Appendix H

Actions Sheets Key

Sector: The sector of work under which the action would fall. Infrastructure (I), Regulatory Program (R), Outreach and Engagement (O), and Emergency Services (E).

Task Force Rank: Based on aggregate of individual Task Force member rankings. Task Force members were asked to rank their top 10 with the action believed to have the most community enthusiasm ranked number 1 and the action believed to have the least community enthusiasm ranked number 10. Actions beyond 10 were effectively not ranked.

Cost Score: Staff scored.

$ Minor; Savings or efficiency, takes minor amount of staff time, or can roll into existing duties with existing staff time and resources, <0 to 20hrs, <0 to $2K

$$ Modest; Modest additional costs, modest amount of staff time. 20 to 100hrs, $2-10K

$$$ Moderate; Moderate additional costs, takes moderate amount of additional staff time, or can be contracted out in future budgets. 100-500hrs, $10-50K

$$$$ High; Additional costs, takes additional staff time, can be contracted out with additional resources. 500-2000hrs, $50-200K

$$$$$ Major; Significant costs, takes significant amount of staff time, or can be included in future capital improvement plans. 2000+hrs, $200K+

Staff Rated Effectiveness Score: Staff scored. Based on effectiveness and confidence at reducing community vulnerability to flooding, at reducing community exposure to flooding, and at reducing the community share of climate change drivers.

Action Category:

Quick Win = do now or contract under flood risk reduction effort.

Planning = develop a plan as part of flood risk reduction effort, or include in Comprehensive Water Resources Management Plan amendment, future budget, or Capital Improvement Plan (CIP).

Development = may be worth doing with additional resources, a special circumstance, a partnership, or as technology improvements change cost structure.

None = benefit is not worth the cost or effort.

			Task Force Average Rank	Cost	Effectiveness	Category
I.07	Infrastructure	Better Maintain Existing System	5.0	$$$$$	high	Planning
I.08	Infrastructure	Control Sources of Clogs	7.3	$$$$$	high	Planning
E.01	Emergency Services	Develop Local Flooding Emergency Response Plan	7.4	$$$	medium	Planning
I.15	Infrastructure	New Storage in Parks	7.6	$$$$$	high	Development
I.19	Infrastructure	Buy Low Homes	8.4	$$$$$	low	None
I.16	Infrastructure	New Storage in Roads	8.4	$$$$$	high	Development
I.13	Infrastructure	Search for System Constraints and Quick Wins	9.0	$$$	high	Planning
I.10	Infrastructure	Reduce Sanitary System Inflow	9.1	$$$$$	medium	Ongoing
I.24	Infrastructure	Flood Storage with Predictive Pumping	9.1	$$$$$	high	Development
R.08	Regulatory Program	Update Plans with Flood Risk	9.3	$$$	low	Planning
R.03	Regulatory Program	Regulate Impervious	9.3	$$$$	low	Development
I.25	Infrastructure	Capital Project Prioritization Framework	9.5	$$	medium	Development
I.01	Infrastructure	Citywide Risk Modeling	9.6	$$$	high	Planning
R.04	Regulatory Program	Require Private Flood Storage	9.8	$$$$	low	None
E.02	Emergency Services	Define and Communicate the Available Services	9.9	$$	medium	Quick Win
I.09	Infrastructure	Reduce Vulnerability of Sanitary Lift Stations	10.0	$$$$$	medium	Development
I.14	Infrastructure	Bigger Pipes	10.0	$$$$$	high	Development
I.03	Infrastructure	Peak Flood Visualization	10.1	$$$	high	Planning
I.04	Infrastructure	Flow Path Visualization	10.3	$$$	high	Planning
O.08	Outreach and Engagement	Develop Flood Intervention Fact Sheets	10.3	$$$	medium	Quick Win
O.07	Outreach and Engagement	Develop Frequently Asked Questions (FAQs)	10.5	$$	high	Quick Win
I.17	Infrastructure	Design to a Future Risk Level	10.6	$$$$$	medium	Planning
I.18	Infrastructure	Plan Emergency Overflow Paths	10.6	$$$	high	Planning
O.01	Outreach and Engagement	Build Awareness of Stormwater System	10.6	$$	low	Planning
I.02	Infrastructure	Standardize Failure Analysis	10.6	$$$$	medium	Development
O.06	Outreach and Engagement	Promote Sandbag Service	10.8	$$	high	Quick Win
O.10	Outreach and Engagement	Host Flood Summit	10.8	$$$	medium	Development
R.02	Regulatory Program	Flow Path Review	10.9	$$$	high	Planning
O.05	Outreach and Engagement	Develop a 'What is My Flood Risk?" Map	10.9	$$$	high	Quick Win
I.05	Infrastructure	Predictive Snowmelt Modeling	11.0	$$$	low	Development
I.06	Infrastructure	Active Lake Level Monitoring, Smart Infrastructure Pilot	11.0	$$$$	high	Development
I.11	Infrastructure	Assess Water Supply System Risk	11.0	$$$$	medium	Planning
I.12	Infrastructure	Communicate Risk to Power and Utility Industry	11.0	$$	medium	Development
I.20	Infrastructure	Incentivize Redevelopment of Exposed Structures	11.0	$$$$$	low	None
R.01	Regulatory Program	More Permit Review and Regulation	11.0	$$$	medium	Development
R.05	Regulatory Program	Regulate Development to a Higher Flood Standard	11.0	$$	low	Development
R.06	Regulatory Program	Tiered Stormwater Utility Fee Based on Impervious Cover	11.0	$$$	low	Development
R.07	Regulatory Program	Participate in the Community Rating System	11.0	$$	low	Planning
O.02	Outreach and Engagement	Develop and Communicate Dynamic Flood Threat Indicator	11.0	$$$	low	Development
O.03	Outreach and Engagement	Groundwater Level Viewer	11.0	$$	low	Planning
O.04	Outreach and Engagement	Promote WaterAlert (USGS) Subscriptions	11.0	$	low	Quick Win
O.09	Outreach and Engagement	Provide Stormwater Technical Assistance Grant Program	11.0	$$$	medium	Quick Win
O.11	Outreach and Engagement	Engage With Stakeholders at Time of Capital Investment	11.0	$$	medium	Development
O.12	Outreach and Engagement	Engage Realtors, Developers, Insurers on Local Flood Risk	11.0	$	medium	Development

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.01	Infrastructure	Citywide Risk Modeling	Create a standard method across the city (and potentially across other nearby cities) to analyze the risk and consequence of potential for failure of the entire storm sewer system, pipe by pipe, structure by structure. Additionally, this would include creating a standard method to determine impacts due to failure of a part of the system. Finally, reporting methods (maps, prioritized infrastructure components, etc.) would be standardized so that infrastructure risk in different parts of the city and even nearby cities can be easily compared by staff, residents, and decision-makers.	A general understanding of the risk of each part of the storm sewer infrastructure system will be able to help prioritize maintenance and inspection activities. Additionally, failure analysis which is often risk based, is not currently standard and is generally quantified on a case by case basis and by the people involved. Therefore, comparing infrastructure risk in different parts of a city or between cities is quite difficult. The only way to know which parts of the infrastructure system should be prioritized in maintenance, with a finite maintenance crew, is to assess the risk of entire storm sewer system in a standard and comprehensive way.	The process of evaluating risk of infrastructure may not lend itself to a process that is general. It may be a process that is so "case by case" that the standardized method may become overly complicated and onerous.	TBD	$$$	high	Planning
I.02	Infrastructure	Standardize Failure Analysis	Create a standard process for investigating reported or actual failures after significant events. Post event investigation would survey debris lines for peak flow elevations, review damage, investigate system function using hydrologic models, investigate past maintenance records and report expected and actual system performance.	This is an alternative or lead-in to smart infrastructure that allows the organization to build knowledge of system function, and periodically review and plan interventions in operations and maintenance that may lead to better system function.	Additional data could sit on the shelf if there is not organizational capacity to review, utilize or react to it.	TBD	$$$$	medium	Development
I.03	Infrastructure	Peak Flood Visualization	Create products that visualize and explain the extent of expected flooding during storm events. The various types of products could be paper and/or digital maps, the online water resources web map, Google Earth xml files, or other innovative methods.	Creating maps or other visualizations of the potential extent of flooding helps identify the locations throughout the city that are most likely to flood. Additionally, similar to the activity of education and outreach, identifying areas of potential flooding and areas that do not show flooding help the public become aware of instances when the system is not functioning as expected. As the public becomes more aware of flooding throughout the city through these products, the new knowledge can likely motivate more citizens to take part in flood risk reduction efforts when they are aware of the extent of flooding throughout the city.	With new flood mapping that is far more extensive than traditional FEMA maps, flood insurance prices and home prices may be affected. Maps alone do not tell the entire story; they cannot explain other flood characteristics such as duration. The public may react to the maps by implementing a fix that doesn't appropriately address the issue, i.e., a resident might plan to place a sandbag wall when the duration of flooding is so long that they might still be exposed to basement flooding from groundwater seepage. Some interpretations of the flood maps from the public may not be accurate. Notes concerning the reliability of the tools must be included (based on a calibrated or uncalibrated model, validated with observed data, etc.).	TBD	$$$	high	Planning

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.04	Infrastructure	Flow Path Visualization	Create visual products that explain the routes that water would flow during storm events. The various types of products could be paper and/or digital maps with flow direction arrows, the online water resources web map, Google Earth xml files, animations or videos, or other innovative methods.	Creating maps or other visualizations of flood water flow paths helps identify the locations throughout the city that should remain open (no obstructions, no development, no pedestrians, cars, etc.) during a flood. Additionally, similar to the activity of education and outreach, identifying areas where water should be flowing during flooding events helps the public be aware of times when the system is not functioning as expected. Areas that would be emergency overflow areas (EOFs) during a flood can also be improved prior to flooding so that when activated, they do not erode.	With new flood mapping that is far more extensive than traditional FEMA maps, flood insurance prices and home prices may be affected. Maps alone do not tell the entire story; they cannot explain other flood characteristics such as duration. Some reactions to the flood maps from the public may not be entirely appropriate. Notes concerning the reliability of the tools must be included (based on a calibrated or uncalibrated model, validated with observed data, etc.). Homeowners who live adjacent to flow paths and/or emergency over flows (EOFs) may take it into their own hands, on their own property, to alter the terrain so that water does not flow adjacent to their home. This may have other adverse consequences on their own or on other people's homes.	TBD	$$$	high	Planning
I.05	Infrastructure	Predictive Snowmelt Modeling	Forecasted/predicted snowmelt modeling to help the city better understand spring flood risk.	Predictive snowmelt modeling may help city staff and the community better understand spring flood risk. Forecasted high springtime water levels associated increased flood risk may inform flood risk reduction measures by the city (e.g. preparation for emergency pumping, sandbags, etc.), especially for landlocked basins and basins with restricted outlets.	While melt can be estimated, it is uncertain due to duration of melt and any intervening rainfalls. This can lead undue alarm or a 'cry-wolf' affect. This effort may be better at a watershed or metro area level. Alternatives include amplifying general messages from the NWS. Existing water levels and snowpack measurements are required to forecast spring water levels. Collecting this information may take considerable staff time; but without this information, the snowmelt modeling may only provide a limited benefit for restricted outlet and landlocked basins.	TBD	$$$	low	Development
I.06	Infrastructure	Active Lake Level Monitoring, Smart Infrastructure Pilot	Construct water level and discharge measurement sensors at key stormwater management system points (i.e. critical lakes, ponds, streams, and pipes).	Current water level measurements can be used to monitor flood exposure, and therefore inform flood management activities (i.e. emergency pumping, sandbagging) as well as optimize operation of dynamic stormwater management systems equipped with adjustable weirs and outlets. Inconsistencies between measured data and flood models has led to identification of stormwater infrastructure no longer functioning as intended (i.e. sediment filled pipes, pipes with frost heaves, sediment filled channels, clogged outlets, etc.). Increasing the number of sensors throughout the city would allow for a more widespread system performance evaluation.	Sensors can be difficult to maintain and are frequently damaged by adverse weather conditions and vandalism. Discharge monitoring may lead to identification of Inflow and Infiltration (I&I) issues. Data connections could be considered to creek flow gages maintained by watershed districts. The ability to construct and utilize adjustable weirs based on forecasted data may be limited by the DNR. For these additional measurements to be useful, the existing flood models may need to be refined to provide real-time forecasting abilities.	TBD	$$$$	high	Development

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.07	Infrastructure	Better Maintain Existing System	Use a proactive asset management strategy to proactively inspect system to 1) identify infrastructure with relatively minor issues that can be readily repaired, and 2) add operations to remove collected debris and sediment from system trash racks, storm sewer pipes, catch basins, and inlets.	Repair and replace stormwater infrastructure before minor issues escalate to costly replacements (inspect concrete pipe cracks, CCTV, stormwater pump head tests, ditch/stream thalweg surveys). Additionally, trash racks, culvert inlets, and storm sewer pipes can be blocked by sediment and debris. Poorly performing infrastructure reduces the overall stormwater infrastructure system efficiency and results in additional flooding/drainage issues.	Addressing minor issues may provide water quality benefits. Less complaints from residents and more confidence in the stormwater management system.	TBD	$$$$$	high	Planning
I.08	Infrastructure	Control Sources of Clogs	Street and flow path debris can clogs and plug stormwater infrastructure. Proactive street sweeping and maintenance of inlets and flow paths can reduce debris sources.	Trash racks, culvert inlets, and storm sewer pipes can be blocked by sediment and debris, resulting in additional flooding/drainage issues. Even if partially plugged, additional flooding can occur. To address these sources of clogs and debris, the city could evaluate the benefits of implementing/constructing more stormwater Best Management Practices (BMPs) (i.e. vegetative cover, construction stormwater management, etc.).	Addressing the sources of clogs and debris may provide water quality benefits and documentation of these measures may be useful for the Municipal Separate Storm Sewer System (MS4) permit and Stormwater Pollution Prevention Program. Addressing the sources of clogs and debris may also require enforcement, which could adversely impact relationships with private property owners in the city.	TBD	$$$$$	high	Planning
I.09	Infrastructure	Reduce Vulnerability of Sanitary Lift Stations	Assess risk, floodproof, raise or relocate sanitary lift stations out of floodplain. For those sanitary lift stations that are low in elevation and within the floodplain, it may be important to elevate the lift station, or move it entirely so that it is no longer in the floodplain.	When sanitary lift stations are in the floodplain, they can become unreachable during a significant flood. Additionally, they may become inundated with stormwater. This could cause a problem by allowing stormwater into the sanitary system, overwhelming it with too much flow. Improvements could include raising the electrical and controls systems, floodproofing the hatch, planning for emergency sandbagging and pumping to access, raising a section of the structure, or relocating entirely.	Often these features are placed where they are for multiple very good reasons. Moving a lift station is a significant task, especially when space in a well-developed city is hard to come by. And finding another place out of the floodplain that is still as good as the original place (with regard to the other deciding factors) is a difficult task.	TBD	$$$$$	medium	Development
I.10	Infrastructure	Reduce Sanitary System Inflow	Failures in the sanitary sewer system can cause backup into structures.	The long term reduction of sources of infiltration and inflow of surface and groundwaters can incrementally reduce risk.	This program is ongoing and associated with the sanitary sewer utility. It is ongoing in standalone projects and the neighborhood and Municipal State Aid (MSA) street reconstruction programs.	TBD	$$$$$	medium	Ongoing
I.11	Infrastructure	Evaluate Water Supply System Risk	For those water supply systems (for example, wells) that are low in elevation and within the floodplain, it may be important to elevate the system, or move it entirely so that it is no longer in the floodplain.	When water supply systems are in the floodplain, they can become unreachable during a significant flood. Additionally, they may become inundated with stormwater. This could cause a problem by contaminating the water supply system and creating an expensive condition that requires remediation.	Often these features are placed where they are for multiple very good reasons. Moving water supply systems is a significant task, especially when space in a well-developed city is hard to come by. And finding another place out of the floodplain that is still as good as the original place (with regard to the other deciding factors) is a difficult task. Often distribution pipes are buried under roads and this would require tearing up roads.	TBD	$$$$	medium	Planning

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.12	Infrastructure	Communicate Risk to Power and Utility Industry	Much like an emergency action plan, or education and outreach, this activity would be providing the proper information to private utility companies (electric, internet, fiber optic, etc.) of the locations and facilities that are most flood prone. Ideally, the activity that publishes flood extent visualizations could feed into this one.	Access to buried utilities could be very limited around flood prone facilities. During flood events, driven often by large storm events, electricity could be down in parts of the city. The private utility companies should be aware of the areas and facilities prone to flooding so that they can plan to reduce the vulnerability of exposed systems, or be better prepared to fix elements of their system during and after a storm.	This could become a daunting task every time the modeling is updated and the maps are recreated. Additionally, if there are flooding issues and private utilities are down, the city could be blamed or even sued if the private utilities company feels that the provided information was not accurate enough to help them be successful.	TBD	$$	medium	Development
I.13	Infrastructure	Search for System Constraints and Quick Wins	The stormwater network involves a complex system of overland flow, stormwater pipes, ditches, ponds, basins, and streams to convey stormwater off of the landscape. Using existing models and infrastructure data, identify the isolated and "easy to solve" choke points that may be limiting the overall capacity of the stormwater management system.	Significant reductions in flood risk may be achievable in areas with "easy to solve" stand-alone constraints. These "easy to solve" fixes are likely to be significantly less expensive than other comprehensive system changes.	Some of these retrofits are likely to be located within stormwater easements on private property (i.e. backyard flooding problems). Replacement/retrofit of the storm sewer in these areas may be disruptive. (Assume this is a desktop review to find these "easy to solve" retrofits and other activities are the construction/implementation for those locations). The effort can be used to inform future project scope and selection to better target resources to flood risk reduction.	TBD	$$$	high	Planning
I.14	Infrastructure	Bigger Pipes	Replace undersized storm sewer in specific flood areas in some areas where there are no/limited downstream impacts associated with larger discharge from bigger pipes.	Replace undersized storm sewer in specific flood areas to improve discharge away from the site and reduce flooding for areas without concerns of downstream impacts.	In many instances, retrofitting bigger pipes is likely to lead to downstream impacts. Furthermore, other governing agencies, such as watershed management organizations or downstream cities, may limit or refuse additional discharge associated with larger pipes because of downstream impacts. There are limited opportunities for this type of risk transfer after the affects of climate change are factored in to an already constrained system.	TBD	$$$$$	high	Development
I.15	Infrastructure	New Storage in Parks	Retrofit new storage into or under park spaces.	There is limited available, open space for construction of stormwater storage. Utilizing the space in or under park spaces is one of the few remaining places for stormwater storage. Increased stormwater storage will reduce downstream discharge and reduce flood risk (impacts) to downstream properties.	There will likely resistance from the community to flooded parks and additional resources may be required to convert the park to a multipurpose land use. The addition of new storage may not be applicable everywhere, including sites with limited infiltration capacity, polluted ground, adjacent to wellheads, or with high bedrock. To use park spaces as flood storage, the city will likely need to educate residents about the multipurpose land use and that the park space will be flooded from time to time. The Park and Recreation Department, Park and Recreation Commission, and park users would be stakeholders. Stormwater reuse for irrigation may be an option is some parks.	TBD	$$$$$	high	Development

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.16	Infrastructure	New Storage in Roads	Retrofit new stormwater storage into or under roads.	There is limited available, open green space for construction of stormwater storage (i.e., a stormwater pond). As roads and parking lots are reconstructed, utilize this space in or under parking lots/roads as one of the few remaining places for stormwater storage. Increased stormwater storage can help reduce downstream discharge and reduce flood risk (impacts) to downstream properties.	Flooded roads and parking lots may receive pushback from the community and additional resources may be required to educate residents about where to drive/park during wet periods. The addition of new storage may not be applicable everywhere, including sites with limited infiltration capacity, polluted ground, adjacent to wellheads, or with high bedrock. Furthermore, stormwater storage on roadways is limited by requirements for emergency vehicle access. Storage under roadways is also limited by other buried utilities.	TBD	$$$$$	high	Development
I.17	Infrastructure	Design to a Future Risk Level	When designing a part of the stormwater infrastructure system, we can no longer rely on using design storm events that are based solely on past observed data. We should be considering what climate forecasting models are telling us, and we should be considering the expected life of the infrastructure.	A part of the stormwater infrastructure system that is mean to last 5 years and then no longer function does not necessarily need to be overly concerned with what the climate may be 30 years from now. Additionally, the probability of a 1% annual chance event occurring in the next 5 years is only about 5 percent. On the contrary, a part of the system meanT to be functional for the next 50 years should most certainly be considering the changing climate and the predictions of future large storm events. The probability of a 1% annual chance event occurring in the next 50 years is 40 percent. Given that, the chance of a piece of infrastructure being tested by its design storm during its life depends on the expected life of the infrastructure. And the magnitude of the change in the characteristics of the design storm event also depends on the expected life of the infrastructure.	This approach will create even more uncertainty in the design process. In all likelihood, ponds, pipes, structures, weirs, pumps, and all other infrastructure will be designed bigger, potentially uncomfortably big and uncomfortably expensive, if the future climate risk is seriously considered in design.	TBD	$$$$$	medium	Planning
I.18	Infrastructure	Plan Emergency Overflow Paths	Planning emergency flow paths is the approach of understanding the natural emergency overflows, and then planning to create, maintain, and protect those that exist, that safely pass stormwater flow, and therefore protect people and structures from flooding and harm.	Having a prepared understanding of the emergency flow paths, rather than surprise of where stormwater ends up flowing, is beneficial for the protection of infrastructure within the city. Additionally, similar to the activity of publishing visualizations of flow paths, this planning can help understand the function of the system and whether or not it is operating appropriately during large flood events.	Some residents may not like where emergency overflows are planned, prepared, maintained and protected. This would impact park uses. There are certainly instances of unplanned overflow locations that will surprise the public, and require study and private or public action to limit exposure. There may be pushback from the public in creating or maintaining these features. Outreach and would be necessary to communicate where these areas are and how park uses may be impacted.	TBD	$$$	high	Planning

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.19	Infrastructure	Buy Low Homes	Offer to purchase homes that are so flood exposed that the cost to protect them from flooding (or significantly reduce their flood exposure) is so high that it is beyond the value of the home. This is much like totaling a car after an accident significant enough that it doesn't even make sense to try and fix the car.	The cost of capital projects to protect some homes can be very high, particularly for some homes that are built very low and near bodies of water. The vulnerability can be due to a number of factors and decisions when the home was built. Regardless of the reason for the high vulnerability, the cost to protect homes in this condition is beyond the value of the home itself. Additionally, there may be a cost in emergency rescues for people who live in those homes during flood events. Therefore, buying the home is the most cost-effective solution. Buyouts have been shown to be a cost-saving measure for taxpayers because the damages avoided result in cost savings on both flood insurance and disaster relief.	Strategies to reduce vulnerability of these homes to flood can be much more fruitful. Buying out a resident is an emotional process; it may or may not be easy for a person to move, even if it is for their protection and benefit. Often, the cost/benefit for acquisitions makes the most sense on the lowest value homes - it is important to consider offsetting acquisitions with affordable housing options. Removing the vulnerable home will also remove a property/home from the tax base of the city. The loss in tax base may make sense if a 'fix' is considerably more expensive. The city then would have to decide if it is possible to redevelop the site, raise the future structure to limit exposure, or leave it vacant. A vacant site may provide minimal temporary storage. Leaving properties vacant could also increase green space. If state or federal funding is used, it might be deed restricted as open space in perpetuity.	TBD	$$$$$	low	None
I.20	Infrastructure	Incentivize Redevelopment of Exposed Structures	The city can create a program that is available to residents where they can redevelop or reduce the flood risk of their home and be helped financially by the city.	A redevelopment project of a home is expensive financially, takes time and effort, can be stressful if the home is inhabitable for a time, and has other factors that make it difficult. Incentives offered by the city can be motivating to a homeowner to help them decide to take action and protect themselves. The incentives can also turn the necessary project from impossible to possible financially. If the voluntary acquisitions are not an option, this approach may be able to reduce flood risk while maintaining, or even improving, the tax base.	This process of redevelopment is happening without incentives. Incentives complicate the financial proposition, and involve the city in a process that is atypical and may cause more uncertainty and conflict. Incentives may need to be large to convince a homeowner to take on such a big task. The overall cost of the city depends on the number of homes that they intend to provide aid to, and the number of people willing to join the incentive program.	TBD	$$$$$	low	None

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
I.24	Infrastructure	Flood Storage with Predictive Pumping	Add the innovative technology that monitors current conditions, tracks forecasts, models predicted flooding, and operates pumps to respond, to pump stations on water bodies that could benefit from predictive pumping flood risk reduction strategies.	Water bodies with passive outlets can only be drawn down to the outlet's invert, or sometimes below with long periods of evaporation and minimal rain. All of the water in the water body is taking up storage that cannot be filled with incoming stormwater. A water body with a pumped outlet could potentially be drawn down further than normal to create the opportunity for added stormwater storage during a flood event. This is a way to create or provide storage without actually creating additional ponds, underground storage, or other types of storage on the landscape. It's simply a way to better utilize the current volume available for storage within the city.	This method (predictive pumping) requires good weather forecasts, calibrated models with proven prediction capabilities. This method will likely be a long process of working with the DNR to develop a plan that improves storage capacity for the protection of the people, but also promotes protection of the other living things in and around the water body. Retrofitting predictive pumping will require more than electronics, wiring, and programming logic. It will likely require modifications to pipes on the suction side of the pump to be able to draw the water body down further. Some lift stations are quite small (fitting in the space of a manhole perhaps) and retrofitting this type of capability may require a small box or building on the surface to house the equipment.	TBD	$$$$$	high	Development
I.25	Infrastructure	Develop Capital Project Prioritization Framework	Maximize the effectiveness of limited funds by being deliberate in examining the vulnerability to floods and the greatest sources of possible disruption. Develop a scoring system using cost benefit analysis to identify and prioritize capital projects. The method used should be objective, transparent, and easy for the public to access and understand.	Capital projects don't go through a vetting process. Requests are considered without determining how a specific issue ranks in comparison to others with regard to flood exposure, effectiveness, etc. There is a feeling among the Task Force that 'the squeaky wheel gets the grease'.	Some project petitioners may find their project doesn't even register when compared to others. Even among Task Force members this would likely be the case. Judging criteria would have to be determined.	TBD	$$	medium	Development
R.01	Regulatory Program	More Permit Review and Regulation	Engineering review for small additions, accessory structures (sheds), impervious expansions not related to a building (deck/patio/etc.). Permits for grading, new homes, and major remodels with footprint changes all include engineering review for flow paths, grading and drainage. Retaining wall, minor remodels, interior remodels, mechanical, and other permit types are not reviewed.	Reviewing more permit types may catch additional issues relating to site-to-site, drainage.	This program is staff intensive, and would require additional resources for a fairly limited benefit.	TBD	$$$	medium	Development
R.02	Regulatory Program	Regulate Flow Paths	Inventory overland flow paths. Consider flow paths in permit review process. Make room for and plan for flow where it occurs by grading or armoring flow paths. Divert or limit unplanned flow paths by requiring engineered grading plans during permit review, when serious issue areas are encountered.	Some improvements may not be presently triggering a permit review by the Engineering Department. Staff could investigate and identify issue areas, create a comprehensive list, and require private properties to address the risk in design if at the time a permit is applied for on an issue area.	Minor addition to staff review process for permits that are already reviewed by Engineering. Minor addition in permits that would trigger a review by Engineering. May limit property owners ability to implement improvements on their property or increase their costs. Policy or code revision may be necessary.	TBD	$$$	high	Planning

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
R.03	Regulatory Program	Regulate Impervious	Impervious surfaces generate more runoff. Limiting impervious surfaces by changing ordinance can reduce runoff generation.	Analysis in task force effort showed this approach is very limited in terms of effectiveness.	Major additional cost to some private parties. Moderate addition to staff review process for permits that are already reviewed by Engineering. Moderate addition in permits that would trigger a review by Engineering. May limit property owners ability to implement improvements on their property or increase their costs. Policy or code revision would be necessary. Would increase green space and may promote more trees. Both cost and benefit is highly variable depending on the level of regulation, and if mitigation is allowed. The costs are born by both the public, and private parties, depending on the level of regulation.	TBD	$$$$	low	Development
R.04	Regulatory Program	Require Private Flood Storage	Projects that trigger the regulatory check would be required to store volume on their site.	There is a perception that redevelopment is adding volume and contributing to flood impacts. Analysis in task force effort showed this approach is very limited in terms of effectiveness. Current regulatory program manages risk on a permit-by-permit basis for residential, commercial, and industrial sites. Sites larger than one acre in size are required to control stormwater volume under the Construction Stormwater Permit.	Major addition to staff review process for permits that are already reviewed by Engineering. Additional design, coaching, and inspection necessary. Post-construction program with inspections necessary. Maintenance agreements or other legal instrument necessary. Enforcement necessary. Will limit property owners ability to implement improvements on their property and will increase their costs. Policy or code revision would be necessary. There are additional costs that would be born by private parties that is not included in the costs score.	TBD	$$$$	low	None
R.05	Regulatory Program	Regulate Development to a Higher Flood Standard	Level of protection is currently the 1% annual chance (100-year) storm. This would be more restrictive, applying standards for a larger storm event such as the 0.2% annual chance (500-year) storm. (i.e. higher lowest floors and potentially further setback from water).	Climate change is a main driver of increased flooding. Future predictions are that flood events will be larger and more frequent.	Minor addition to staff review process for permits that are already reviewed by Engineering. Minor addition in permits that would trigger a review by Engineering. May limit property owners ability to implement improvements on their property or increase their costs. Policy or code revision will be necessary.	TBD	$$	low	Development

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
R.06	Regulatory Program	Tier Stormwater Utility Fee Based on Impervious Cover	High impervious sites pay more. Model site runoff generation and rework the land use x acreage calculations to consider specific impervious of the individual site.	Make the polluter pay' concept. Applying penalties for adding impervious may deter those from implementing projects.	Staff intensive. Potential for a lot of negotiating back and forth about impervious cover. Would need to consider how residential stormwater BMPs like raingardens, landscaping, permeable pavements, and rain barrels fit it. May require staff intensive site inspections/verifications and annual or biannual updates. Some owners may be willing to 'pay their way out' to still be able to complete their project.	TBD	$$$	low	Development
R.07	Regulatory Program	Participate in the Community Rating System	The City of Edina participates in the National Flood Insurance Program. The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions.	Potential cost savings for those holding policies.	Number of policies and staff time required will determine if participation is cost-effective.	TBD	$$	low	Planning
R.08	Regulatory Program	Update Plans with Flood Risk	Roll the Flood Risk Reduction Strategy and Comprehensive Water Resources Management Plan amendment into the Comprehensive Plan with a major amendment.	Promote a citywide vision for flood risk reduction.	Need to collaborate with other comp plans and groups such as the Southdale work group and other small area plans.	TBD	$$$	low	Planning
O.01	Outreach and Engagement	Promote Awareness of Stormwater System	Education and outreach to community on the function and importance of the stormwater management system.	An education and outreach program will help the community understand the function and importance of the stormwater management system and its role to minimize flooding and manage water quality. Education may improve flooding issues (e.g. improved participation in Adopt-a-Drain), identify stormwater infrastructure that is no longer functioning as designed, and help residents understand multipurpose land use (e.g. flooded parks and soccer fields).	Additional understanding of flood risk has the potential to impact property values may reduce some property values. Synergy with MS4 required community education/outreach may limit additional city resources required. Education of the community may also improve water quality (reducing illicit dumping, salt usage, etc.). Staff would utilize customer service standards of integrity, quality, and service to assist residents in accessing available resources.	TBD	$$	low	Planning

ID	Sector	Activity Name	Description	Justification/Motivating factors	Tradeoffs and Other Considerations	Task Force Rank	Cost Score	Staff Rated Effectiveness Score	Action Category
O.02	Outreach and Engagement	Develop and Communicate Dynamic Flood Threat Indicator	Forecast flood threat for design storms and also scenarios such as ice jams, saturated conditions, and snow melt. Host the dynamic indicator online.	Perception of flood threat determines action.	Would require moderate maintenance effort. Groundwater level and extent is highly uncertain and non-continuous. May provide false sense of security.	TBD	$$$	low	Development
O.03	Outreach and Engagement	Develop Groundwater Level Viewer	Users can view relative groundwater level with year over year changes.	Flooding risk may increase if shallow groundwater is high and stormwater infiltration is limited.	May provide false sense of comfort. Groundwater elevations and extent is extremely variable spatially and temporally. Might be difficult to relate relative groundwater level to an individual basement elevation. Money may be better spent encouraging those at greatest risk to invest in draintile and sump pump systems instead.	TBD	$$	low	Planning
O.04	Outreach and Engagement	Promote WaterAlert (USGS) Subscriptions	Anyone can sign up for text alerts for available United States Geological Survey (USGS) stream gauge sites.	Program already operating. Would be low cost/energy to implement. Changes can be viewed in nearly real-time. Experience may help customers to benchmark their own risk on the hydrograph (water elevation graph).	May provide false sense of comfort. Urban streams tend to be flashy (i.e., flow and elevation can increase rapidly). Can add to website Frequently Asked Questions.	TBD	$	low	Quick Win
O.05	Outreach and Engagement	Develop a 'What is My Flood Risk?" Map	Complementary to existing water resources map with the goal of communicating flood risk clearly.	Better communication of flood risk. Understanding circumstance is first step in addressing vulnerability and exposure.	Concern over impact on property values as community becomes more flood aware. It may be difficult to show the depth of flooding on the map - some may be an inch whereas others may be more than a foot. Some assumptions are made about topography - more detailed surveys on a site by site basis could show structures higher or lower than the model and aerial photo suggest. Concern about accuracy and completeness. Feedback from those that use the map is critical.	TBD	$$$	high	Quick Win
O.06	Outreach and Engagement	Promote Sandbag Service	Create series of videos to communicate how to make a request for sandbags and how to build a sandbag wall. Train staff how to receive requests and provide assistance over the phone.	Most are unaware of the service. Those that are aware highly value the service.	Some property owners and renters may have limited ability to place their own sandbags. Unclear what service provider might do this type of work if it were hired out. Disposal of sandbags post-event. Staff would need to be trained on how to receive requests and provide assistance over the phone.	TBD	$$	high	Quick Win

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O.07	Outreach and Engagement	Develop Frequently Asked Questions (FAQs)	Available on the City website. A resource for reception staff to direct customers to.	Would help to debunk myths. Help people self-serve the information. More immediate access to information versus calling a staff person, although always an option.	Occasional review and minor edits would be needed. Need to inform staff that the resource is available to share with customers. Standard customer service standards of integrity, quality, and service apply.	TBD	$$	high	Quick Win
O.08	Outreach and Engagement	Develop Flood Intervention Fact Sheets	Develop Fact Sheets for common interventions that property owners and renters could implement to reduce their exposure and vulnerability to flooding. Interventions may be pre, mid, or post storm. Fact sheets would provide a description, general cost information, and appropriate applications. Examples include floodproofing, elevating utilities, flood insurance, sanitary backflow prevention, sandbagging, among others.	Some feedback suggests that the interactive water resources map in its current form requires technical expertise to interpret. Changes to the interactive map would make the flood risk information more accessible. A potential barrier to reducing one's own exposure to flooding may be their perceived ability (knowledge, skills, and resources) to take action.	Other barriers, such as cost may limit a property owner or renter's ability to implement. Renters may have limited ability to implement strategies. Considerations ought to be made for all residential structures, not just single dwelling units. Fact sheets may be used by sellers to show how structures are less exposed/vulnerable.	TBD	$$$	medium	Quick Win
O.09	Outreach and Engagement	Provide Stormwater Technical Assistance Grant Program	Pilot year completed in 2019. Competitive grants help pay for technical evaluation of an issue affecting a resident's property. A report documents understanding of the problem and lays out a potential plan that could then be implemented by the property owner, at their cost.	Some technical assistance can increase the perceived ability (expertise, knowledge, resources) for an individual to help themselves. Case studies may be useful to others in similar situations.	Grant covers design, up to a cap. Grant does not cover implementation. Reformat to cover more, from 1:1 to presentation and future design consultations. This could be like a mini flood summit. $20,000/yr existing funding. Would need to ensure the program is attractive to applicants.	TBD	$$$	medium	Quick Win
O.10	Outreach and Engagement	Host Flood Summit	Direct mail invitations to at-risk properties. Get all stakeholders together including representatives from neighborhoods, insurance, emergency service professionals, county, police and fire, landscapers, home service providers, MN DNR, engagement professionals, decision-makers, Watershed Districts, infrastructure experts, neighboring cities. All share and discuss roles and approaches for a changing climate with increasing flood risk.	Incorporates various approaches involved in reducing exposure, increasing resilience to changing risks, transformation, reducing vulnerability, transferring and sharing risks, and preparing, responding, and recovering.	Would require major staff effort and coordination of other parties. Would be a pilot. Unaware of a local model to follow or existing process/program to leverage. Consider equity when selecting a pilot community.	TBD	$$$	medium	Development

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O.11	Outreach and Engagement	Engage with Stakeholders at Time of Capital Investment	Incorporate into public improvements such as street reconstruction and park improvement projects. Develop custom engagement plans as appropriate.	Incorporate into public improvements such as street reconstruction and park improvement projects. Develop custom engagement plans as appropriate.	Opportunities to address problem areas may lie outside of the public improvement project boundaries. Some solutions may require private property cooperation in the form of easements, agreements, and assessments. This is a long term strategy driven by private and public investment.	TBD	$$	medium	Development
O.12	Outreach and Engagement	Engage with Realtors, Developers, and Insurance Agents on Local Flood Risk	Host a class to inform realtors, developers, and insurance agents on local flood risk. Presentation materials could be hosted online or made into a brief video.	As more stakeholders understand flood risk, there will likely be a market effect.	As more stakeholders understand flood risk, there may be a market effect. Desire for residents and property owners to be engaged first. Information must be accurate, current, and easy to understand.	TBD	$	medium	Development
E.01	Emergency Services	Develop Local Flooding Emergency Response Plan	Source flood threat information and predict flood threat. Define affected areas/parties and frontline communities. Develop warning system. Develop emergency response plan. Establish public information program. Develop maintenance and improvement program. Coordinate with other departments/agencies.	A hazard response plan exists for major disasters only. Customers expect a higher level of service and response than the current major disaster response plan provides. The perceived flood threat likely influences property owner/renter behavior. The plan should consider frontline communities and vulnerability. Developing a plan based on historical service requests alone is not an equitable approach.	This strategy doesn't effect the flood, but instead effects the preparation for and recovery after a disaster. Damages may be reduced and a return to normalcy may happen more rapidly. Would require setting a trigger condition. Opportunity to consider better protections for frontline communities.	TBD	$$$	medium	Planning
E.02	Emergency Services	Define and Communicate the Available Services	Info about what the City can and can't do about active flooding; explanation of how the City prioritizes flood-related requests for service posted to City website. Call center training and emergency response plan inclusion.	There is a gap between the status quo service level and customer expectations. Better defining available services may motivate property owners and renters to take actions to reduce their own exposure.	Potential equity disparity if service delivery is driven by requests for service only. Have a plan for engaging with frontline communities, reaching out rather than only waiting for a request for service.	TBD	$$	medium	Quick Win