

FLOODING IN MILTON: COLLECTIVELY MANAGING CLIMATE CHANGE RISKS

General Instructions

The city of Milton is home to 80,000 people and is known as a great place to live. It has strong working and middle classes, historic neighborhoods, farmland, and open spaces. Most residents live in the southern part of the city, an area packed with residential and commercial neighborhoods. The more rural, northern part is dotted with farms and woodlands and is where developers are now eager to build new residential neighborhoods. (See Figure 1 for a map of Milton.) Milton is also home to the Granite River, which historically provided power for a thriving mill industry. As the mill industry declined, the river became the focus of recreational uses, such as parkland and boating. Recently, the residents of Milton were reminded of the devastating power of the Granite River when many homes, businesses, and roads were destroyed or damaged in a major flood. Fortunately, no lives were lost.

River flooding in Milton is related to two different trends. First, over the last 50 years, as Milton and the surrounding metropolitan region have developed, hard surfaces like roads and buildings have caused stormwater runoff during storms to flow quickly into swollen creeks and rivers rather than drain into the ground. Second, it appears that rainfall patterns are changing: this recent storm is the third “100-year storm” that Milton has experienced in the last decade.¹ Not only have these storms increased the frequency of river flooding, but they have also caused sewer collection systems to occasionally overflow onto streets and into storm drains, thus polluting recreational areas such as beaches and fishing waters.

Now, the city of Milton is in a difficult position. A popular TV news reporter was preparing a story about local climate change risks based on a study by faculty at Brackley College when a major storm caused significant flooding. From the reporter’s perspective, the storm underscored the point she wanted to make: climate change will have significant consequences for Milton.

The reporter captured dramatic footage of roads, parking lots, homes, and businesses under several feet of water. Milton quickly became a striking example of Brackley professor’s statement: “Climate change may be caused by millions of decisions around the globe, but it’s up to local communities to deal with the impacts.” After the story ran, the mayor’s office was inundated with requests from residents and business owners. They demanded the town do

¹ A 100-year storm refers to rainfall totals that have a 1% chance of occurring in any given year.

something about river flooding, an existing problem that could get worse as a result of climate change.

In response, the mayor convened the **River Flooding Task Force**, a small working group of city officials and community leaders, to **generate recommendations about how flood risks in Milton can be managed now and into the future**. If this Task Force can reach agreement on a set of actions to be taken, the mayor will make it a priority to implement them during the remainder of his administration. **He will consider an agreement that has the support of only five of the six group members**, but it is more risky politically for him to pursue an agenda that does not have support from all the parties. Hence, **he would strongly prefer that the group to come to a full consensus on a recommended strategy**.

The mayor is also concerned about sound fiscal management. Milton ran unexpected deficits the past two years and had to use all of its “rainy day” funds. New, large public projects will likely require raising fees or taxes. However, the cost of repairs and recovery from another big storm could cost the city \$15 - \$20 million, a significant hit to their annual budget \$175 million.

The mayor has received word that some federal agencies are willing to provide financial support for local risk-management activities. If at least five of six members of the River Flooding Task Force can reach agreement on how best to reduce the city’s vulnerability to a changing climate and win broad community support, the city is likely to be near the front of the line for substantial federal funding.

About Today’s Meeting

This is the third and final meeting of the Task Force. At its first meeting, the group heard about the Climate Change Risk Assessment prepared by the faculty at Brackley College (Appendix A). The Task Force was surprised to learn that **within two decades, there could be a 70% increase of extreme precipitation events**,² which could potentially lead to a doubling in flood events. **In the long-term, the ocean’s increasing tidal inflow into the Granite River will increase the likelihood of higher river levels and river flooding**. At the first meeting, the Task Force also agreed upon a trained, neutral facilitator, who was invited to facilitate the remaining two meetings.

During the second meeting, the group heard a presentation about best practices for managing urban river flooding and brainstormed a few options that seemed most appropriate for Milton.

During today’s final meeting the Task Force must decide on a set of recommendations for the mayor regarding two aspects of the city’s vulnerability to river flooding: managing flood risks in the Lower Granite River Area and managing growth in Northern Milton. The group should keep in mind that the mayor is asking for policy advice—he does not need all the details right now. **Don’t get lost in the details; you don’t have a lot of time.**

² An extreme precipitation event is defined as four inches of rain in 48 hours.

Issues for Today's Meeting

Issue 1: Managing Flood Risks in the Lower Granite River Area

The Task Force is **focusing its efforts on the Lower Granite River portion of the river**, which has experienced particularly bad flooding during recent storms (Figure 2). There are many homes and businesses located in the floodplains in this area.³

The group brainstormed some options for how to deal with flooding in this area during the second meeting. In reaching a decision today, the group is free to generate a recommendation that is a hybrid of these options or to add additional requirements or contingencies.

- **Building floodwalls** along the Granite River could prevent the river from spilling into the floodplains where homes and business are located. The advantage of this option is the high level of protection it provides for neighborhoods located in the floodplains, as long as flood conditions do not exceed the design capacity of the walls. Floodwalls built today will have to handle changing rainfall patterns for at least the next 50 years. There are also several disadvantages. If the floodwalls fail, damage could be severe. Floodwalls tend to increase flood risks in downstream areas without floodwalls, damage the river ecosystem, and reduce everyone's access to the river. Lastly, obtaining all the necessary environmental permits could be challenging, given the environmental impacts of the project.
- **Flood-proofing buildings** in the floodplain could reduce the amount of financial damage that flooding causes by reducing the cost of repairs and allowing people to return to their home or work more quickly. However, flood-proofing could be very expensive for some Milton homeowners and businesses. Flood insurance rates are almost certainly going to increase in the next few years as federal subsidies are eliminated due to the recent Flood Insurance Reform Act. This could leave Milton residents without flood-proofed homes and without affordable flood insurance. The group developed the idea of a property tax rebate whereby the city would reduce property taxes for homeowners and businesses in flood-prone areas if they purchased flood insurance and implemented flood-proofing strategies (such as flood-resistant building materials and removing utilities from their basements).
- **Flood-proofing key infrastructure**, such as sewer collection systems and sewer pump stations, could reduce physical and environmental damage from floods and strengthen the resilience of local infrastructure services. Pump stations tend to be located in low-lying areas and if they flood, sewage can back up into homes and onto streets. Pump stations could be flood-proofed by surrounding them with a small wall and access gate. The cost, which is about \$600,000 per pump station, could be financed over time by water rates.
- **Managed retreat** entails moving people and property out of the areas at the highest risk of flooding. The city could create a **voluntary program to purchase properties within flood-prone areas**. It would remove the structures and, where appropriate, restore the

³ A floodplain is the flat area next to a river that becomes covered in water when the river overflows.

ecology of the floodplains to hold as much floodwater as possible. A park or ball field could also be designed to absorb floodwater. A property sales tax of 1% to 3% of the price of all future home sales could go into a local fund to purchase properties in flood-prone areas.

Issue 2: Managing Growth in Northern Milton

Development in the region has resulted in much of the ground being covered in impervious surfaces, such as roads, parking lots and buildings. Impervious surfaces do not allow precipitation to pass through and enter the ground, which in turn causes stormwater runoff to flow quickly into swollen creeks and rivers and increases the likelihood that rivers will overflow their banks. Some are concerned that if the farms and woodlands in Northern Milton (see north of Route 7 on Figure 1) are developed into sprawling neighborhoods, flooding downstream could worsen. During the previous meeting, the Task Force brainstormed the following options for dealing with this issue:

- **Incorporate low impact development (LID) in city planning regulations**, such as zoning and subdivision regulations. Under this option, new and redevelopment projects would be required to use LID techniques that promote the infiltration of precipitation as close as possible to the point it hits the ground. Techniques include porous pavements, rain gardens, and bioswales, among others. These practices reduce stormwater runoff volume and help to reduce flooding risk. This option requires minimal investment by the city, but may increase the cost of construction.
- The group discussed a **city program to purchase development rights at market value** from interested property owners in Northern Milton. Property owners would continue to own the land, but the city would own the development rights so that land would remain in its current form, such as farmland or woods, instead of being developed for residential or commercial use. The program could prioritize properties along rivers and streams.

Summary of Options**Issue 1: Managing Flood Risks in the Lower Granite River Area**

<i>Option</i>	<i>Estimated Costs</i>	<i>Potential Financing Strategy</i>
1.1 Do nothing	\$0 now, but \$15 - \$20 million in recovery after each large storm	N/A
1.2 Floodwalls	\$10 - \$18 million (\$2,000 per linear foot)	Grants, bonds financed with tax revenue
1.3 Flood-proofing buildings	\$10,000 - \$100,000 per building	Property owner pays, but city may offer property tax rebate
1.4 Flood-proofing infrastructure	\$1.8 million (\$600K per pump station)	Grants, water fees
1.5 Buy-back program for properties in the floodplain	\$100,000 - \$1.5 million per property, total cost depends on popularity of program.	Property sale tax of 1-3% of sale price

Issue 2: Managing Growth in Northern Milton

<i>Option</i>	<i>Estimated Costs</i>	<i>Potential Financing Strategy</i>
2.1 Do nothing	\$0 now, but flooding may become more severe downstream	N/A
2.2 Incorporate low impact development into city planning regulations	Minimal cost to city, may increase cost of construction	N/A
2.3. Purchase of development rights program	Depends on scale of program, but \$5 million minimum	Grants, taxes, fees

Appendix: Climate Change Risk Assessment Memo

From: Brackley College Science Advisory Committee
To: River Flooding Task Force
Re: **Summary of Climate Risks Facing Milton**

This memo provides key information about climate change risks facing Milton. The Risk Assessment is based on a careful review of detailed climate forecasts and modeling results produced by the federal and state government.

The following effects of climate change are relevant to your work:

- The number of **extreme precipitation events** is expected to increase, which may result in more river flooding.
- **Sea level rise** may result in more river flooding due to tidal flow into the river during extremely high tides or storm surges.

Milton has historically experienced an average of 2.7 **extreme precipitation events** per decade (four inches of rain in 48 hours). Best estimates are that these will increase by:

Historical (1970-2010)	Short-Term (2010-2039)	Medium-Term (2040-2069)	Long-Term (2070-2099)
2.7 events	22% to 70%	41% to 72%	74% to 162%

Given the increased frequency of extreme precipitation events, the Granite River floodplain will be reshaped. By 2050, it's likely that the 500-year floodplain (the area that has a 0.2% chance of flooding every year) will become the 100-year floodplain (the area that has a 1% chance of flooding every year). This means that the most serious floods will be five times more likely to occur.

The mean sea level is expected to rise by:

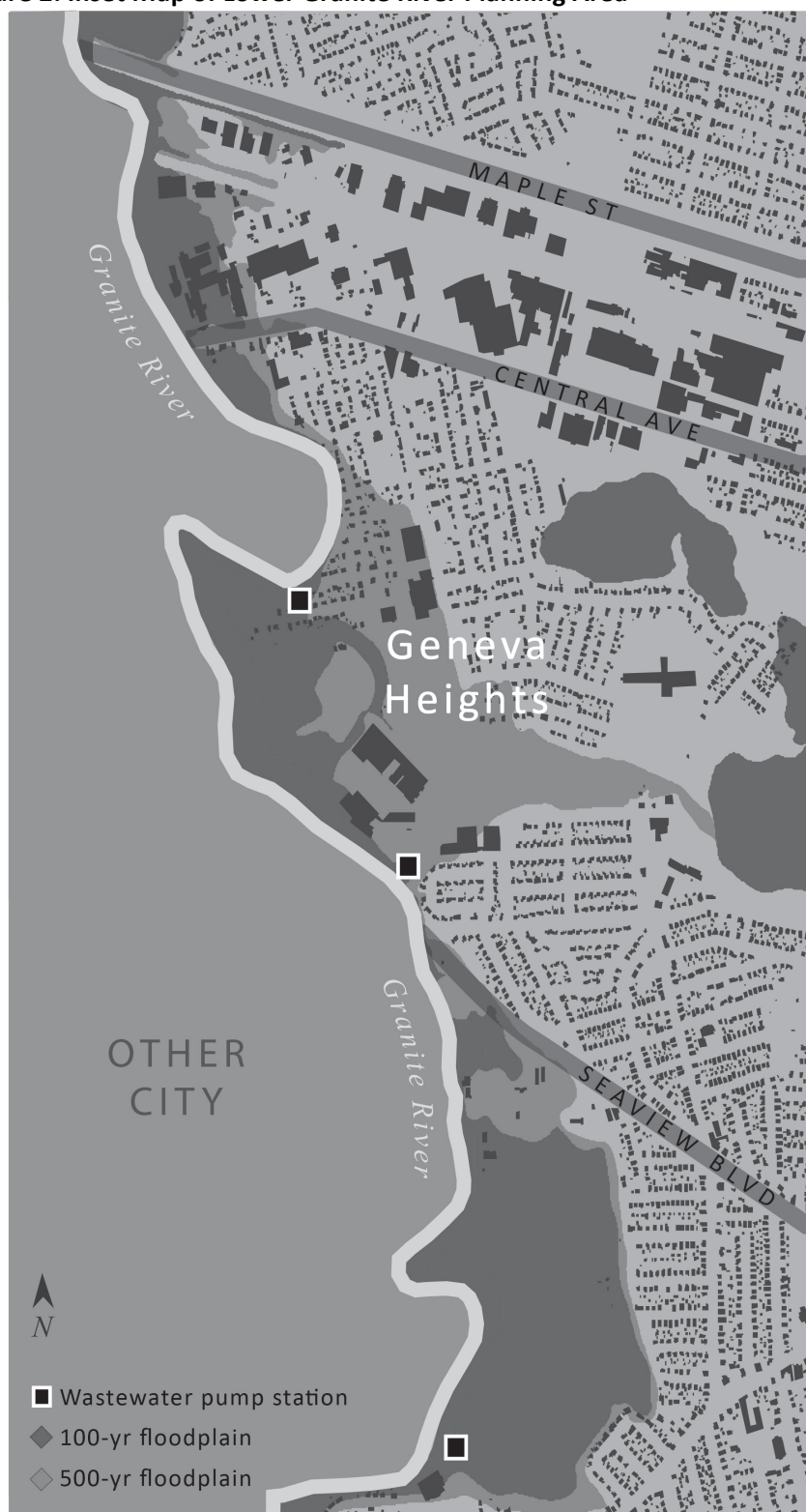
Short-Term (2010-2039)	Medium-Term (2040-2069)	Long-Term (2070-2099)
0.5 to 0.8 ft	1 to 1.7 ft	2 to 4.7 ft

Currently, the Granite River is only affected by the tides during Category 3 hurricanes, when storm surge pushes water from the bay into the river. However, if sea level rises two feet, the river could become tidally influenced during Category 1 hurricanes. With four feet of sea level rise, the river could become tidally influenced during exceptionally high tides, which occur once or twice every year. **Without complex modeling work, it is difficult to know exactly how the Granite River floodplain might change if the tides affect it more frequently; however, we can say with near certainty that sea level rise will increase the likelihood of river flooding in the long-term.**

Figure 1: Map of Milton



Figure 2: Inset Map of Lower Granite River Planning Area



*100-year floodplain has a 1% chance of flooding in any given year

**500-year floodplain has a 0.2% chance of flooding in any given year

Members of the Task Force

The Planning Director – The Planning Director oversees all planning effort in Milton, including zoning code updates, master plan updates, and preparation of the hazard mitigation plan.

The Public Works Director – The Public Works Director maintains Milton’s infrastructure, including its stormwater system, wastewater system, and roads. The Director is trained as a civil engineer and has worked in Milton for 25 years.

Executive Director, Community Action Partners – Community Action Partners is a not-for-profit social service organization that serves the needs of Milton’s low-income residents with health programs, job training programs, and childcare.

President, Chamber of Commerce – The Chamber of Commerce represents the business community in Milton. The President wants to make sure that Milton remains a “business-friendly” city with low taxes and minimal regulations.

Chairperson, Geneva Heights Neighborhood Association – Geneva Heights is a working and middle class neighborhood in the lower Granite River area. About 6% of the neighborhood is located in the 100-year floodplain and about 15% of the neighborhood is located in the 500-year floodplain. Several homes were badly damaged in the last flood.

Executive Director, Alliance for Watershed Health – The Alliance for Watershed Health is a long-time environmental advocacy group focused on improving the ecology of Granite River. The Executive Director and Alliance for Watershed Health have been actively pursuing opportunities for restoration projects along the Granite River.

Facilitator – The Task Force invited a trained, neutral facilitator to help move the discussion along and keep the parties engaged. Everyone has agreed to work with this facilitator.

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