchment-Wide Approach to Flood Protection and Multi-Functional Measures
John Stewart Frey, Landscape and Urban Designer,
Ramboll – Liveable Cities Lab, City of Copenhagen

11:00 -11:10  Break

11:10 – 11:30  Restoring the Role of Tiber Creek: Flood Adaptation for the Federal Triangle
Karolina Kawiaka, Senior Lecturer
Dartmouth College

11:30 – 12:00  Dutch Inspiration on Urban Resilience
Jan Peelen, Attaché for Infrastructure & Water Management
Embassy of the Kingdom of the Netherlands

Edgar Westerhof, Flood Risk & Resilience Lead – North America
Arcadis U.S.

12:00 – 12:40  Lunch Break (lunch will be provided)
**Breakout Session**
- Identify potential advantages/co-benefits and challenges for each type of project:
  - Underground storage and/or conveyance out of Federal Triangle
  - Underground storage with parking
  - Upstream detention techniques
  - Restoration of natural drainage
  - Flood proofing buildings
- Identify potential funding opportunities and partnerships
- Identify any short-term actions that could be taken in the interim to reduce the flood risk in the Federal Triangle area

**Report Out from Breakout Session**

**Break**

**District of Columbia Levee Risk Communication**
*Mark Baker, Dam and Levee Safety Officer*
*National Park Service*

*Jehu Johnson, Levee Safety Program Manager*
*U.S. Army Corps of Engineers Baltimore District*

*Nickea Bradley, State Hazard Mitigation Officer*
*DC Homeland Security and Emergency Management Agency*

**DC Hazard Mitigation Plan**
*Nickea Bradley, State Hazard Mitigation Officer*
*DC Homeland Security and Emergency Management Agency*

**Wrap-Up and Next Steps**
*Stacey Underwood, Silver Jackets Coordinator*

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*A Very Special Thanks to the Speakers and to the Members of the DC Silver Jackets Team for their Support in Planning this Workshop:*
## List of Attendees

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<th>Agency/Organization</th>
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<td>Anacostia Riverkeeper</td>
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<td>ARCADIS</td>
<td>Fernando Pasquel</td>
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Below is a comprehensive compilation of all of the comments/ideas that the groups documented during the breakout session verbatim. Multiple groups listed the same or similar ideas but they have not been consolidated in this document. One of the next steps of the project will be to review and consolidate the responses prior to the meeting with stakeholder leaders. Also note that the participants were brainstorming during this session, so some of the responses are ideas that have not been confirmed as accurate or viable.

1. Discuss as a group and list the top 3-5 responses for each type of project.

**Underground Storage and/or Conveyance out of Federal Triangle (e.g., storage tank, tunnels)**

*Potential Advantages/Co-benefits:*
- Takes it off street
- Redistribute throughout the city
- Comprehensive upstream
- Preserves historic character of the city
- There are viable solutions
- Integrates well with existing system
- Out of sight – initial construction disruption – but no later disruption
- Consolidated (possibility)
- Capacity could be large (volume)
- Single entity (DC Water) responsible for maintenance
- Design of Potomac River tunnel to accommodate pumped water from Federal Triangle – it’s not too late! This would give advantage of potential water treatment at Blue Plains (vs. pumping to Tidal Basin) and at worst case, overflow would discharge down river at JBAB rather than at Tidal Basin

*Potential Challenges:*
- Still multi-jurisdictional
- Large pumping operation
- Lots of maintenance
- Very capital cost intensive
- Construction very disruptive
- Underground utilities – identify, relocate, constraints
- Cost – total bill
- Distribution – could lead to increased water bills (like DC Water long-term control plan)
- No co-benefits/multi-use potential
Underground Storage with Parking

Potential Advantages/Co-benefits:

- Multi-purpose
- Revenue generating – self financing
- Large storage capacity
- Area of refuge/first response capability
- Gets buses off street to free space for other activities
- Can address water storage and parking issues (but parking may also be nuisance)
- Revenue source
- Multiuse – parking, flood control, irrigation
- Maximizing project to fullest extent
- Can treat water
- Costs offset by revenue
- Public/private financing including geothermal
- Centrally located
- There is a huge deficit of parking in the area
- Pushing it all underground
- There is potential to retrofit near already developed areas
- Wouldn’t be used very frequently so wouldn’t have to deal with cleanup. Clean waters funding.
- Better for buses (parking close to museums)
- Flood water storage
- Revenue from parking
- Mall irrigation
- Visitor center
- Geothermal
- Reduce pollution from traffic
- Capacity to meet or exceed 200 year flood volumes
- Provides tourist parking – increases total tourist revenue
- Funding mechanism to partially offset costs – parlay costs
- Water credits
- Irrigation
- Opportunities for geothermal
- Didn’t see advantages of parking given that there are policies that want to discourage it. There are advantages of underground storage only but didn’t get to discuss them

Potential Challenges:

- Operational challenges
- Multi stakeholder participation needed
- Underground utility coordination
- Groundwater intrusion
- Unknown impact on traffic and congestion
- Security issues
• Concern about if we even need parking (or if parking should be centralized) and storage given current demand
• Life safety – in flash flood do you have time to get people out quickly enough?
• Need to also deal with upstream pipe systems, upgrades will increase cost
• Location between two metro stations
• District would need to pay to connect to water storage
• Future of autonomous vehicles and changing landscape – may need less parking; some other locations may work better – need study on economics and operation / security
• Not consistent with other existing plans
• Parking is main concern, storage could be a benefit
• Utilities underground
• Terrorism threat
• How to deal with flash flooding – seems risky
• A lot of water to capture
• Making assumptions like who will run, maintain and operate – who will clean the water
• Ventilation? Security?
• Having to move existing utilities - a lot of them
• Pumping out groundwater - high groundwater
• Risk to people next to a tall cistern
• Entities have reluctance to take on new responsibilities
• Cost of evacuation
• Underground unknown
• New gates may not be 100% reliable for public safety
• Highly disruptive construction on the Mall for several years
• Unknown federal security infrastructure in the area
• Climate change could make it used more often
• Smithsonian does not charge for entry so no funding there
• Problems with operations - dual use facility but conflicting uses
• Major traffic (regional) impacts
• Major challenges with underground utilities and tunnels
• Evacuations during storms (people and equipment)
• Groundwater hydrology
• Ventilation engineering requires above ground structures (aesthetics)
• Initial upfront cost
• Encourages cars and detracts from public transit
• Security requirements
• Parking increases overall depth of facility and challenge to construct
• Low potential for full cost recovery
• Substantial risk of people and assets in flood control facility
• Increased security risk to surrounding properties/visitors (terrorism, etc.)
• Lack of access to many Mall attractions (far from Memorials)
• Encourages vehicular transportation as opposed to mass transit (counter to many policies designed to discourage car traffic)
• Conflicts with Smithsonian South Campus Master Plan
Upstream Detention Techniques

Potential Advantages/Co-benefits:

- More comprehensive approach
- Design is amenity
- Multiuse purpose
- Paradigm shift on allowing to flood
- Co-benefits – Environmental, heat island, recreation
- Could include diversion outside watershed (upstream areas)
- Decentralized – funded incrementally, failure of one piece does not cause system failure
- Incorporated into future development – already happening to some degree with regulation (SW) – could encourage incentives for exceeding regulations
- More public engagement, community cohesion
- Could be lower cost
- Extending life of existing SW infrastructure
- Good to use in combination with grey infrastructure
- Can reduce the burden elsewhere in the city for the 2 tunnels being constructed
- We need to look for a solution beyond Federal Triangle
- Gives the city a way to do park infrastructure
- Incorporate green infrastructure into existing projects
- Potential to reduce heat island effect with green infrastructure
- A tie to historic geography
- Policy restrictions to promote retention on private property
- Expand incentive programs to larger property holders
- Biodiversity and habitat
- Urban heat island mitigation
- Human quality of life – open space and gardens
- Opportunity to pretreat runoff
- Initially less expensive to construct
- Helps with small storms, adaptive
- Cost could be chunked out to smaller projects – incremental
- DC Water has trained folks for DC Clean River LID work maintenance
- Co-design – park, trees
- What about the roads? What about the courtyards in side buildings?
- Opportunity to innovate over time
- Comprehensive approach to retaining water can make the biggest impact
- Can also provide recreational, habitat, water quality/reuse improvements
- Reduce insurance rates!
- Comprehensive approach
- Everyone is protected
- Site by site impact unknown
- Improve recreation/ecosystem/habitat
- Show off to the world
• Reduce losses; reduce flood insurance premium of private building, public/private partnership through the process
• Increase property value (of private properties)

Potential Challenges:
• First cost
• Multi-jurisdictional
• Maintenance after flooding / cleanup
• Potential lack of ownership
• Distributed ownership/management
• Maintenance cost
• Not complete solution – doesn’t provide needed capacity
• Difficult to monitor progress – is there a consistent baseline?
• These could be challenges for any of the types of projects
  o Capacity – contain enough water to make a difference
  o Finding space in an urban environment
  o Utility conflicts
  o Maintenance
  o Water quality interacting with public access areas and people
  o Public safety/liability
  o Political will
  o Competing interests for space
  o Cultural change
• This is not a standalone solution
• Would need to acquire larger parcels to do more substantial intervention
• Enforcement challenges for private property
• Jurisdictional differences – conflicting local priorities and policies
• Possible breeding grounds for mosquitos
• Maintenance must be funded and enforced
• Long term operations
• Construction and maintenance disruptions
• Not enough to tackle big floods; doesn’t solve the problem on its own
• Might slow down traffic/roads
• Cost, limited resources
• Not enough space to put in projects, too developed, too expensive
• Hard to get upstream areas to contribute to Federal Triangle, where is the incentive?
• Utilities and other underground area
• Groundwater table is higher
• Site by site approach doesn’t accomplish much
• Stakeholder buy-in is complex
• Permitting and funding challenges
• Funding challenges
• Operation, maintenance
• Space
- Stakeholders coordination
- Permitting
- Need to update Federal Triangle modeling; need to do this anyway to show how Bloomingdale tunnels and measures help Fed Triangle/reduce flood risk

**Restoration of Natural Drainage**

_Potential Advantages/Co-benefits:_
- Not fighting against nature
- Design is amenity
- Additional green space
- Less intrusive
- Backup for 17th street levee
- Passive
- More resilient (adaptable)
- Used for people conveyance/recreation; aesthetics, heat island reduction; increased natural habitat
- Might be a stand-alone solution to solve flooding for Fed Triangle
- Less disruptive than Mall parking garage
- Could be aesthetically pleasing but replaces things like pollinator garden, old elms
- Potentially less expensive
- Potential water quality benefit
- Works with ancient history of site
- Potentially less expensive
- Greening of urban areas
- Water quality benefit in smaller storms
- Educational benefit (more visible)
- Potential for quicker, incremental implementation
- Potential for positive impacts to parkland (features draw people to underutilized space)

_Potential Challenges:_
- Multi jurisdiction stakeholders
- Maintenance, irrigation, cutting, planting
- Standing water problems
- Trash collecting
- Utilities
- Maintenance
- Smithsonian Gardens (and NGA Sculpture) negatively impacted; high maintenance, difficult to access for visitors, volunteers and staff;
- Potentially limited plant palette, needs irrigation
- Moat between visitors and museums – not welcoming, potential lack of wheelchair access
- Changes cultural setting of buildings
• Puts water against buildings – issues with utilities, area ways, etc.
• Impacts on sidewalks, bus stops, etc.; less width for pedestrians
• Bridges needed to museum, who repairs?
• Eliminates cultural features like A.H. fountain, site sculptures
• May interfere with extended lower level of NMAAHC
• Need drop offs at C Ave
• Dense urban environment – limited available space
• Potential negative impacts to park land
• Long term maintenance responsibility
• Potential for negative impacts to cultural/historic resources
• Potential traffic impacts
• Mosquitos
• Complexity of design (every situation is unique, high number of stakeholders)

**Flood Proofing Buildings**

**Potential Advantages/Co-benefits:**
• Any new project should include more flood control
• All federal buildings should include roof water retention gardens
• Follow executive orders or beat them
• Use submarine doors, they really helped hospitals in Houston in Hurricane Harvey. Can be done building by building instead of trying to fund one giant project.
• Cost distributed
• Customizable
• Multiple options
• Passive and action options
• Benefit to investing facility
• Can be implemented in phases
• Lower cost
• Insurance incentives
• Faster to act on
• Customizable/a lot of options
• Implemented in phases
• Direct benefits to the property for the cost
• Passive and active options
• Usually lower cost
• Quick implementation
• Don’t need Congressional approval?
• Smaller project = fewer people to coordinate with; lower cost; faster implementation; positive, direct impact to flood insurance
• If everyone in the adjacent areas each agreed to do it the benefits are enhanced
• Easier retrofit than other options, such as underground parking or pumping station for a precinct/district
• Could provide security protection for man-made hazards too!
• Small-scale project will not shift enough water to impact your neighbor
• Excellent secondary protection (say, with a levee)
• Small projects, manageable by each property owner
• Lower cost to implement
• Lower flood insurance if implementing properly
• Fewer people to deal with/to coordinate with/obtain permissions
• If everyone implements them, helps the community
• Easier to retrofit existing structure
• Provide security protection/incorporate into security perimeter
• No adverse impact to other properties
• Could be secondary measure to create redundancy

Potential Challenges:
• Backup of sewer systems within buildings gets trapped by flood gates protecting against storm water runoff from outside
• Aesthetics
• Storage of bulky elements
• Training and maintenance burden
• Deployment time
• Historic preservation issues
• Energy cost
• Not integrated with larger scheme
• Lack of motivation
• Hard to validate
• Hydrostatic pressure
• Cost
• Complex issue and difficult to be comprehensive
• Reliability question
• Aesthetic/historic requirements/Section 106
• Storage requirements
• Advanced notice for deployable structures/manpower
• May induce flooding on other properties
• Need a flood to test it
• Existing structural issues
• Reliability on humans/mechanical equipment – training and maintenance
• It’s expensive – need to navigate funding issues
• Requires stakeholder buy-in and permitting
• Aesthetic and structural issues
• Operations/maintenance coordination is extensive and expensive
• Still need to manage risk – how far is too far/not far enough
• Managing design flaws down the road is a challenge
• If implemented at a campus level, this diverts water to the neighbor
• Stakeholders buy-in – structural, aesthetic
• Operation and manpower to maintain
• Storage of the equipment
• Budget to maintain
• Evacuation plan
• Design flaw leading to more maintenance
• Adverse impact to your neighbors

2. As a group, identify potential funding opportunities and partnerships for implementing any type of flood risk management solution for the Federal Triangle area (for study, design, construction, and/or operation).

• Parking scenario - public private partnership
• Use tax for storm water
• Federal appropriation
• Donations
• Commuter tax
• Tourist tax
• Tax incentives
• SW fees, impervious areas fees, local DC funds (limited amount)
• Volunteer work (for small green infrastructure stuff)
• Congress
• Public Private Partnership (P3)
• Business improvement districts
• EPA/FEMA grants
• SRC program
• HUD - Upstream distributed projects
• EPA – co-benefactor – Chesapeake Bay Implementation Grant, 319
• Need to create a partnership between FED/DC/NPS; any additional funding from utility would be hard
• Congressional authorization (cannot pay for interior storage)
• Disburse cost burden to building owners
• Congress
• DC Government
• For underground parking – The public/private funding is available. But who will own, operate and maintain this? Compiling up with Federal share for construction. Smithsonian has experience with a zoo parking lot turning it over to a private developer – this project did not go forward. Will parking revenue really cover ALL of the costs? This is a big project – are there any other $500 million, non-road public/private projects where this works?
• Streetscape integration with roadway grant? ICET?
• Monuments take on additional runoff in their design
• EPA and FEMA – funding for green infrastructure
• Park and recreation tax
• Maintenance using adoption-highway type mechanism
• Agency partnerships
• Parking – visitor events
• Revenues rates, taxes
• User tax
• Reduced risk – insurance taxes
• Consolidate other and capital budgets for fed projects and for Smithsonian
• Trust Account for feds in the area
• Water quality for Bay, Potomac; charge for irrigation
• Bake sale – cupcakes
• Turn to Security and continuity of operations
• Take advantage of major redevelopment – FBI, Penn Ave, Constitution Gardens
• Retrofit – do more green roof
• Fund a study lead by NCPC or other agency that completely tests and compares options across broad criterion
• DC Water? Credits?
• Congress
• Jointly funded; DT bus input(?), NPS, SG
• District stormwater retention credit program (use facility to generate SRC’s), for fed agencies selling and accepting SRC money is problematic but could use private contractor (like ESPCs (?)) where contractor builds and receives SRC money for 20 years
• Congressional appropriation
• Public/private partnership
• Insurance company investment
• Fees, levies, taxes
• Congestion tolls
• Grants
• Environmental incentive
• Regulation (decree)
• Bonds
• Intergovernmental partnerships
• New agency (fund the Silver Jackets)
• FEMA, DDOT
• Congress
• Public/private partnerships
• Fees
• Bond funding
• GSA downtown bid dedicated stream to flood risk management
• Congress/OMB – but there’s competition for resources
• Would be great if federal budget process incentivized agencies working together
• Capital improvements request should be coordinated with planning phase (2-5 years)
• Identify lead agency, partners and pool funds
• Building managers are siloed at GSA – makes it tough to coordinate
• FEMA grants program for states
• Private donations?
• Stormwater Mgmt credits?
• Congress/OMB thru capital improvement – 2-5 year out
• This group can come up with projects and identify agency lead to ask for funding: NPS-floodable parks, GSA – floodproofing, HMA grant, PDM, FMA, HMGP
Partnership – working with DC agencies to apply for grants
Talk to David Rubenstein
Stormwater credit
GSA has a capital funding account from their rent from other federal buildings

3. As a group, identify any short term actions that could be taken in the interim to reduce the flood risk in the Federal Triangle area.

- Flood proofing buildings
- Green infrastructure, bioswales, green roofs, etc
- Consider cloudburst roads for road renewal
- See upstream
- DOEE/DDOT GI implementation
- Flood warning system
- Better modeling (real time)
- Maintaining existing infrastructure
- Automated/remote control systems
- Keep funding current initiatives/programs
- Public outreach to increase onsite retention
- Emergency action plans
- DOEE can consult Federal Triangle buildings on flood proofing systems
- Develop vulnerability rating system
- Flood proofing of buildings – some already done
- Find ways to brag about interventions – like flood conversations at Lock Keepers House – Public Education
- Earth day or preparedness – educational programs about flood risk
- Upgrade building roof – green infrastructure
- What are some next steps for additional analysis:
  - Impact of recent efforts to flood proof buildings and need for comprehensive solution – understand if that changes remaining damage
  - What is individual expense for building owners
  - Cost-benefit analysis of all plans
  - Impact of options on visitor experience and security
  - Other sites for underground storage – distributed impact
- Building modification
- Use existing buildings, tunnels, etc.
- Make people more flood aware - show past flood events.
- Put flood gauges around town.
- More stuff out of the basements.
- Get used to living with water.
- More plants.
- Make use of what you have – make use of parks and reaction area for low lying areas.
- New projects should retain more water – more than 1, 2” per hour. -
- Elevate utilities valuable resources
- Develop flood management plan
- Flood training exercises
• Identify potential locations for implementation
• Identify existing/potential public projects
• Develop policy
• Protect valuable low lying assets – elevate
• Flood proof mechanicals and utilities to the extent possible below the base flood elevation (BFE)
• Implement best practices with green infrastructure strategies
• Could we use a side street as a designated “flood street”
• Individual actions – self rising floodwalls, dams
• Keep moving stuff out of the basement (utilities, important stuff)
• Keep taking advantage of major remodels and retrofits of buildings, streets, parks to include detention, LID
• New rules! New regulations! Upgrade to higher standards
• Set up credits, incentives and stormwater fees
• Flood gates
• Move collections out of basements
• Other efforts to move key equipment to protected location
• Improve resiliency of roadway tunnels; harden tunnel utilities to handle water or provide gates and keep water out
• Regional and agency emergency response planning
• Public outreach – keeping trash out of catch basins
• New additional idea (more long-term) – Flood proof 3rd, 9th and 12th Street tunnels and use them to store floodwater. Direct flow there...could be ~20 million gallons
• Flood proofing
• Put up “story pole” with flood marks for 100 year flood
• Other educational outreach
• Keep talking about it
• Recalibrate thinking to 500 year plus
• Flood proofing
• Educational signage and outreach (high water marks)
• Executive orders
• Gel bags – no more sand!
• Planning – identify and prioritize risks (DOEE will do this!), vulnerabilities for the entire campus; what has been accomplished to help with mitigation?
• Update policies and guidance to require more rigorous flood assessment - for risk during planning/design
• Can FEMA and NPS team up? Share funds? NPS uses FHWA funds for some projects, could do something similar with FEMA??
• No more sandbags – ban it!
• Engineering audit in terms of locations of flood barrier, risk assessment, entry points
• Update/implement current policies and guidance on compliance with SW regulations to assess flooding risk and the need of mitigating
• Update flood map (might not be short term)
• FEMA to talk to FHA on policies to allow other federal agencies to take their grant funding
Other Notes Provided:
What are some next steps for analysis?
- What is individual expense for building owners?
- Impact of recent efforts to flood proof buildings; need for comprehensive solution; understand remaining damage
- Cost-benefit of all plans
- Impact of options on visitor experience and security
- Other sites for underground storage – distributed impact