Soybean Farmer

Gabriel is a farmer with soybean fields on the bank of a river. Every summer he struggles to keep crops alive through short, intense rainfalls followed by longer periods of drought. He is saving money to purchase expensive irrigation equipment to water the crops during periods of drought. However, he is concerned about heavy rainfall causing soil erosion which often washes away important nutrients that could end up polluting the nearby river. Gabriel has planted grass along his fields to help stop some of the erosion, but he doesn't think it's enough to prevent runoff during an intense rainfall.

Soybean Farmer

Soybean Farmer

Soybean Farmer

Soybean Farmer

Soybean Farmer

Soybean Farmer

Soybean Farmer

Soybean Farmer

City Planner

Lin works to figure out the best way to use the city's land to accommodate a growing and changing population and environment. She has been thinking about how to improve future neighborhoods to decrease the probability of flooding and power outages, while also considering the problem of wastewater overflow from sewer systems during storms. She is concerned that while the city needs to replace the current combination sewers with sanitary sewers, the cost and inconvenience of doing so will cause the public to disapprove of the project.

City Planner

City Planner

City Planner

City Planner

City Planner

City Planner

City Planner

City Planner

Director of Community Health

Ray is a local public health official who works to keep the community safe and healthy. He is concerned about the health problems that can occur after a heavy amount of rain. The sewer systems in his city have already overflowed multiple times in the last decade, leaking bacteria ridden sewage into basements and streets. When flooding occurs, it can take a long time to sufficiently dry out buildings, which could lead to mold growth that causes respiratory problems. It will be expensive to update the city's infrastructure, but Ray believes that they health and safety of the community should be a top priority in the budget.


Director of Community Health

Director of Community Health

Director of Community Health

Director of Community Health

Director of Community Health

Director of Community Health

Director of Community Health

Director of Community Health

Historian

One of the last remaining Hopewell Indian Tribe burial mounds is located in the floodplain of the local river. Decades ago, city expansion efforts destroyed many of the mounds and the numerous artifacts that could have been hidden inside. As a historian, Anna wants to ensure that what is left of the mounds can be safely preserved. However, whenever the river floods, it threatens to wear away the edges of the mounds. She is concerned that because so few people know that the mounds exist, they won't be considered in future resilience plans.

Historian

Historian

Historian

Historian

Historian

Historian

Historian

Historian

University Professor

Denise is a professor at a local university. She isn't an expert on climate science, but she has spent time researching changing weather patterns and their effects on the country. She is concerned that city officials will spend too much time and money on creating solutions to keep the city from flooding, and not enough on having the appropriate emergency response systems in place in the case of a severe flood. Since the amount of rainfall the city will have in the future is so difficult to predict, Denise is worried that newly built systems based on historic weather patterns will not be adequate.

University Professor

University Professor

University Professor

University Professor

University Professor

University Professor

University Professor

University Professor

Floodplain Resident

Maria lives in the floodplain of the river. She knows the risks associated with living in an area that can easily flood, but it was the most affordable option for her young family. She installed a sump pump to keep the basement dry if there is a lot of rain, but she notices a lot of flooding on the roads in her neighborhood. She is especially concerned that school buses won't be aware of the flooding on the roads and will get stuck or have to drive off course… endangering those on board and delaying the scheduled pick-ups and drop-offs.


Floodplain Resident

Floodplain Resident

Floodplain Resident

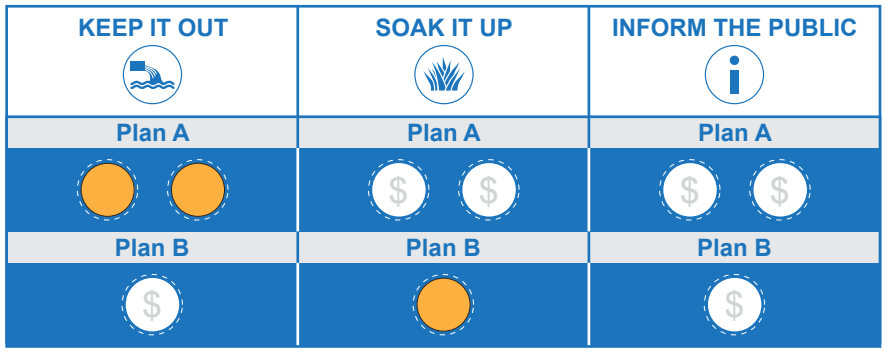
Floodplain Resident

Floodplain Resident

Floodplain Resident

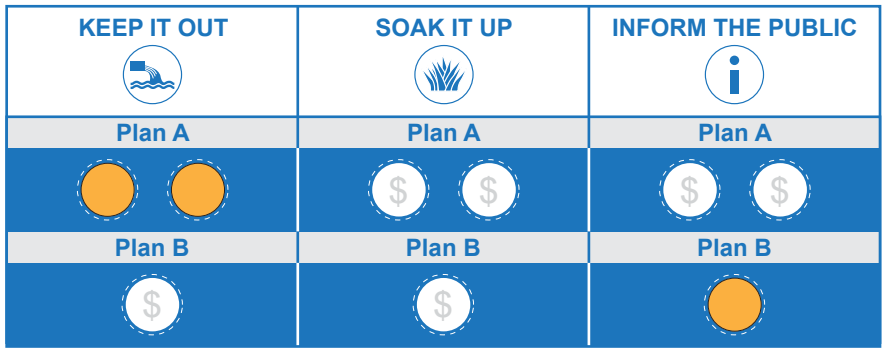
Floodplain Resident

Floodplain Resident



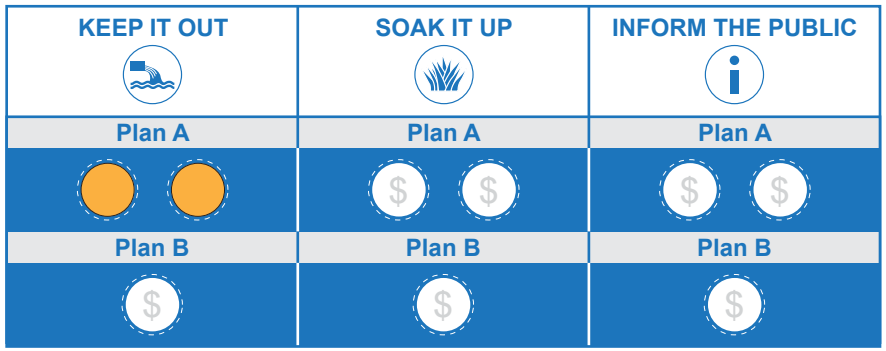
EP_001

Our plan puts a lot of money towards the Keep it Out strategy and a little money towards the Soak it Up strategy. Once completed, the plan eliminates the possibility of what's predicted to be a 100-year flood. The plan will involve building a new wastewater treatment plant that can treat three times as many gallons of waste water a day, replacing half of the city's combined sewer systems with separated sewers, and installing state of the art subway entrance covers. In addition to these changes, the city will also create incentives for businesses and home owners to create green roofs and rain gardens for their homes and buildings to help capture and filter rainwater. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Construction for the new sewer system will mean long traffic jams for daily commuters, and heavier traffic in neighborhood streets used as short cuts to avoid the traffic. There are also concerns about the construction of the new wastewater treatment disrupting historically significant burial mounds, but the city believes it is the only appropriate location for the new plant.



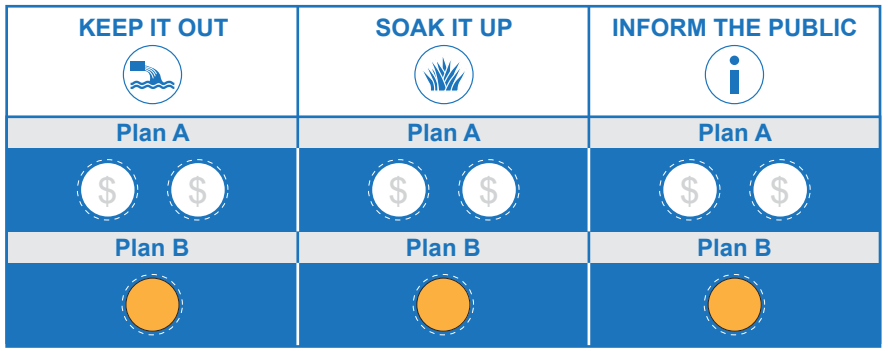
EP_002

Our plan puts a lot of money towards the Keep it Out strategy and a little money towards the Inform the Public strategy. Once completed, the downtown and suburban neighborhoods of the city are protected from what's predicted to be a 100-year flood, but the north west part of the city will remain vulnerable to flooding. The plan will involve building a new wastewater treatment plant that can treat three times as many gallons of waste water a day, replacing half of the city's combined sewer systems with separated sewers, and installing state of the art subway entrance covers. In addition to these changes, the city invests in a public education campaign to educate groups of people on the hazards of extreme precipitation, and builds renewable microgrids for hospitals, police stations, and fire stations. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Construction for the new sewer system will mean long traffic jams for daily commuters. There are also concerns about the construction of the new wastewater treatment plant disrupting historically significant burial mounds, but the city believes it is the only appropriate location for the new plant. Flooding will still affect farmers, who are worried about their crops being killed by the excess water, and some school administrators are upset that their schools are not being picked for microgrid installation.



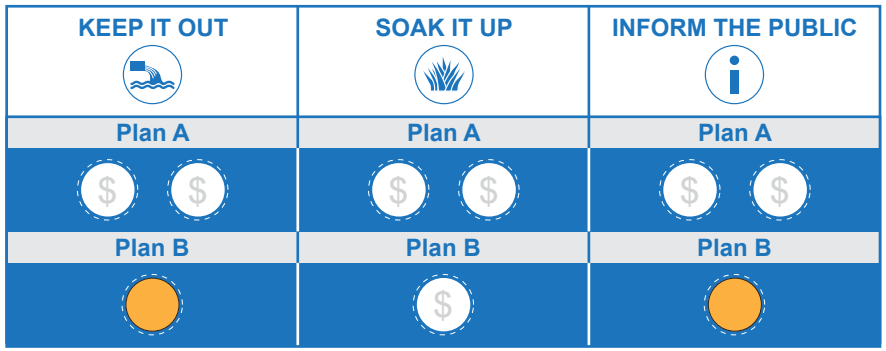
EP_003

Our plan puts a lot of money towards the Keep it Out strategy with one leftover coin. Once completed, the downtown and suburban neighborhoods of the city are protected from what's predicted to be a 100-year flood, but the north west part of the city will remain vulnerable to flooding. The plan will involve building a new wastewater treatment plant that can treat three times as many gallons of waste water a day, replacing half of the city's combined sewer systems with separated sewers, and installing state of the art subway entrance covers. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Construction for the new sewer system will mean long traffic jams for daily commuters, and heavier traffic in neighborhood streets used as short cuts to avoid the traffic. There are also concerns about the construction of the new wastewater treatment disrupting historically significant burial mounds, but the city believes it is the only appropriate location for the new plant. Flooding will still affect farmers, who are worried about their crops being killed by the excess water if they are not able to afford the equipment necessary to keep the water from inundating their fields.



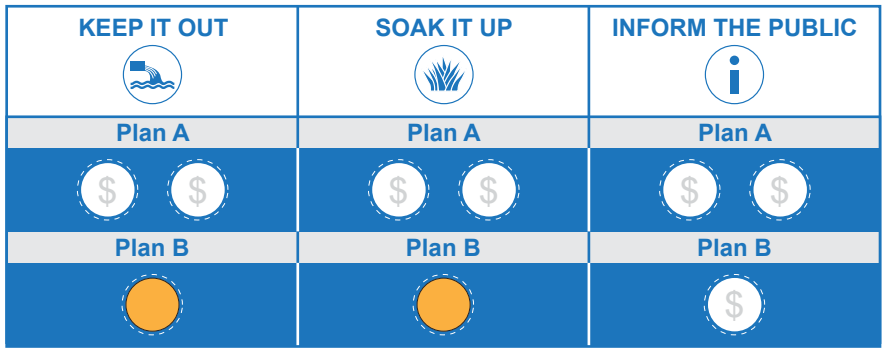
EP_004

Our plan puts a small amount of money towards each of the strategies. Once completed, the downtown and suburban neighborhoods of the city remain vulnerable to what's predicted to be a 100-year flood, but the rest of the city is protected from the flooding. The plan will involve building water plazas to capture excess water in the city, creating incentives for businesses and home owners to have green roofs, rain gardens and rain barrels, and investing in microgrids for hospitals, police stations, and fire stations to maintain power in emergency situations. While these updates will help decrease the amount of flooding in the city, some people are unhappy with the changes. The city is concerned about the wastewater treatment plant becoming overwhelmed and backing up during the next storm, as well as the increasing incidents of powerlines being downed by rushing flood waters, and the public is concerned about the safety of the water plazas as children can easily fall into the water and drown. Neighborhood residents have been forced to relocate to stay away from flooding. Low-income neighborhoods are being inundated with water because they can't afford to invest in green infrastructure, and local schools are upset that they were not chosen to receive funding to build a microgrid to keep the power running during extreme events.



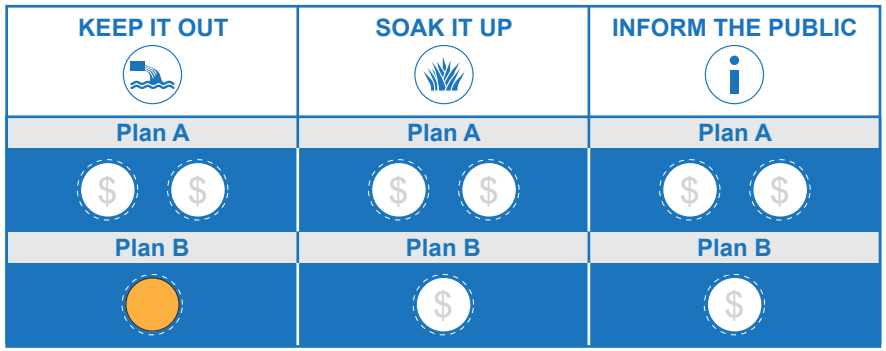
EP_005

Our plan puts a small amount of money towards the Keep it Out and Inform the Public strategies. Once completed, the downtown and suburban neighborhoods of the city and the more rural parts of the city will remain vulnerable to what's predicted to be a 100-year flood. The plan will involve building water plazas and parks to capture excess water in the city, and investing in microgrids for hospitals, police stations, and fire stations to maintain power in emergency situations. These updates are not going to help decrease the amount of flooding in the city and some people are unhappy with the updates that have been made. The wastewater treatment plant is likely to become overwhelmed and back up during the next storm allowing untreated water to flow into streets and water systems. The public is concerned about the safety of the water plazas as children can easily fall into the water and drown, and local schools are upset that they were not chosen to receive funding to build a microgrid to keep the power running during extreme events. The university is also concerned that parts of their campus remain vulnerable to flooding since they have had to cancel classes due to intense flooding in the past.



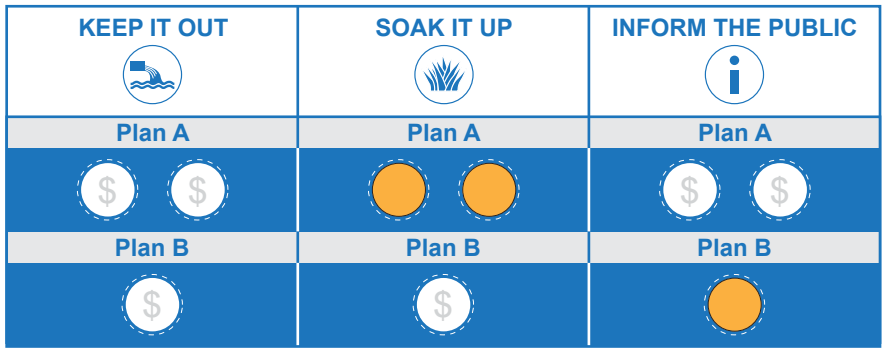
EP_006

Our plan puts a small amount of money towards the Keep it Out strategy and the Soak it Up strategy. Once completed, the downtown and suburban neighborhoods of the city remain vulnerable to what's predicted to be a 100-year flood, but the rest of the city is protected from the flooding. The plan will involve building water plazas and parks to capture excess water in the city, and creating incentives for businesses and home owners to have green roofs, rain gardens and rain barrels. While these updates will help decrease the amount of flooding in the city, neighborhoods are still at risk for floods and some people are unhappy with the plan. Neighborhood residents have been forced to relocate to stay away from flooding, and low-income neighborhoods are being inundated with water because they can't afford to invest in green infrastructure. Residents are concerned about the increasing incidents of powerlines being downed by rushing flood waters, and the possibility of the wastewater treatment plant becoming overwhelmed and releasing wastewater into the streets and local waterways. The public is also thinking about safety precautions for the water plazas as children can easily fall into the open pools of standing water.



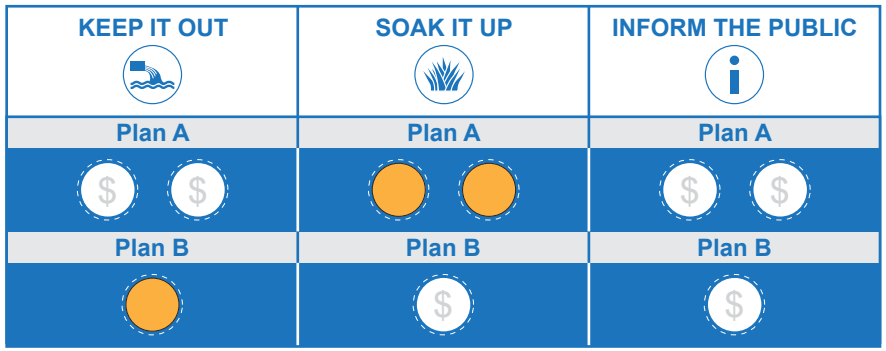
EP_007

Our plan puts a small amount of money towards the Keep it Out strategy with two coins leftover. Once completed, the downtown, suburban neighborhoods, and rural areas of the city will remain vulnerable to what's predicted to be a 100-year flood. The plan will allow the city to invest in building water plazas and parks to capture and filter excess water in the city. These updates will help with some excess water in the city, but the city remains vulnerable to flooding and some residents are not happy about the changes. Without updates, the wastewater treatment plant is likely to be backed up during the next extreme precipitation event which could mean sewer overflows into city streets, and many people are concerned about the safety of the water plazas as children could easily fall into the standing pools of water. The university is also concerned about extreme precipitation as they have had to cancel classes in the past due to sever flooding on campus.



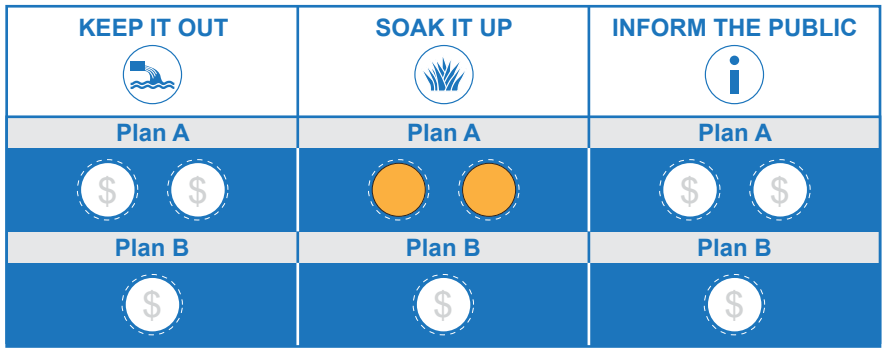
EP_008

Our plan puts a lot of money towards the Soak it Up strategy and a small amount of money towards the Inform the Public strategy. Once completed, the downtown and suburban neighborhoods of the city are protected from what's predicted to be a 100-year flood, but the north west part of the city will remain vulnerable to flooding. By investing a large portion of money in the Soak it Up strategy, green infrastructure will be implemented throughout the city. Vulnerable parking lots and alley ways will be repaved with porous pavement, roads will be restructured to include green space, and gardens will be placed around stormwater drains. In addition to these changes, the city invests in a public education campaign to educate groups of people on the hazards of extreme precipitation, and builds renewable microgrids for hospitals, police stations, and fire stations. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Flooding will still affect farmers, who are worried about their crops being killed by the excess water inundating their fields. Permeable sidewalks are causing problems in the winter as snowplows and shovels are getting caught on the bricks, leading to uneven pathways for pedestrians. And, local schools are upset that they were not chosen to receive funding to build a microgrid to keep the power running during extreme weather events.



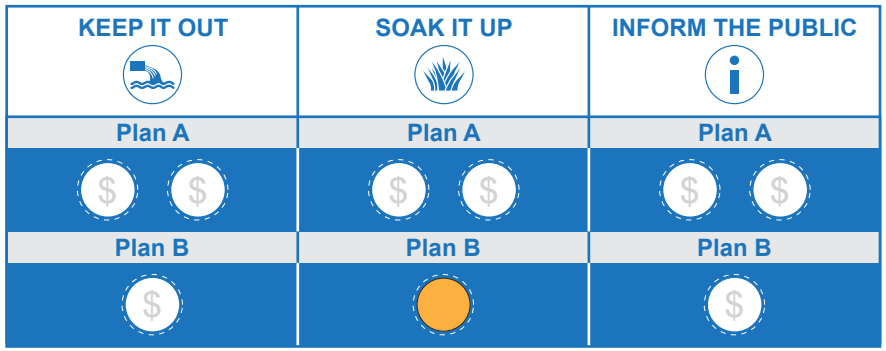
EP_009

Our plan puts a lot of money towards the Soak it Up strategy and a small amount of money towards the Keep it Out strategy. Once completed, the downtown and suburban neighborhoods of the city are protected from what's predicted to be a 100-year flood, but the north west part of the city will remain vulnerable to flooding. By investing a large portion of money in the Soak it Up strategy, green infrastructure will be implemented throughout the city. Vulnerable parking lots and alley ways will be repaved with porous pavement, roads will be restructured to include green space, and gardens will be placed around stormwater drains. The plan will also involve building water plazas and parks to capture and filter excess water in the city. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Permeable sidewalks are causing problems in the winter as snowplows and shovels are getting caught on the bricks, leading to uneven pathways for pedestrians. Additionally, residents are worried that the wastewater treatment plant will be overwhelmed by the next storm and cause untreated water to flow into streets and water systems. The public is also thinking about safety precautions for the water plazas as children can easily fall into the open pools of standing water.



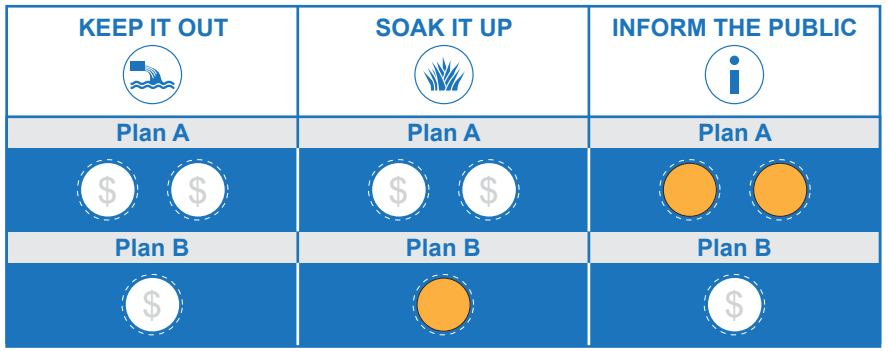
EP_010

Our plan puts a lot of money towards the Soak it Up strategy with one leftover coin. Once completed, the downtown and suburban neighborhoods of the city are protected from what's predicted to be a 100-year flood, but the north west part of the city will remain vulnerable to flooding. By investing a large portion of money in the Soak it Up strategy, green infrastructure will be implemented throughout the city. Vulnerable parking lots and alley ways will be repaved with porous pavement, roads will be restructured to include green space, and gardens will be placed around stormwater drains. While these updates will help decrease the amount of flooding in the city, some people are unhappy about these impending updates. Permeable sidewalks are causing problems in the winter, as snowplows and shovels are getting caught on the bricks, causing uneven pathways for pedestrians. Flooding will also still affect farmers, who are worried about their crops being killed by the excess water if they are not able to afford the equipment necessary to keep the water from inundating their fields.



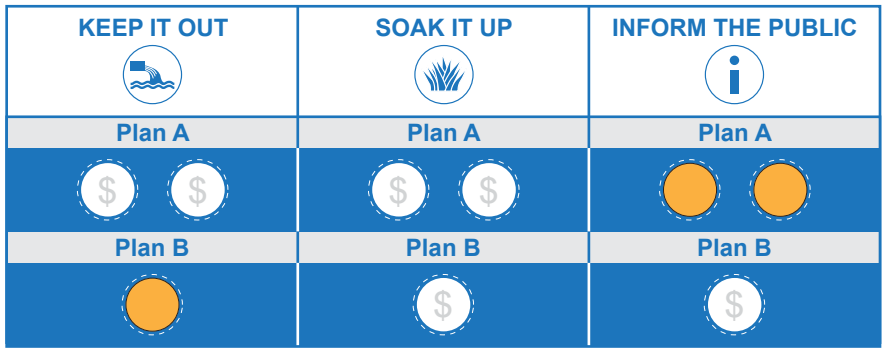
EP_011

Our plan puts a small amount of money towards the Soak it Up strategy with two leftover coins. Once completed, the downtown and suburban neighborhoods of the city and will remain vulnerable to what's predicted to be a 100-year flood. The plan allows the city to invest in creating incentives for businesses and home owners to create green roofs and rain gardens for their homes and buildings to help capture and filter rainwater. While these updates will help decrease the amount of flooding in the more rural areas of the city, there is still flooding in the downtown and suburban areas, leaving many people unhappy about the impending updates. Residents are concerned about the increasing incidents of powerlines being downed by rushing flood waters, and some neighborhood residents have been forced to relocate to stay away from flooding. Low-income neighborhoods are being inundated with water because they can't afford to invest in green infrastructure.



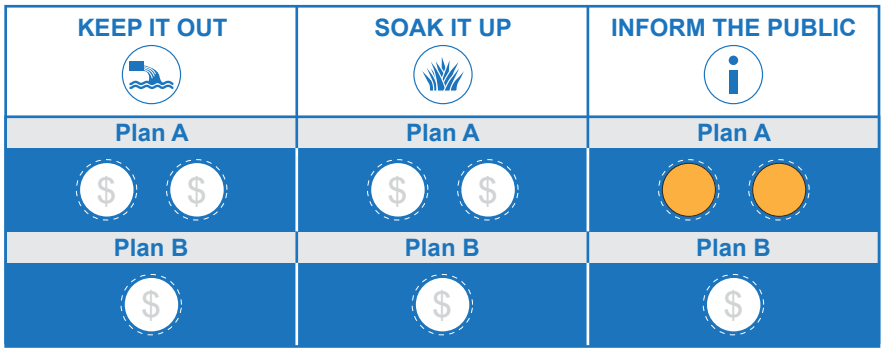
EP_012

Our plan puts a small amount of money towards the Soak it Up and strategy and a lot of money towards the Inform the Public strategy. Once completed, the downtown and suburban neighborhoods of the city and will remain vulnerable to what's predicted to be a 100-year flood. By investing in the Inform the Public strategy, the city will be able to implement a plan that designates and prepares more storm shelters for residents to evacuate to, in addition to moving powerlines underground and raising electrical transformers to maintain power and communication during extreme rainfall events. While these updates will help decrease the amount of flooding in the more rural areas of the city, there is still flooding in the downtown and suburban areas, leaving many people unhappy about the impending updates. Residents are concerned about the increasing incidents of powerlines being downed by rushing flood waters, but they are also considering the risks, like fires, when the lines are moved underground. The public is also concerned about wastewater overflows into city streets and basements due to an overwhelmed sewer system.



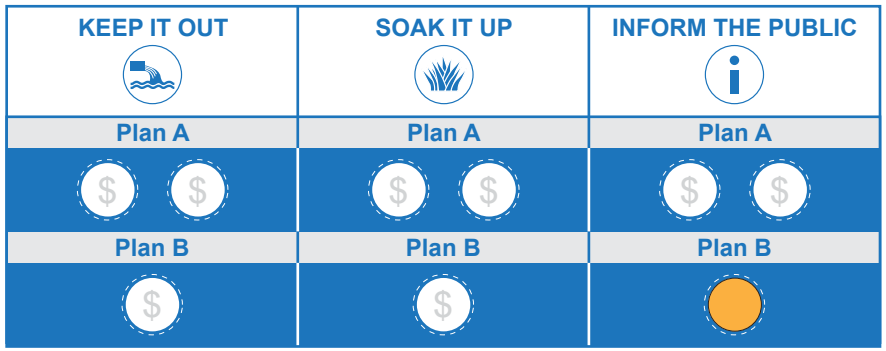
EP_013

Our plan puts a small amount of money towards the Keep it Out strategy and a lot of money towards the Inform the Public strategy. Once completed, the downtown, suburban neighborhoods, and rural areas of the city will remain vulnerable to what's predicted to be a 100-year flood. The plan will focus on ensuring power remains available during extreme precipitation events by burying power lines underground and raising electrical transformers above the flood line, as well as designating and preparing more storm shelters for residents in case an evacuation is necessary. The plan will also involve building water plazas and parks to capture and filter excess water in the city. These updates will help with some excess water in the city and help keep the public well informed, but the city remains vulnerable to flooding and some residents are not happy about the changes. The buried electrical lines can cause underground fires and the sewer system can back up, allowing wastewater to flood into neighborhood streets and homes. The city created water plazas downtown, but the public is worried about the safety of children who could fall into the standing pools of water. University officials are also concerned about flooding as the school grounds often become inundated with water and they have to cancel classes to keep students from wading through water.



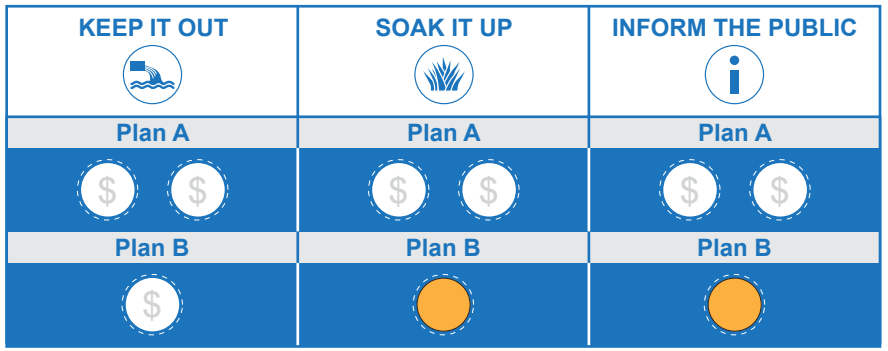
EP_014

Our plan puts most of the money towards the Inform the Public strategy with one leftover coin. Once completed, the downtown, suburban neighborhoods, and rural areas of the city will remain vulnerable to what's predicted to be a 100-year flood. The plan will focus on ensuring power remains available during extreme precipitation events by burying power lines underground and raising electrical transformers above the flood line. It will also involve designating and preparing more storm shelters for residents in case an evacuation is necessary. These updates will help with some excess water in the city and help keep the public well informed, but the city remains vulnerable to flooding and some residents are not happy about the changes. The buried electrical lines can cause underground fires that are difficult and expensive to repair, and the sewer system can back up and overflow, allowing potentially hazardous wastewater to flood into neighborhood streets and homes.



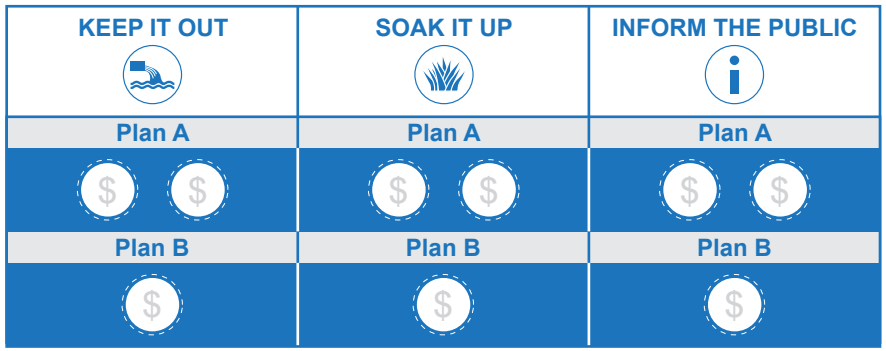
EP_015

Our plan puts a small amount of money towards the Inform the Public strategy with two leftover coins. Once completed, the downtown, suburban neighborhoods, and rural areas of the city will remain vulnerable to what's predicted to be a 100-year flood. The plan will allow the city to invest in a public education campaign that educates the city on the hazards of extreme precipitation through a social media campaign as well as traditional advertising. The city will also build renewable microgrids for hospitals, police stations and fire stations so they continue to have power if the larger grid is impacted by an extreme precipitation event. These updates will help with some excess water in the city and help keep the public well informed, but the city remains vulnerable to flooding and some residents are not happy about the changes. Some people are concerned about the aging sewer system that can back up and overflow, allowing potentially hazardous wastewater to flood into neighborhood streets and homes. Flooding will also affect farmers, who are worried about their crops being killed by the excess water if they are not able to afford the equipment necessary to keep the water from inundating their fields. Additionally, not all buildings will gain access to funding for microgrids, and some local schools are upset that they were not chosen.



EP_016

Our plan puts a small amount of money towards the Soak it Up strategy and the Inform the Public strategy. Once completed, the downtown and suburban neighborhoods of the city and will remain vulnerable to what's predicted to be a 100-year flood. The plan allows the city to invest in creating incentives for businesses and home owners to create green roofs and rain gardens for their homes and buildings to help capture and filter rainwater. However, residents are concerned about the increasing incidents of powerlines being downed by rushing flood waters, and low-income neighborhoods are being inundated with water because they can't afford to invest in green infrastructure. The plan will also allow the city to invest in a public education on the hazards of extreme precipitation using social media as well as traditional advertising. The city will also build renewable microgrids for hospitals, police stations and fire stations so they continue to have power if the larger grid is impacted by an extreme precipitation event. The education campaigns and microgrids will help in some ways, but residents are concerned about the aging sewer system that could overflow, allowing hazardous wastewater to flood the streets. Farmers are also worried about their crops being killed by flooding, because the necessary equipment to keep the water from inundating their fields is expensive.



EP_017

No strategies implemented. The city continues to experience growing vulnerabilities to extreme precipitation without a resilience plan.

KEEP IT OUT



Plan A

The city's aging combined sewer system is currently releasing nearly 3 billion gallons of untreated wastewater into nearby water ways due to combined sewer overflows during heavy rainfalls. To reduce this amount of overflow by 95%, the city will replace half of the combined sewer system pipes and update the wastewater treatment plant - investing $5 billion in construction costs over the next 25 years. The city will also prepare for future flooding events by designing and installing emergency covers for public transportation station entrances. This billion-dollar project will allow for quick and complete coverage of each vulnerable station entrance, allowing the stations to remain dry and functional for use immediately after a storm.

Plan B

The city cannot currently afford to invest in high budget, long term projects, but needs to decrease the amount of stormwater from flooding the streets and running into the local river. The city has invested $4.5 million in building a water plaza for the city. A water plaza can serve as a space to play sports, eat lunch, and relax when it's dry, but will catch stormwater and act as a water basin during an extreme rain event. These plazas can be a cost-effective way to beautify the city and take some stress off of the sewer system. To protect their public transportation tunnels, the city is planning a $30 million project to raise the tunnel vents located in floodplains above ground level to prevent inundation, and seal off the vents that are not necessary.

SOAK IT UP




Plan A

In order to clean up the local river, the city has initiated a $2.5 billion green infrastructure project to prevent sewer overflows and excessive storm water runoff. The project will strive to replace unnecessary "grey infrastructure" with new "green" options that slow and filter stormwater into the ground or sewer system. Planters will be built around stormwater drains, rain gardens created along buildings, and green roofs installed. The city will also replace asphalt paving with porous pavement in parking lots and curbside parking areas that are close to the river. Green infrastructure tends to last longer than typical grey infrastructure, and can reduce energy costs in the long run. Cleaning up the river could also make it available for recreational uses.

Plan B

The city has initiated a $15 million incentive program that issues grants and tax breaks to private property owners such as homeowners and businesses that integrate green infrastructure on their properties. Homeowners can apply for grants to design and build rain gardens, purchase rain barrels, and build flow-through planters. Businesses can also apply for funding to build green roofs and rain gardens, and purchase cisterns to limit the amount of stormwater runoff from the mostly impervious concrete buildings and surroundings. These new incentives could decrease the amount of stormwater runoff by millions of gallons.

INFORM THE PUBLIC

Plan A

A big problem during extreme weather events, including extreme precipitation, is power loss due to flooding, wind, and heavy snow affecting power lines. To keep the city's power on during unpredictable storms, the city will invest $1 billion to move vulnerable powerlines under ground, raise vulnerable switchboards above the floodplain, and improve the system to include more redundancy. The city will spend an additional $200,000 to update the emergency notification system to reach more people in more languages to make sure people can prepare and head to safety if needed, and designate more buildings as storm shelters throughout the city.

Plan B

To keep costs low, but to ensure the city can limit the number of power outages, the city has decided to create microgrids for hospitals, homeless shelters, and schools. These microgrids will disconnect from the larger power grid and run on a separate power source during a storm, which allows the buildings to continue running properly if a power outage occurs. The city will also set up an emergency alert system that sends alerts in multiple languages to cell phones and start a public safety campaign that explains how to remain safe during extreme precipitation events, including when to evacuate and where to go if an evacuation is needed. All of these updates will cost just over $20 million.