

A Risk-Based Analysis and Stress Test of General Fund Reserve Requirements for the City of Sharonville, Ohio

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Table of Contents

Section 1 - Executive Summary	3
Section 2 - Introduction	7
Section 3 - The Approach to Uncertainty.....	9
Section 4 - Financial Risks: General Fund Revenue Volatility, Major Employer Risk, Hotel Tax Risk, Employee Leave Risk, and Remote Work Risk	13
Section 5 - Extreme Event Risk.....	23
Section 6 - Secondary Risks and Comparable Analysis	27
Section 7 - Putting it All Together	34
Appendix 1 – Limitations of GFOA’s Analysis.....	48

Section 1 - Executive Summary

A local government's "reserves" are the portion of fund balance which serves as a hedge against risk. The City of Sharonville, Ohio ("the City" or "Sharonville") has asked the questions: "what is the right amount of general fund reserves for us?" and "how resilient would any potential reserve target be to losses?" The Government Finance Officers Association (GFOA) has helped the City answer this question by examining the risks that it is subject to.

GFOA's methodology is intended to evaluate potential risks and their cost to the City's general fund. Our methodology is not intended to predict Sharonville's future. The GFOA Risk Model provides the option for Sharonville to adjust variables when future conditions change. Our model and this report also describe the assumptions behind our analysis and recommendations.

First, we identified the risks that posed the most clear and present danger to the City. The major risks are:¹

- Closure of a the City's major employer (Ford plant)
- Recessions and revenue volatility
- Flooding
- Underperforming hotel taxes
- Accrued employee leave liabilities
- Hazardous material spills

For each risk we calculated the probability that the City would experience the risk over a ten-year period and, if an event were to occur, what the magnitude of the loss could be for the City's general fund. To calculate the probability and magnitude of events, we did the following:

- **Analyzed Sharonville's own experience and the experiences of other municipalities.** For example, a recession would have similar impacts in other Ohio municipalities because the economic and legal environment would be similar (e.g., state aid would be impacted similarly).
- **Reviewed research produced by other agencies.** For instance, the Federal Emergency Management Agency (FEMA) has data on costs that natural disasters have caused.
- **Drew from the expertise of City staff.** City staff work every day on preparing the City for the risks it faces. Staff provided their expertise to help us estimate risks. For example, City staff helped us understand the nuances of revenue instability risks, hotel taxes, and hazardous material spills.

We modeled each risk individually and then combined each individual risk into a ten-year model of the City's reserves. The model is intended to answer the question: what amount of reserves will give the City sufficient confidence that it will be able to cover the losses from the risks GFOA has analyzed?

We combined all of the information described above to create a ten-year probabilistic model. The City's goal for this analysis was to find an amount that can give the City sufficient comfort that its reserves will cover its risks. The complete review the results from the 10-year Risk Model are available in Section 7 of this report. **GFOA discussed all of the factors that were accounted for by the Risk Model and other contextual factors with the City's Finance Director and reached the following joint conclusions about**

¹ The first four risks were taken from the City's Multi-Hazard Mitigation plan.

the range of reserves that should be held in the City's General Fund and Fire Fund. Again, a complete discussion of how these conclusions were arrived at is available in Section 7.

Analysis Conclusions on Range of Reserves for City's General Fund	
A reserve policy typically expresses reserve targets as a percent of expenditures. Below we have converted the dollar figures to a percent of expenditures	
Dollars	Percent of General Fund Expenditures
\$8.5 million (80% confident over 10 years)	45%
\$11 million (95% confident over 10 years)	58%

Analysis Conclusions on Range of Reserves for City's Fire Fund	
A reserve policy typically expresses reserve targets as a percent of revenue. Below we have converted the dollar figures to a percent of expenditures.	
Dollars	Percent of Fire Fund Expenditures
\$3.0 million (70% confident over 10 years)	35%
\$5.5 million (80% confident over 10 years)	64%

To complement the reserve analysis, we offer the following additional recommendations:

The City should adopt a robust reserves policy. A policy on the target level of reserves that the City should maintain and the acceptable use of those reserves provides clear decision-making boundaries for reserves. Furthermore, GFOA has found that a policy that identifies a floor and ceiling for reserves, rather than just a single target number, may provide more useful guidance. This is because a City government will rarely, if ever, have exactly the amount of reserves called for by its policy. Having a range defines the acceptable tolerances the reserves should stay within. The City has done a good job over the years of managing its reserves. The City can enhance this practice by adopting a policy with a range of reserves shown in the table we just saw in the last section.

For the purpose of the policy, the **general fund** range could reference reserves equal to 45% to 55% of the City expenditures, which rounds down the upper end of the range a bit. This would still provide the City with a high level of confidence. The **fire fund** reserves range could be similarly rounded: 35% to 65% of fire fund expenditures.

GFOA can provide a model policy template to help the City with policy adoption.

The City should adopt a mechanism to monitor its own compliance with the policy. GFOA's Financial Foundations research suggests that boundaries (e.g., financial policies) must be monitored in order to be fully effective.

The City should consider further investments in cybersecurity. Cybersecurity is an emerging and growing threat for local governments. Available data suggests a number of sobering points:

- Local governments are the most attractive targets for cybercriminals and ransomware attacks against local governments are becoming more common.
- The amount of damages from an attack appear to only be weakly correlated to the size of the government. Data suggests that the average attack costs around \$100,000 but attacks can and have cost local governments many millions of dollars. The City's current policy limit is \$1 million. This means that even though Sharonville is not as large as cities that have made headlines for the losses incurred by an attack, Sharonville could still suffer a substantial loss – perhaps in excess of its policy limits.
- Cyber insurance policies are getting more expensive and harder to come by. As of this writing, GFOA members are reporting doubling of premiums or being denied coverage altogether.

Given the points above, the City might consider the following recommendations that have implication for the City's reserves:

- Continue planning for enhanced security and make cost-effective investments in cybersecurity controls that both: A) reduce the likelihood of a successful attack; and B) reduce the potential damages, if an attack succeeds. Because reserves are ultimately a form of self-insurance there could be a strong case for using some of the City's reserves to strengthen its cybersecurity. This is because a dollar invested in prevention is usually going to be more effective than a dollar invested in remediation. An example of a resource that is accessible to local governments for improving cyber controls is CIS 18 Critical Security controls, <https://www.cisecurity.org/controls>.
- Be prepared to retain more risk on a cyber insurance policy. If policies get substantially more expensive (or, worst case, unavailable), the City could lower the cost of a policy by retaining more risk. This could be accounted for in the City's reserve amount. As we stated above, there is a plausible risk of a cyberattack costing the city more than \$1 million. Therefore, "retention" of risk is not just the insurance deductible, but also includes the risk of a catastrophic attack that costs more than the policy limit.

Consider a "financial disaster plan". Many of the City's foremost risks are financial risks, like the closure of the community's major employer or a recession. The City's ability to restructure and adapt its operations to such an event will have an important impact on its financial health. So, just like the City has a plan for responding to natural and man-made hazards, it could put in place a plan to respond to a financial catastrophe. GFOA's Fiscal First Aid program (<https://www.gfoa.org/ffa>) provides many free resources to help local governments respond to financial challenges. These resources could be used by the City to develop its own financial disaster plan.

The City could consider a robust internal borrowing policy. The City conduct some internal borrowing now for routine operational purposes. Internal borrowing can also be useful as a "last line of financial defense" in a crisis. There will always be some chance that Sharonville could find that it needs access to more financial resources than are available in its general fund reserves. GFOA's research suggests that

interfund borrowing could be a practical tool in emergency circumstances. Some other funds might be able to make short-term loans to the general fund in the case of an emergency. The City could develop policies to provide the flexibility to use these borrowing tools while also providing the necessary guidelines and limitations to ensure that borrowing occurs in a fiscally prudent manner.

GFOA's analysis has its limits. It is impossible for any risk analysis to be completely comprehensive of all considerations facing the City. Appendix 1 to this report lists the important limitations of this analysis.

Section 2 - Introduction

“Reserves” are the portion of a local government’s fund balance that are available to respond to the unexpected. Reserves are the cornerstone of financial flexibility. Reserves provide a government with options to respond to emergencies and to provide a buffer against shocks and other forms of risk. Managing reserves, though, can be a challenge. Foremost is the question of how much money to maintain in a general fund reserve. How much is enough and when does a reserve become too much? This can be a sensitive question because money held in reserve is money taken from constituents, and the argument could be made that excessive reserves should be returned to residents in the form of lower taxes/fees or enhanced services.

The City of Sharonville has been considering this question recently, given its vulnerability to economic stressors, financial risks, and manmade and natural extreme events. The City engaged the GFOA in order to produce a recommendation to help it decide the appropriate reserve level for the general fund, given these risks. GFOA is a non-profit association of more than 21,000 state and local government finance professionals and elected officials from across North America. A key part of GFOA’s mission is to promote best practices in public finance, including reserve policies.

GFOA’s approach to reserves does not suppose “one-size-fits-all.” Ideally, a local government’s reserve strategy will be customized to the risk that the local government faces. For example, GFOA’s “Best Practice” on general fund reserves recommends that general-purpose governments maintain reserves of no less than two months of regular operating revenues or regular operating expenditures (i.e., reserves equal to about 16.7 percent of revenues or expenditures), but that local governments should determine a reserve target that is most appropriate for their circumstances.² Therefore, GFOA worked with the City to conduct an analysis of the risks influencing the need for reserves as a hedge against uncertainty and loss.

A “risk” is defined as the probability and magnitude of a loss, disaster, or other undesirable event.³ Our analysis focuses primarily on risk retention, or using reserves, to manage risk. However, our analysis also encourages the City to think about how other risk management methods might alleviate the need to hold larger reserves. In other words, can the City manage its risks in some other way besides holding reserves? A thorough examination of the risk factors should lead to a range of desired reserves and improve the City’s understanding of its overall risk profile. A risk-aware analysis helps the City *stress test* its reserve strategy.

As a first step to this project, GFOA conducted a review of the risk factors influencing the amount of reserves a municipal government should hold.⁴ This review identified the risks on Exhibit 2.1 as the most salient risks to Sharonville’s general fund reserve.

² GFOA Best Practice. “Appropriate Level of Unrestricted Fund Balance in the General Fund.” GFOA. 2009.

³ Definition of risk taken from: Douglas W. Hubbard. *The Failure of Risk Management: Why It’s Broken and How to Fix It*. John Wiley and Sons, Inc. Hoboken, New Jersey. 2009.

⁴ The risk factors and basic review method were developed and published in the GFOA publication: Shayne C. Kavanagh. *Financial Policies*. (Government Finance Officers Association: Chicago, IL) 2012.

Exhibit 2.1 – Primary Risk Factors that Influence Reserve Levels for Sharonville	
Revenue source stability, particularly as it relates to the potential for revenue decline from an economic downturn	
Vulnerability to extreme events and public safety concerns, with emphasis on: • Closure of a the City’s major employer (Ford plant) • Recessions and revenue volatility • Flooding • Underperforming hotel taxes • Accrued employee leave liabilities • Hazardous material spills	

The next section gives an overview of how we analyze these risks and what you can expect to see in the rest of this report.

Section 3 - The Approach to Uncertainty

The accomplished forecasting scientist, Spyros Makridakis, suggests a “Triple-A” approach for dealing with highly uncertain phenomena.⁵

1. **Accept.** First, we must accept that we are subject to uncertainty. For example, the severity and timing of a flood is unpredictable. Sharonville could go years without experiencing a serious flood or one could occur this year!
2. **Assess.** Next, we must assess the potential impact of the uncertainty, with history providing a useful reference point. The experiences of other local governments are also a good reference point. For example, we used the historical experiences of other relevant municipalities to estimate the potential impact of the closure of the City’s major employer.
3. **Augment.** The range of uncertainty we face will almost always be greater than what we initially assess it to be. Therefore, we must augment our understanding of risk beyond what our historical experiences show us. For example, very few people saw the 2008 Great Recession coming or thought it could be as bad as it was. They were unprepared for this historically unprecedented recession. We can augment our understanding of risk using a technique called “Probability Management.”⁶ Probability Management is an application of modern information processing technology that allows us to simulate thousands of potential events (e.g., floods, recessions, etc.) so that we can observe the probability of events of various magnitudes coming to pass. The statistical technique that Probability Management is based on is called “Monte Carlo analysis.” This technique was established in the late 1940s, but until very recently required special computers and software to use. Modern information technology has made Monte Carlo analysis accessible to anyone with a personal computer.

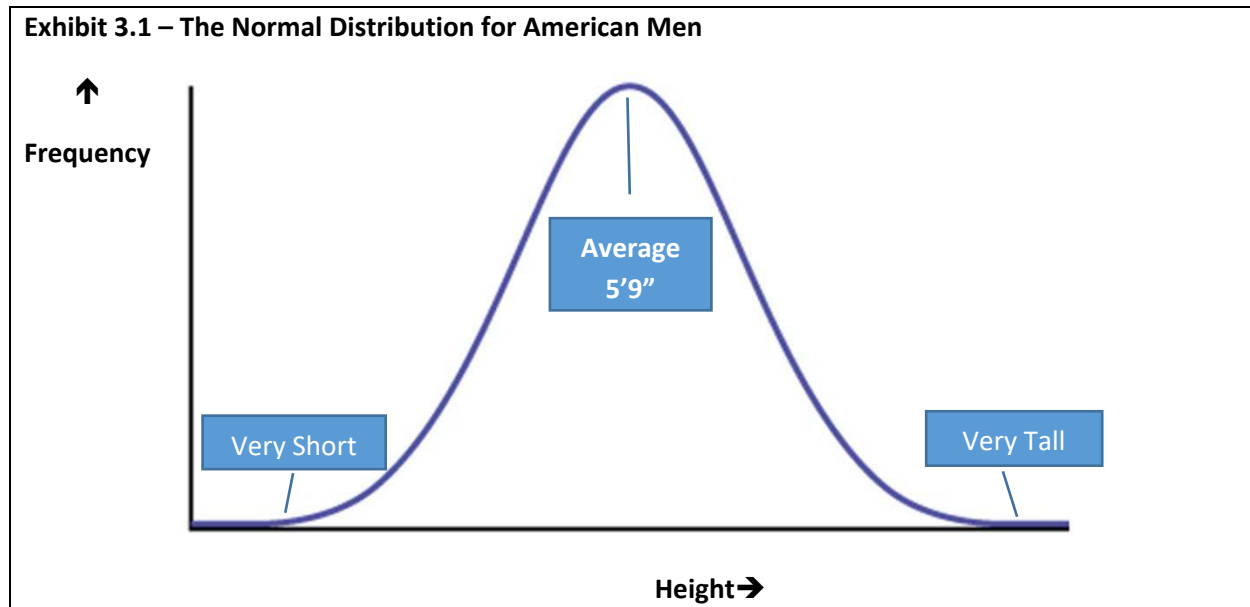
In order to use Probability Management, we express any given type of extreme event as a range of possibilities that the City might experience. This range is called a “distribution.” A distribution is a shape that signifies how frequently the City might expect to experience a certain type of event and/or how severe the event might be.

The most common type of distribution is called the “normal distribution,” more popularly known as the “bell curve.” Many phenomena fit a bell curve. To help us understand how to read a distribution, we can start with an example that is related to everyday life: the height of American men.

⁵ See: Spyros Makridakis, Robin Hogarth, and Anil Gaba. *Dance with Chance: Making Luck Work for You*. (Oneworld Publications: Oxford, England). 2009.

⁶ The discipline of “Probability Management” was developed by Dr. Sam Savage, author of *The Flaw of Averages*. You can learn more about Probability Management at probabilitymanagement.org.

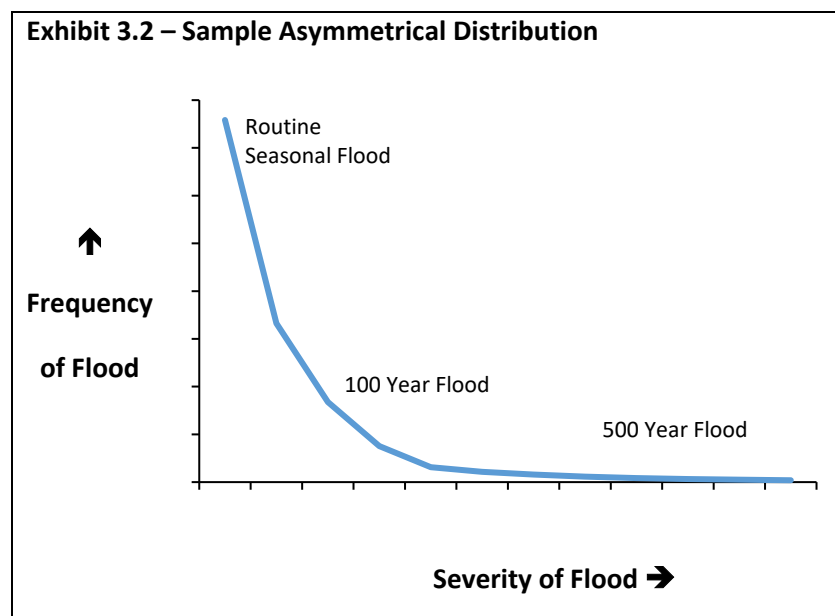
Exhibit 3.1 shows a bell curve for the height of American men. The horizontal axis of Exhibit 3.1 represents height. The vertical axis represents frequency. The most common height is 5'9", so it is shown at the top of the curve. Much taller men, like NBA centers, would be found on the right-hand side of the curve. Very short men would be found on the left.



The normal distribution can help analyze risk. To illustrate, the severity of an economic downturn is roughly normally distributed. A few downturns are slight, few are severe, but most are closer to average.

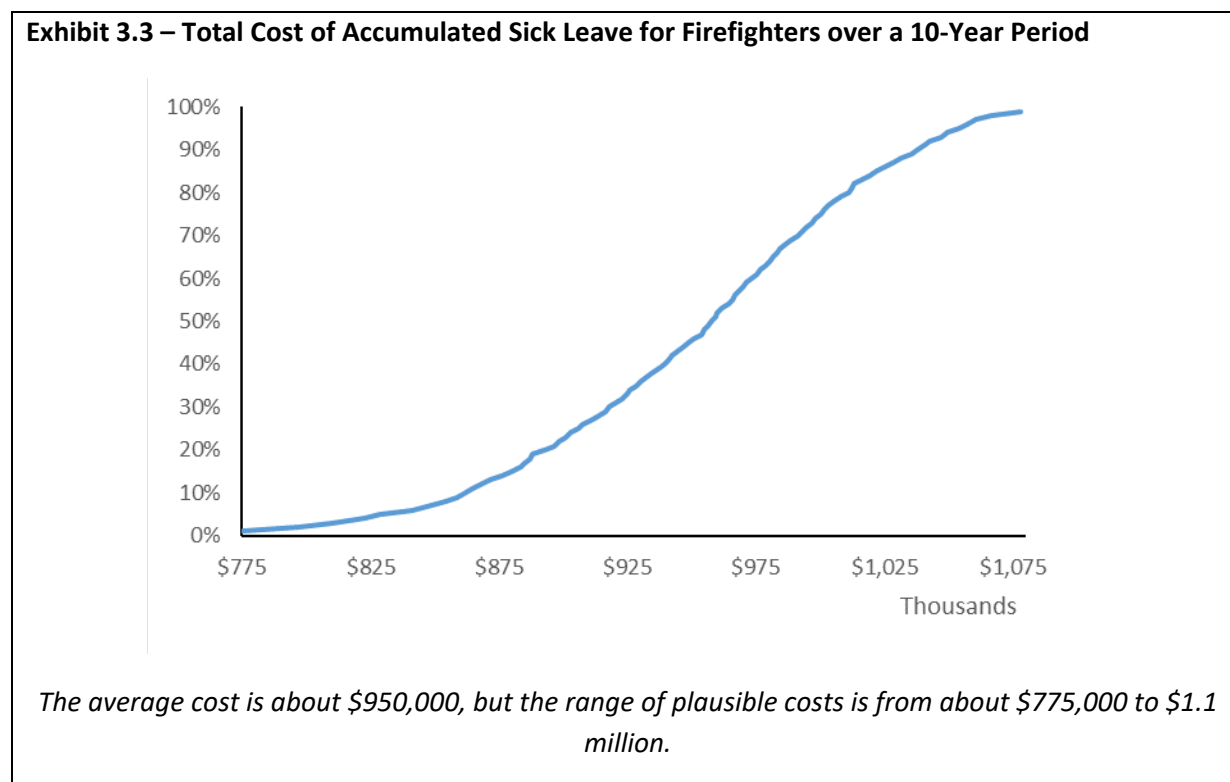
Another type of distribution we use in our analysis is an asymmetrical distribution, shown in Exhibit 3.2. Floods are an example of an asymmetrical distribution. Exhibit 3.2 shows that routine seasonal floods are the most common. Large “100-year” or “500-year” floods are rare, but the severity is much greater. The distribution is “asymmetrical” because the frequency with which we will experience these events are not evenly distributed around the middle of the distribution.

Put another way, there are far more seasonal floods that are smaller than the “average” flood. Yet, there are far fewer floods (“500-year”) that are larger than the average flood.



Expressing Sharonville’s vulnerability as distributions allows us to calculate the probability that an event of a given magnitude will come to pass. When we associate a dollar amount with that event, we can estimate the probability or chance that Sharonville will need to have a given amount of money on-hand to respond.

Exhibit 3.3 is not a distribution but is a type of graphic we will use often in this report. It is called a “cumulative probability chart.” It shows that increasing amounts of reserves are needed to gain more confidence that the City will have enough money to cover the total cost of firefighters’ accumulated sick leave over a ten year period. We see that the City can expect to pay out at least \$775,000 and that \$1.1 million is a plausible upper limit. The average cost is about \$950,000.



It is important for the reader of this report to understand that **there is never one single, objectively best amount of reserves to hold**. The amount of reserves the City will want to hold will partially be a function of the City’s willingness to take on risk. If City officials are willing to take on risk, they might opt for lower reserves and spending more money on current services. If officials are more risk averse, they might opt for higher reserves. GFOA’s recommendations are informed by where reserves appear to provide the best value or “bang for the buck.” For example, on Exhibit 3.3 the vertical axis is the chance that the City will incur at least as much as is shown on the blue line. We could also think of it as the amount of confidence the City would have that it could cover its costs, if it put aside that much money. So, if the City wanted to be 50% confident, it would put aside \$950,000 (the average cost). Most local governments want to be a lot more confident than that, though. However, we see that the curve flattens out at the top right. This means that to “buy” more confidence costs increasingly more money. For example to increase from 50%

to 55% confident costs an additional \$8,000, but to go from 90% to 95% confident costs an additional \$16,000. Hence, the best bang for the buck is before the line starts to go flat.

Let's now preview what you will see in the rest of this report. In Section 4, we cover financial risks, such as revenue instability owing to economic downturns or the closure of the City's major employer (the Ford plant). In Section 5 of this report, we will review the City's primary risks posed by extreme events, including floods and hazardous material spills. Section 6 reviews secondary risk factors that have less weighty implications for the City's reserve strategy. We include Section 6 to highlight the full range of risks that were considered, even if some of them did not seem to present as clear and present a threat to the City's general fund reserve.

After we analyze the individual risks, in Section 7, we will consider the risks holistically. This section will:

- Consider the risks over a ten-year time period, which provides a more complete perspective on potential vulnerability and how to use reserves.
- Consider the potential occurrence of any of the risks we analyzed to occur at the same time. Obviously, if they did occur at the same time, the stress on the City's reserves would be compounded.

Section 4 - Financial Risks: General Fund Revenue Volatility, Major Employer Risk, Hotel Tax Risk, Employee Accumulated Sick Leave Payout Risk, and Remote Work Risk

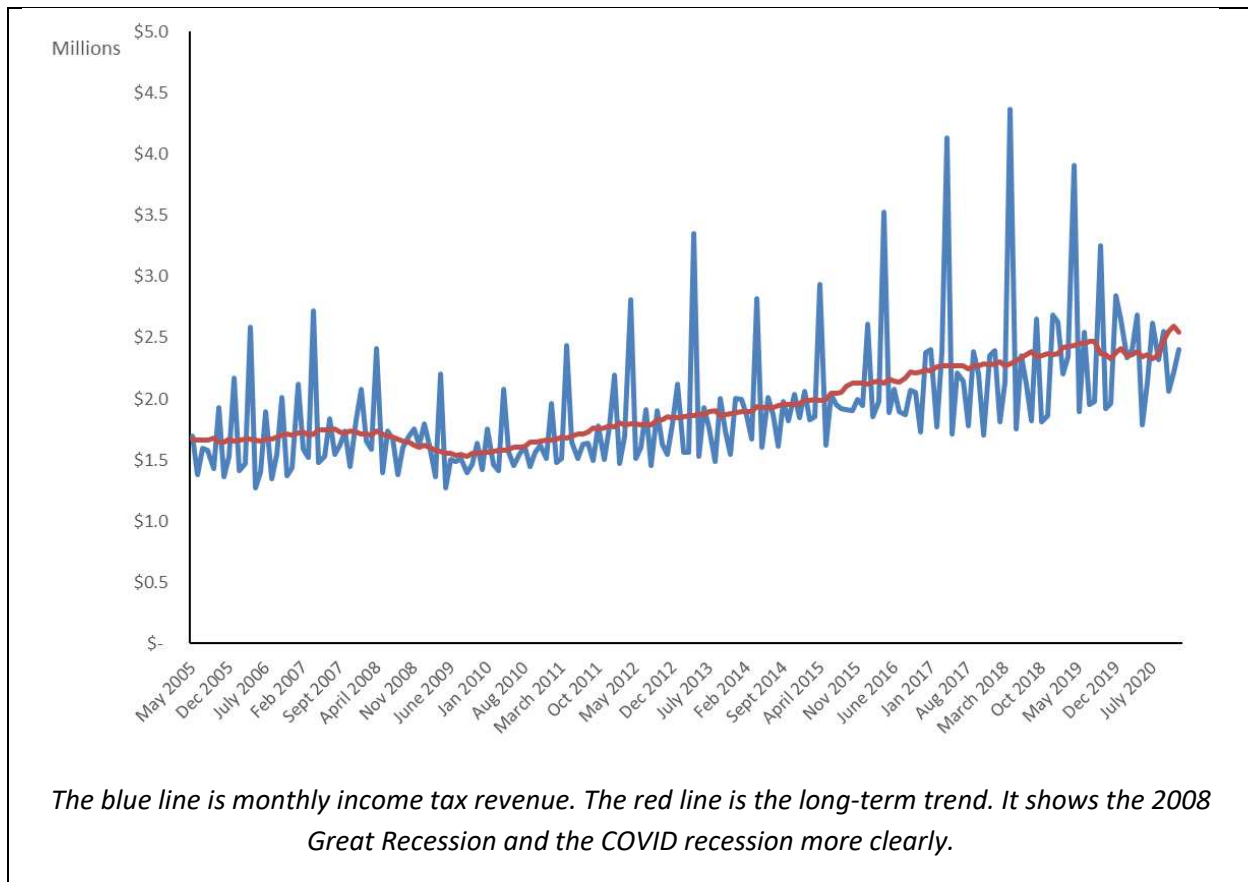
This section presents the analysis of the City's primary risk – volatility of its revenue sources, particularly the income tax. This section also covers risks from: recessions; a closure of the City's major employer; shortfalls in the City's hotel tax revenue; payouts to City employees for accumulated sick leave; and reduction in the City's tax base due to employers allowing employees to work remotely.

A. Risk from Recessions to General Fund

The City's income tax revenue is split between general fund and the fire fund: a 1% income tax is dedicated to the general fund and a 0.5% income tax is dedicated to the fire fund. Income tax revenue is, by far, the City of Sharonville's most important general fund revenue source. On average, it has comprised about 87% of the City's general fund revenues since 2010. The income tax is even more important to the fire fund – it has comprised over 92% of the fire fund revenues since 2012.

The income tax has a reputation for volatility. This is because the amount of income tax revenue the City receives varies by month. The City sees particularly large spikes in April, when the City has received on average, since 2010, 13% of its annual income tax revenue. If the income tax revenue were evenly distributed, the City would only receive 8% of the total income tax revenue every month. There also smaller spikes in January, October, and July. The blue line in Exhibit 4.1 shows the variable monthly pattern that the City experiences in its total income tax revenue. The red line uses a technique called "moving averages" to smooth out the month-to-month variation and shows us the long-term trend. We can more clearly see the dips associated with the 2008 Great Recession and the COVID recession.

Exhibit 4.1 – History of Monthly General Fund Income Tax Revenue and Long-Term Trend



We can use this information to estimate risk in the future from recessions. We see the largest 12-month decline during the Great Recession was 9.3% and the largest 12-month decline during the COVID recession was 5.7%. We know that the COVID recession was the worst downturn since the Great Recession. The COVID recession had a sharp downturn, but only lasted two months. Thus, though we should not assume the Great Recession represents a “worst case,” we do know that it was worse than all other recessions that have occurred in the United States since World War II. That tells us that it represents something approaching a worst case. Our simulation can use this information to simulate potential even worse scenarios, but also limit the simulation from exaggerating the potential for “even worse” scenarios. We might also assume that the COVID recession represents a sort of “middle of the road” recession – the decline was very sharp, but the duration was also very short. The combined effect is a relatively mild recession. We also know there have been milder recessions in US history, such as the 2001 “dot.bomb” recession.

We must also consider the role of other revenues. Sharonville’s historical data shows that other revenues are vulnerable to recessions. The decline during the Great Recession is obscured by a larger infusion of intergovernmental revenue that the City received in 2008. If we ignore intergovernmental revenue, other revenue declined by 7% in 2008 and 10% in 2009. This might be a more realistic benchmark given that intergovernmental revenues are much less important to Sharonville today than they were at the time of

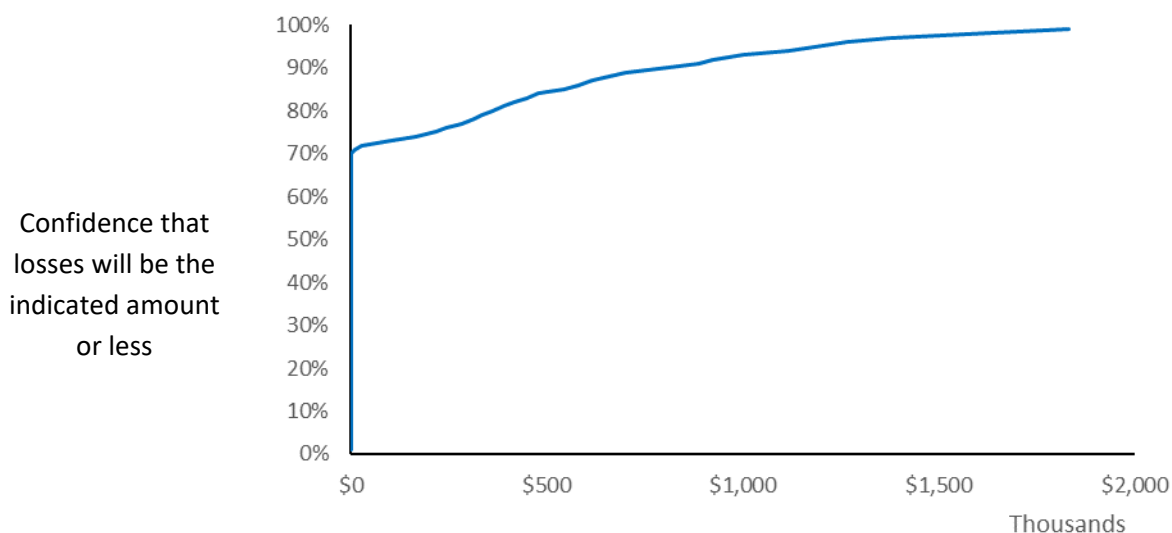
the Great Recession: in 2007 and 2008 the City received over \$1 million annually, but in recent years it has received less than \$300,000 annually. Other revenues declined by 18% during the COVID recession, too, but it is worth noting that part of the reason for this large decline is that 2019 saw an unprecedented increase, due largely to increased investment proceeds. In 2017 the City began working with an investment firm. Returns from the new investment strategy began to peak in 2019. Hence, there was a lofty peak for the City to fall from between 2019 and 2020.

To conduct a simulation over a ten-year period we must also consider the frequency, duration, and time between recessions. To do this, we gathered data on all recessions that have occurred in the United States since 1950. We used these historical patterns to guide the simulation's parameters for the frequency, duration, and time between the simulated recessions.

To conduct a simulation, we must also consider the impact of a recession, when one does happen. To do so, we used the City's historical experiences from the 2008 Great Recession and the COVID recession. The Great Recession represents something close to a "worst case," when income tax revenues went down by just under 10% per year. It is important to note that that our simulation does not assume the Great Recession as the absolute worst case. The simulation allows for even more severe recessions, though they will be rare. The simulation also produces much milder recessions. The model simulates other revenues in a similar fashion. During the Great Recession, other revenues also declined by about 10% annually. However, we should also account for the new, more active investment strategy being pursued by the City. Primarily, this means that the City will "have more room to fall" during recessions.

Exhibit 4.2 shows the cumulative probability curve for a single year loss, accounting for all the information described in this section, including how often recessions occur. About 70% of the time the City will not experience any loss at all. For 80% of the time, losses will be less than \$360,000. Approximately 90% of losses will be less than \$810,000 and approximately 95% of the time they will be less than \$1.2 million. The blue line does not reach 100%, but it does show that there is a small chance of losses significantly in excess of \$1.2 million.

Exhibit 4.2 – Cumulative Probability Chart for Annual Recession Losses



Checkpoints

- ✓ Income tax is the City's most important revenue, by far. Past recessions show that it is vulnerable to economic downturns.
- ✓ The City's other revenues are also vulnerable to economic downturns, particularly investment proceeds.
- ✓ We can use the City's historical experience in past recessions to simulate future recessions. The simulation shows that any given year has about 70% chance of no losses from recessions. The most extreme annual losses could approach \$2 million.

B. Closure of Major Employer

Opened in 1958, the Sharonville Ford Transmission Plant employs approximately 1,790 employees.⁷ Being a large employer, Sharonville is concerned about future of the plant. If the plant were to close or curtail operations, it could have a sizable impact on the City's income tax revenues.

To assess the risk of closure or curtailment of operations, GFOA reviewed production lifecycle and trends affecting the auto manufacturing plants and spoke with industry experts. In interviewing the experts, we provided general information on the plant, but did not identify the original equipment manufacturer or the location of the plant.

⁷ Ford, "Worldwide Locations," <https://corporate.ford.com/operations/locations/global-plants/sharonville-transmission-plant.html>.

The experts thought that the more likely impacts in the short-term are labor and operation reductions due to on-going supply chain disruptions, such as the more recent chip shortage for vehicles. The supply chain disruptions for the auto industry are expected to continue into 2023.⁸ Without supplies, plants have temporarily shut down production.⁹ Longer-term considerations include electric vehicles (EVs). Our experts noted that plants can be repurposed from a focus on internal combustion engine (ICE) products to EV products as the manufacturing processes and skillsets required are very similar. The pitfall is that EVs have fewer component parts, requiring less labor. However, our experts noted that the impacts are many years down the road as charging infrastructure is not in place for mass adoption of EVs.

Another important consideration is the Sharonville plant itself. The Sharonville plant focuses on transmission for the F-Series Super Duty Truck as well as gear sets for additional models.¹⁰ According to the auto industry experts we interviewed, powertrain programs are designed for 20 years, so major shifts are less frequent. Automakers are also responsible for warranties and servicing, which means even if a vehicle model is discontinued there is still ongoing support that is required for a certain period. Additionally, the F-Series attracts significant consumer demand. For example, Ford's first quarter 2022 sales report showed that the F-Series represents approximately 60% of Ford truck sales and 30% of the brand's total sales. In essence, the Sharonville plant produces parts for a popular vehicle line.

Given their insight into auto manufacturing, we asked our interviewees to use their expert judgement to quantify the probability of both A) a complete closure of the plant and B) a reduction in operations (labor). We also asked about the probability of a plant closure using the two timeframes (1 to 5 years, and 6 to 10 years in the future) to recognize that the further future is more uncertain.

The experts believed that a closure was unlikely in the next five years, putting the chance at around 5%. Understandably, the next five years after that (i.e., looking up to ten years in the future) are not as clear. The experts thought that chance of closure would increase considerably given the potential for new technologies, shifts in the market, etc. – around a 20% to 30% chance.

The experts thought a significant curtailment was more probable in the next five years: around a 7% to 10% chance. Over the next 6 to 10 years, they thought the chance might go up to around 15% to 20%.

Research into expert judgment strongly suggests that experts are often “overconfident” in their judgments, which means that they underestimate uncertainty. The research suggests that experts often underestimate uncertainty by around 50%. For that reason, in the GFOA Risk Model we applied a modifier

⁸ Chuin-Wei Yap, William Boston, and Alistair MacDonald, “Global Supply-Chain Problems Escalate, Threatening Economic Recovery,” *Wall Street Journal*, October 8, 2021, <https://www.wsj.com/articles/supply-chain-issues-car-chip-shortage-covid-manufacturing-global-economy-11633713877>.

⁹ Randy Tucker, “Chip shortage pumps brakes at Ford Motor Co.'s transmission plant in Sharonville,” *Cincinnati Enquirer*, May 4, 2021, <https://www.cincinnati.com/story/news/2021/05/04/chip-shortage-shuts-down-fords-sharonville-ohio-plant/4943265001/>.

¹⁰ Chelsey Levingston, “Ford to make huge \$900M investment on Sharonville transmission plant,” *Dayton Daily News*, January 20, 2016, <https://www.daytondailynews.com/news/ford-make-huge-900m-investment-sharonville-transmission-plant/hQi7adCMpRptYWAk854giP/>.

to the judgments from the experts to increase the probabilities they gave by around 50%. So, for example, we increased the chance of curtailment to 15% in the first five years and 30% in the five years after that.

To model the risk of closure or curtailment we also need to estimate the impact of a closure or curtailment, if one happens. First, we examined news stories of curtailments of operations at other auto manufacturing plants. We found a range of about 7% to 15% reduction in labor from each curtailment. However, the Triple-A rule of risk analysis (see Section 2 of this report) cautions against relying too heavily on a limited number of observations. The Triple-A rule advises expanding your range by two times if you using a limited number of observations. Since there are limited number of historical cases to draw upon, we expanded the range to a 5% to 30% potential reduction in labor.

Finally, we had to estimate the financial impact. To do, so we looked at the financial impact on other communities in Ohio that experienced the loss of a major employer. We considered the size of the employer relative to the size of the population and, where data was available, the labor force in the community. Our analysis showed that, given the size the Ford plant relative to the size of Sharonville's population and labor force, we might expect between a 10% and 22% decline in income tax revenues from a complete closure. A curtailment would have a proportionately smaller impact – for example, a 10% curtailment would result in a 0.5% to 2.2% loss of income tax revenue (i.e., 10% of the impact of a complete closure). Examining the experiences of other communities is particularly useful because the income tax loss will show not only the direct loss from the major employer, but also losses experienced by other firms in the community that supported the major employer in some way (e.g., suppliers). Finally, we also applied the Triple-A rule to expand the range beyond just was suggested by the data. Though we did gather the experiences of many communities, it is still a limited number of observations and we should be cautious not to underestimate the uncertainty of the financial impact.

The table below summarizes the annual impacts in both the 1 to 5 year time horizon and the 6 to 10 year time horizon, after we incorporated all of the variables we discussed above into the GFOA Risk Model. Section 7 of this report combines these risks with all the other risks discussed in this report to arrive at the implications for the City's fund balance strategy.

Exhibit 4.3 – Summary of Simulated Annual Losses from Major Employer Closure or Curtailment

By year 5...->	...Chance of zero impact is 77%	...there is a 10% chance of annual loss of at least 6%	... there is a 20% chance of annual loss of at least 1%
By year 10...->	...Chance of zero impact is 40%	...there is a 10% chance of annual loss of at least 18%	...there is a 20% chance of annual loss of at least 14%

Checkpoints

- ✓ The Ford plant is the most important employer in Sharonville. If it closes, the City would lose a good deal of income tax revenue.
- ✓ The plant might also curtail operations. This would also reduce revenue.
- ✓ We spoke with industry experts to estimate the chances of the plant closing or curtailing operations in the next ten years.
- ✓ We also examine how other Ohio cities have been impacted by plant closures.
- ✓ See Exhibit 4.3 for a summary of the quantitative results of our analysis.

C. Hotel Tax or Transient Occupancy Tax Risk

Hotel taxes or transient occupancy tax (TOT) revenues help to support some of the City's debt service associated with its convention center. Factors negatively affecting the Sharonville hotel market could add burden to the City's ability to service the debt. In a worst case, general fund reserves might need to be used to "backstop" the convention center and pay the debt, if hotel tax revenues proved insufficient. This section will examine this risk.

The COVID-19 pandemic has adversely impacted tourism worldwide. The Cincinnati hotel market recorded 66.9% occupancy and \$107.36 for average daily rate (ADR) in 2019, compared to 41.0% occupancy and \$81.64 for ADR in 2020. Data for the North submarket, which includes Sharonville, shows occupancy at 40.0% and ADR at \$69.63 in 2020.¹¹

In reviewing the near-term outlook for Sharonville's hotel market, GFOA gathered forecasted lodging statistics from CBRE, a real estate firm, for the Cincinnati market for 2021 through 2025 and applied the year-over-year growth rate to Sharonville's 2020 figures. We also compared CBRE's forecast with other organizations, including the American Hotel and Lodging Association¹² and found similar results. The forecasts indicate noticeable growth in occupancy and ADR over the next several years before leveling off.

Because forecasts are never 100% accurate, the GFOA Risk Model provides an allowance for the forecast to be inaccurate. We met with the Executive Director of the Sharonville Convention Center to understand possible sources of inaccuracy.

First, the Executive Director believes the forecasts are, generally, conservative. Hence, the actual ADR and occupancy rates are, in his view, more likely to be higher in actuality than the forecast states. The GFOA

¹¹ CBRE, "U.S. and Cincinnati Hotel Outlook," September 29, 2021.

¹² See American Hotel and Lodging Association, "Midyear State of the Hotel Industry Top Findings," July 20, 2021, <https://www.ahla.com/sites/default/files/Midyear%20State%20of%20the%20Hotel%20Industry%20Report%2072621.pdf>.

Risk Model reflects this but simulating that the forecast could be up to 5% too high, but up to 7.5% too low.

Second, the CBRE forecast does not include any risk that new COVID variant reduces demand for hotels. The GFOA Risk Model simulates the risk of COVID by including an 8% chance that a new variant will occur that significantly curtails travel in any year. Presumably vaccinations have made it so that future variants would not impact travel as greatly as in the past, so historical experience is not of much help in estimating the chance of future travel curtailments. Hence, the GFOA and City staff agreed on 8% as a “judgment call” number that can be used to represent some chance of a COVID travel curtailment. The figure of 8% comes from the assumption that there might be one month per year where travel curtailment is a significant risk. If COVID does negatively impact revenues, the model simulates a reduction between 10% and 30%. This is generally in line with how COVID impacted the City in the past.

Finally, the CBRE forecast excludes future recessions. The GFOA Risk Model includes recession risk. The characteristics of recessions (e.g., frequency, duration, etc.) are identical to those that the Risk Model uses for other City revenues. The impact of recession is assumed to reduce revenues between 10% and 20%. This assumption is anchored in the City’s experience with the Great Recession.

Aside from occupancy and ADR, we need to consider the tax base (number of hotel rooms) when evaluating the impacts on TOT revenues. A recession can result in businesses closing, particularly those without the resources to withstand the downturn. On the opposite end of the spectrum, if there is strong hotel demand and high occupancy, hotels may opt to expand or new ones will enter the local market. The GFOA Risk Model allows users to adjust for potential hotel additions and reductions. For example, the Clarion Hotel has proposed plans to turn into a memory care center, reducing the City’s hotel room inventory by 273 rooms for the year in which that will occur.

With occupancy, ADR, and total hotel room information, we can estimate the financial impact. To do so, we simulate the three variables and multiply it by 365 room nights and the City’s TOT rate of 3% to calculate the TOT revenues. If the simulated TOT revenues fall under both: A) the City’s debt service payment for the particular year and B) other planned uses for TOT to support the convention center (e.g., maintenance of the facilities estimated at \$100,000 per year), then that leads to a reduction in the reserve that support repayment of the debt. If these reductions are large enough and numerous enough, the Risk Model may show that the reserve is exhausted and the general fund must provide a backstop.

When we run the simulation using the assumptions described above, the GFOA Risk Model shows very little risk that the City’s general fund would need to backstop the convention center due to underperformance of hotel taxes relative to debt service requirements. There is a chance, in the next few years, that there will be a deficit that will eat into the reserve that supports paying off the convention center debt. However, if we assume the need for the general fund to backstop only occurs if the convention center’s reserve reaches zero, then there is very little chance that a backstop will be needed. The reason is quite simple. The forecast produced by CBRE implies the hotel taxes generated will be well in excess of the amount of debt service required for vast majority of years in our ten-year analysis period, even after the downward adjustments for COVID and recession risk and accounting for the reduction in available rooms from the repurposing of the Clarion Hotel property.

Checkpoints

- ✓ If hotel taxes under perform, it is possible that the City's general fund might need to backstop debt payments that are normally supported by the hotel tax.
- ✓ Fortunately, our analysis shows this risk is very small as projections for hotel average daily rates and occupancy produced by industry experts forecast a large and sustained increase in the coming years.
- ✓ We adjusted the industry forecasts for possible recession and COVID risk and the risk is still small.

D. Employee Accumulated Sick Leave Payout Risk

The City is liable for payouts for accumulated sick leave for about 120 firefighters, police and general employees who are projected to retire over the coming years. The City has taken steps to reduce its liability for accumulated leave by changing its personnel policy for new hires, but it still should prepare for the payouts associated with existing employees. The payouts are unlikely to be stable from year-to-year because the years of service are not evenly distributed among eligible employees. For example, among the 38 fire employees who eligible for payouts, 11 of them have 18 years of service. Thus, when that cohort reaches 25 years of service we might expect payouts to spike up.

However, the total liability and when it will be paid out is a moving target since employees can accumulate and use sick leave over time. They could also choose to work beyond their retirement eligibility date or quit before they retire. To address, this the GFOA Risk Model simulates 1,000 different scenarios that accounts for:

- Different possible year-to-year changes in liability due to accrual or use of sick time. The range of possible change is based on the City's historical experience: the range goes from a 5% annual increase to 5% decrease with a 3% increase being the most likely annual change.
- The chance that an employee resigns in any given year before retirement. The City's historical data suggests there is about 3% chance that a given employee resigns in a given year. The GFOA Risk Model assumes this chance drops to zero within five years of retirement.
- The chance that employee continues to work after becoming eligible for retirement. The GFOA Risk Model assumes only a 20% chance an employee retires immediately base on the City's past experience, but the chance goes up considerably each year after.

The simulation produced the following average payouts and payouts at the 90th percentile. The 90th percentile means that the model simulates only a 10% chance of payouts being **more than** the figure in the table. You can think of the 90th percentile as a pessimistic scenario.

Exhibit 4.4 – Average Payout and Payout at 90th Percentile for Accumulated Leave for Five and Ten-Year Period by Employee Group

	Total Average Payouts		90 th Percentile Payouts	
	5 Years	10 Years	5 Years	10 Years

Fire	\$350,000	\$950,000	\$428,000	\$1,038,000
Police	\$450,000	\$750,000	\$545,000	\$775,000
General	\$590,000	\$870,000	\$665,000	\$905,000

The range of potential annual payouts for police and general employees is integrated into the GFOA Risk Model for the general fund, so is accounted for in the holistic risk-aware outlook we provide in Section 7. The fire payouts are accounted for in the fire fund. The GFOA Risk Model includes a separate model for fire payouts. The fire fund is also impacted by risks like recessions, employer closure, and remote work so Section 7 will also include a holistic assessment of fire fund risk.

E. Remote Work Risk

The COVID-19 pandemic has popularized remote working arrangements. Though many employers are resuming in-person work models, other employers are continuing to allow at least some employees to continue to work remotely. Employees who work remotely do not contribute to the City's income tax base because the income no longer earned inside of the City's boundaries. To assess the risk to the City's future revenues, we first examined research from McKinsey on the likely prevalence of remote work in the future.¹³ The McKinsey study provided information on the potential for remote work in various industries. The City's tax base has a large share of employment in manufacturing and transportation/warehousing. These two industries have relatively little potential for remote work compared to many other industries. For example, one of the City's top-ten employers is an engineering firm. According to McKinsey, that category of employment has more than three times the potential for remote work than manufacturing and transportation. Of course, just because part of an employer's workforce could, in theory, work remotely, it doesn't mean they will. We also looked at survey results from McKinsey about CEO attitudes towards remote work and how much CEOs tend to embrace remote work (or not). The GFOA Risk Model each simulated how much each of the top 10 employers in Sharonville would embrace remote work (or not) based on the firm's policies towards remote work (if remote work is allowed and to what extent) and based on the total potential of remote work at the firm. The results for the top ten employers was then assumed to be representative of what would occur in the tax base as a whole. What we found is that the average reduction in the tax base from remote work policies is about 4%, in a given year but it could be higher. For example, there is a 10% chance that the reduction could be more than 9% in a given year. Section 7 will show how this risk interacts with all of the other risks we analyzed.

¹³ See: Andrea Alexander, Aaron De Smet, and Mihir Mysore. "Reimagining the Post-Pandemic Workforce" McKinsey Quarterly. July 7, 2020. See also: Susan Lund, Anu Madgavkar, James Manyika, and Sven Smit. "What's Next for Remote Work: An Analysis of 2,000 tasks, 800 jobs, and nine countries. November 23, 2020.

Section 5 - Extreme Event Risk

Although Sharonville can receive reimbursement from insurance and public agencies for natural disasters and some man-made extreme events, having adequate reserves in place is important to quickly and decisively respond to extreme events. For example, FEMA reimbursement will not cover all the costs the City incurs and it could take months, if not years, to receive reimbursement. Floods and hazardous

material spills are important extreme event risks the City faces. In discussions with City staff, these disasters represent the greatest risk and will be the focus of this section of the analysis.

The following sub-sections will explore the potential budgetary implications that these hazards have for the City government.¹⁴ These sections will explain any notable features of the data sets we used and discuss the range of potential damage the City could experience, as suggested by the data we gathered.

A. Flooding

The City is at some risk for flooding. There are 399 properties in the 100-year flood zone and 233 in the 500-year flood zone. We can also look at the value of the properties in the floods zones. The 100-year zone includes \$250 million worth of properties and \$446 million in the 500-year zone. Exhibit 5.A.1 shows a map of flood zones, produced by City staff.

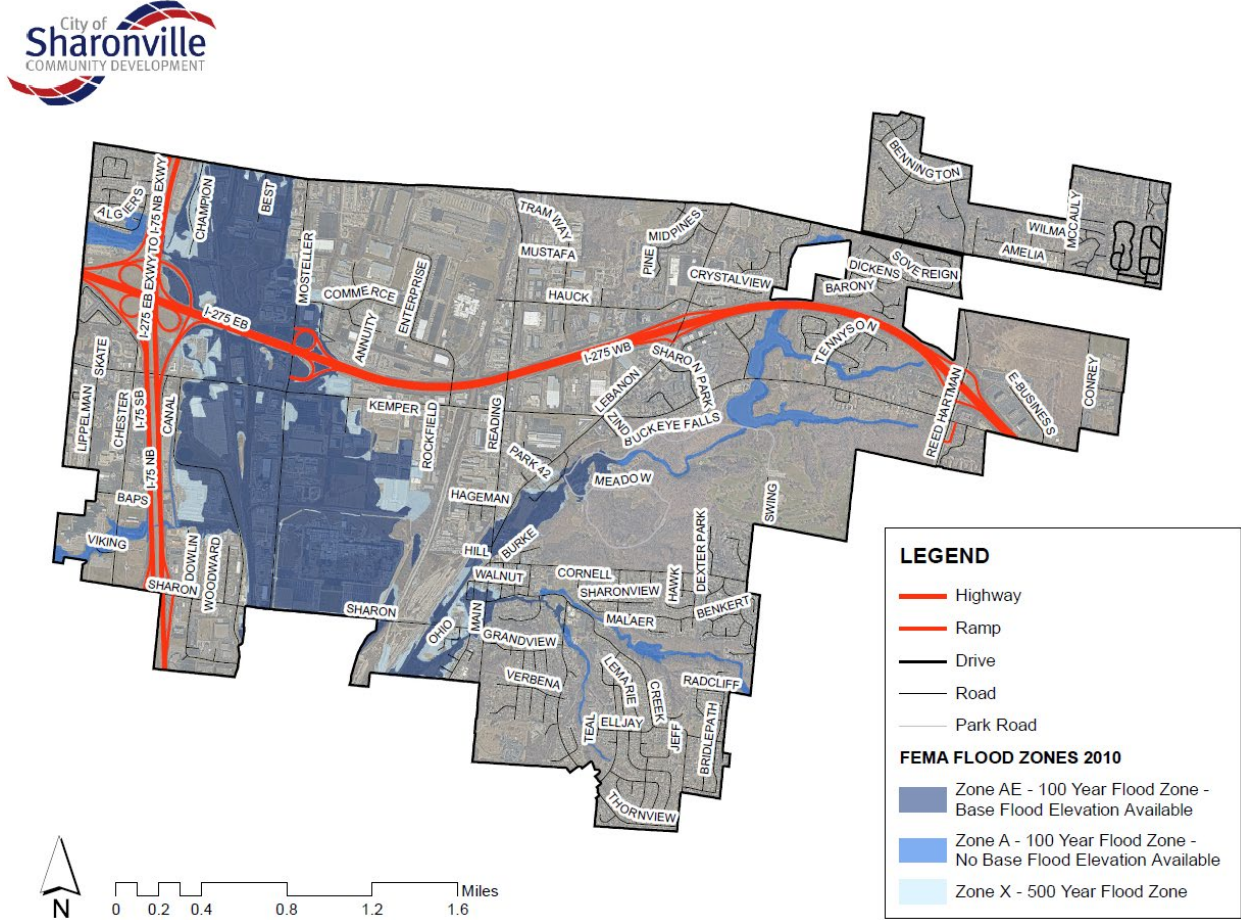
A 100-year or 500-year flood is a rare event because it is expected to occur once every 100 years or 500 years, respectively. This translates to a 1% and 0.2% chance of such a flood occurring in any given year. However, if such a flood did occur we might expect that the City would incur a material cost to respond to the event – for example, public safety response.

FEMA and Reserves

The U.S. Federal Emergency Management Agency (FEMA) reimburses local governments for monies spent in response to a federally-declared disaster. FEMA reimbursement is only partial (typically 75 percent) and is often not immediate. Therefore, local governments must have the financial capacity to respond quickly and decisively, independent of FEMA assistance.

¹⁴ Our analysis excludes damages to private property or any anything else not the direct financial responsibility of City government.

Exhibit 5.A.1 – Flood Zones in Sharonville



To estimate the potential damages from a flood, the City staff first supplied us with the statistics of the properties in each flood zone. Fortunately, the City has not experienced any large floods recently. However, this means there are no historical records to draw upon for what a flood might cost the City.

To estimate the costs, GFOA looked at our most recent clients where the property in the flood zone was correlated to actual historical damages for floods. Of course, the City's general fund is not responsible for providing financial assistance to private property owners, but the value of the property in the flood zone should provide a reasonable measure on the magnitude of the City response required. As such, our approach is looking at the potential cost the City would incur for its responsibility from a flood. For example, if the flood zone was completely uninhabited, then one might reasonably assume that minimal or no emergency response would be required. If there is very intensive land use, a greater response might be required. We then developed a range of plausible damages for Sharonville, based on the value of properties in the zone and based on what other clients have incurred for similar values in the floods zone. Following the Triple-A rule we described earlier in this report, we also doubled the range of results. This results in a conservative approach to the possible damages Sharonville is simulated to possibly experience. For a 100-year flood the range of simulated potential costs are from about \$50,000 to \$105,000. For a 500-year flood, the range is from about \$100,000 to \$190,000.

Exhibit 5.B.2 shows simulated damages for varying levels of confidence for a 100-year and 500-year flood. We see that floods can be quite costly, but the mostly costly floods should be rare. For example, 60% of 100-year floods are simulated to be less than \$73,000 in damages, while only 10% of 100-year floods are more than \$90,000. These figures do not include FEMA reimbursement. FEMA reimbursement is factored into the 10-year risk outlook in Section 7 of this report. FEMA is assumed to reimburse 75% of the cost of a flood. Any FEMA reimbursement is assumed to arrive two years after the event.

An important caveat to what we have discussed so far is climate change. One could argue that climate change could make severe floods more likely. The GFOA Risk Model gives the user to increase the chances of severe floods and observe the results.

Exhibit 5.B.2 – Chance that a Given Flood of the Indicated Frequency would be <u>Less Than</u> the Indicated Amount		
Chance	100-Year Flood	500-Year Flood
50%	\$69,492	\$122,039
60%	\$72,862	\$128,330
70%	\$78,059	\$136,058
80%	\$84,030	\$147,122
90%	\$90,604	\$159,322

Checkpoints

- ✓ The City is vulnerable to flooding.
- ✓ Highly damaging events are rare – 1 in 100 or 1 in 500 years.
- ✓ If a highly damaging event does occur, FEMA assistance will offset much of the costs. However, 25% of the costs will have to be shouldered by the City and the reimbursement will not arrive immediately.

B. Hazardous Material Spills

Sharonville is subject to potential hazardous material spills from truck or train accidents. Trucks and trains carrying hazardous materials travel through Sharonville regularly due to the prevalence of industry in the area. First, the good news is that risk of spills is relatively remote. We first gathered federal statistics on the likelihood of a train or truck accident per mile traveled. We then worked with the City's Fire Department to estimate the number of trips and miles driven. This was based on information the Department has in its role in responding to hazardous material spills. We estimated that the chance of a hazardous material truck spill is less than 1 in 1,000, the chance of train derailment is about 1 in 1,000, and the chance of a minor spill from a train is about 4 in 25. On top of these low chances of a spill occurring, there is a high chance that the party responsible for the spill can be held responsible for the cost. Working with the Fire Department, we estimated a 75% chance of full cost recovery and 15% chance of partial cost recovery. We also used data gathered from other clients to estimate the clean-up cost per gallon spilled. The bottom line is that the chance that the City would have to cover large costs from train or truck hazardous materials spill are quite remote, although it is still possible. The GFOA Risk Model includes these potential costs and we will see the results in Section 7.

The City is also at risk from hazardous material spills in industrial facilities. The Fire Department identified about ten facilities that appear to pose some risk of a meaningful spill. Unfortunately, we were not able

to gather any data to suggest how likely such a spill might be or how much a spill would cost. Given there are only ten facilities and the chance of a spill in any given year is probably not very high, we might expect that the chance of a spill in Sharonville is low. We might also assume there is high chance that the City could recover costs from the responsible party. All of this suggests that the potential financial impact of a spill is probably not high.

Perhaps the major take away is that hazardous materials spill risk is a very low probability event with potentially extreme consequences. Though a large spill of highly toxic materials is highly unlikely, it could happen and could have severe consequences for the City if did – especially if the perpetrator is unable to pay the costs of remediating the spill. In theory, the costs could reach millions of dollars. Also, depending on the nature of the spill, it might also interrupt income taxes – for example, if places of employment have to be evacuated for a time.

Checkpoints

- ✓ Trains and trucks traveling through Sharonville sometimes carry hazardous materials. It is possible that an accident could result in a spill.
- ✓ The costs to clean up a spill would usually be borne by the perpetrator of the spill, but it is possible that the perpetrator would be unable to pay. In this case, it could fall to the City to pay.
- ✓ There are also about ten facilities in the City that present a risk of hazardous materials spills, though we could not obtain data sufficient to model the risk.
- ✓ Hazardous materials spills have a very low probability of occurring, but could have extreme consequences if the spill is large, the materials spilled are very toxic, and the perpetrator cannot cover the cost of the spill.

Section 6 - Secondary Risks and Comparable Analysis

Prior sections of this report reviewed the risks of the greatest financial consequence to Sharonville. In this section we briefly review some other potential risk factors that were considered but that did not appear to present as a pressing risk to Sharonville's general fund reserve as the other risk factors we examined. In some cases, this is because potential impact of the risk is not high. In other cases, it is because the event is highly unlikely to occur. The primary risks are risks that Sharonville stands a good chance of experiencing in the next ten years. This is not to say that Sharonville should not prepare for rarer, but potentially high consequence events or for more frequent, but lower impact risks like some of those described below. It is only to say that these events were not included in the scope of our analysis because they do not appear to present clear and present dangers to the City. Also, in this section we examine how Sharonville compares to other cities on indebtedness and the amount of fund balance maintained.

A. Secondary Risks

GFOA identified some risks that are secondary risks. These risks are not primary risks because they are judged to be of lower probability, of lower severity, or both, compared to the risks we described earlier. Also, as we discuss below, the City has insurance that covers many of these secondary risks.

Cyberattack

Local governments are at high risk for cyberattack, particularly ransomware attack. In fact, studies have shown that local governments are the most popular ransomware targets for cybercriminals. The City currently has coverage under a cyber liability program. The insurance has a \$1 million limit and a \$25,000 deductible for each type of policy included in the coverage. GFOA is not an insurance expert and a detailed examination of the policy was outside the scope of this project, but it is worth noting a few specific points that could entail additional risk:

- The policy limit is set at \$1 million in aggregate. A particularly severe attack could cost more than \$1 million. The Cities of Atlanta, GA and Baltimore, MD made news for incurring well over \$10 million in cost from a ransomware attack. Of course, these cities are much larger than Sharonville, but research suggests that potential damages and size of the government are only weakly correlated. Based on data GFOA gathered for the cost of ransomware attacks it appears quite possible that Sharonville could experience in excess of \$1 million in damages.¹⁵
- The City's policy has four separate \$25,000 deductibles – one for each component of the overall cyber policy.¹⁶ A ransomware attack could trigger more than one policy component. It is not clear from the document that GFOA examined if the City's policy is what is known as "single highest retention" or "multiple retention". If the latter, the City would have to pay up to \$25,000 for each of the four policies that could be policy triggered, for grand total of \$100,000 in potential deductible costs. If the former, the City would only pay the deductible once. Typically, this would be the highest deductible of the available policies, but all the deductibles are the same.
- "Bricking" of hardware is not an uncommon consequence of a cyberattack. The City's policy is very clear that "bricking" is excluded.

¹⁵ Data was sourced from a cyber security data specialist firm, NetDiligence.

¹⁶ The four components are: Data Breach and Privacy Liability; Data Breach Loss to Member; Electronic Media Liability; and Breach Mitigation Expense

- The policy excludes acts of war. This is a common exclusion in insurance policies, but many ransomware attacks are thought to be perpetrated by state or quasi-state actors. If interpreted as an “act of war” the City would not have coverage.
- Generally, municipal governments have found cyber policies to be increasingly expensive or hard to get at all. Insurance companies are becoming more rigorous in their underwriting practices and are increasingly requiring that policy holders have risk-mitigating practices in place, like multi-factor identification and more. This has two implications for the City:
 - The City might wish to investigate the potential for further investment in cybersecurity measures. An example of a resource that is accessible to local governments is CIS 18 Critical Security controls, <https://www.cisecurity.org/controls>.
 - The City may need to be prepared to take on a higher retention for cyber policies.

GFOA did include a simplified cyberattack risk in the GFOA Risk Model. There were a number of simplified assumptions made:

- The model only addresses ransomware. It does not include other types of attacks.
- The model assumes the City is able to retain a substantially similar cyber insurance policy as it has today for the entire ten year period.
- It assumes ransomware attack costs remain roughly analogous to what they are today for the entire ten year period.
- The model does not account for exclusions from insurance that might prevent the City from recovering reimbursements from insurance for damages incurred.

Thus, while the GFOA Risk Model has at least some representation of the most pressing type of cyberattack (ransomware) it is not comprehensive of all cybercrime risk. The model can be easily updated to change insurance policy parameters and potential attack costs.

Lawsuits

Like any local government, the City could be sued. GFOA is not aware of any unusual risk to the City stemming from legal exposure. Also the City is part of an insurance pool that provides coverage for this risk.

Tornados

The City has never been hit by a tornado, but tornados have hit other communities located within proximity to Sharonville.

B. Comparable Analysis

This subsection compares Sharonville to other cities on indebtedness and the amount of fund balance they maintain. This information provides context for the City in selecting its own reserve levels. Debt and reserves are both determinants of financial flexibility. A high debt burden means less flexibility, which then would suggest that reserves are especially important for providing flexibility. A lower debt burden would mean the converse.

Debt

At the end of FY 2020, Sharonville total direct **and overlapping** debt amounted to \$59.1 million, of which \$3.7 million was direct debt. Overlapping debt includes debt issued by other jurisdictions to which

taxpayers in Sharonville are subject. The City's general obligation rating as assigned by Moody's Investor Services is Aa2. Exhibit 6.B.1 compares Sharonville with the medians of similarly-sized peers (population between 100,000 to 500,000) across different Moody's Investor Services' credit ratings. The top row shows the direct debt a city has relative to its full value or total assessed value. For this indicator, Sharonville fairs close to the similarly sized Aaa-rated cities and better than similarly rated Aa cities. The second row shows direct debt a city has relative to its total operating revenues. For this indicator, Sharonville fairs much better with direct debt at 0.10 times its operating revenues, which is less than across all credit rating categories.

Exhibit 6.B.1 – Comparison of Sharonville's Financial Indicators to Cities with Population of Less Than 50,000

	<i>Sharonville</i>	<i>Aaa</i>	<i>Aa</i>	<i>A</i>	<i>Baa</i>	<i>Ba</i>
Direct Debt / Full Value (%)	0.70%	0.60%	1.00%	1.60%	2.30%	3.80%
Direct Debt / Operating Revenues (x)	0.10	0.78	0.83	1.01	1.11	1.43

Source: Moody's Investors Service, "2018 US Local Government Medians Demonstrate Stability of Sector"

To further explore measures of debt, we examined how Sharonville compares to a group of peer Ohio cities based on a combination of factors, including geography, population, and general fund revenue portfolio. Exhibit 6.B.2 provides summary statistics from each of the cities' FY 2020 annual financial report and includes four commonly used measures of indebtedness. The measures are categorized as measures of overall debt and measures of direct debt.

Measures of overall debt captures the full burden placed on the public by debt issued by all local governments that overlap the city. Within this category, the first measure, overall debt per capita, shows the burden placed on citizens by municipal indebtedness inclusive of direct and overlapping debt. The second measure, overall debt burden, compares direct debt plus the debt of overlapping jurisdictions as a percent of the full assessed value of properties in the jurisdiction.

Measures of direct debt includes debt service (inclusive of principal and interest payments) as a percent of the city's expenditures. This measure gauges the pressure placed on the budget by debt payments. The second measure shows direct debt as a percent of the city's full value to show the debt burden relative to the City's tax base.

Exhibit 6.B.2 – Comparison of Sharonville’s Debt Measures with Peer Ohio Cities

		Measures of Overall Debt		Measures of Direct Debt	
	Population	Overall Debt per Capita	Overall Debt Burden (Overall Net Debt as % Full Value)	Debt Service as a % of Expenditures	Direct Net Debt as % of Full Value
<i>Sharonville</i>	13,560	\$4,358	11.23%	0.91%	0.70%
Beachwood	11,953	\$7,152	10.09%	9.62%	1.86%
Blue Ash	12,114	\$8,974	11.96%	13.77%	4.82%
New Albany	10,897	\$13,069	22.11%	10.73%	12.64%
Pickerington	22,158	\$2,159	7.68%	7.77%	1.66%
Solon	22,911	\$2,886	5.37%	2.10%	0.34%
Mean	15,599	\$6,433	11.41%	7.48%	3.67%
Median	12,837	\$5,755	10.66%	8.69%	1.76%

Sources: FY 2020 annual financial report of each city

Among its peers, Sharonville is close to the midpoint of overall debt per capita with \$4,358 compared to the median of \$5,755. Two other cities have lower overall debt per capita than Sharonville, Pickerington at \$2,159 and Solon at \$2,886. With respect to overall debt burden, Sharonville’s overall debt as a percent of full value is 11.23%, which is close to the average amongst the peers of 11.41%. The Cities of Blue Ash and New Albany recorded higher overall debt as a percent of full value than Sharonville.

In examining direct debt measures, Sharonville has the lowest debt service as a percentage of expenditures and second lowest direct net debt as a percent of full value. Sharonville’s debt service as a percentage of expenditures is 0.91%, which is followed by Solon at 2.10%. With direct net debt as a percentage of full value, Solon has the lowest at 0.34% followed by Sharonville at 0.70%.

Sharonville has a relatively low level of direct net debt. However, its overlapping debt places some constraints since its overall debt falls close to the median and averages of its peer cities. While debt could play a role in the City’s risk mitigation strategy, it may be used cautiously.

Claims on Fund Balance

It is important to gain an understanding of existing claims on the City’s general fund balance in order to fully see funds available to the City in case of a major, unforeseen expenditure or emergency.

To help the City consider the amount of reserves to maintain, Exhibit 6.B.3 provides a table of general fund balances as a percent of general fund expenditures for peer cities.¹⁷ Many governments include general government services in the general fund, however Sharonville and Pickerington have separated their fire department and police funds. To provide a more comprehensive view of fund balances dedicated

¹⁷ Governments may also consider evaluating the general fund balances as a percent of general fund revenues. In this instance, we utilized general fund expenditures as Sharonville’s revenues have exceeded expenditures in recent years to support transfers out to other funds, including the capital improvement fund, as well as large year-end set asides.

to general government services, we included information for both cities and their respective funds in Exhibit 6.B.4. Several notes should be made about Exhibit 6.B.3 in order for the reader to fully understand its meaning. First, “fund balance” is an accounting term describing the difference between assets and liabilities in the general fund. “Reserves” (which are the main topic of GFOA’s analysis for Sharonville) are the portion of fund balance set aside, by City policy, as a hedge against risk. Hence, not all “fund balance” is necessarily available as a reserve. The right-hand section of Exhibit 6.B.3 shows how much each city holds in fund balance as a percent of general fund expenditures. Each of three columns on the right in this exhibit examines fund balances from a different perspective between its relationship to risk mitigation.

The first column shows “unrestricted” fund balance as a percentage of general fund operating expenditure. This is an accounting term describing fund balances that do not have constraints placed on their use by an outside entity (e.g., a bond covenant might restrict the use of some portion of fund balance to debt service) and are spendable (e.g., do not represent inventory or other non-liquid assets). An “unrestricted” fund balance may still have constraints placed upon its use, but these constraints would be created by the city government itself. One common constraint is to dedicate some portion of fund balance to hedging against the types of risks described in this report. However, other constraints have nothing to do with risk mitigation - to illustrate: a common self-imposed constraint is setting aside fund balance to pay for a special capital project. While the City does not have such a constraint, if it did, such a constraint *could* be removed and made available for risk mitigation.

The second column shows the amount of fund balance available for risk mitigation after fund balances having self-imposed restrictions (not germane to risk mitigation) are removed from consideration. This leaves self-imposed restrictions that are germane to risk mitigation as well as unrestricted fund balance, which could easily be used for responding to emergency events if needed. This includes the amount committed by Sharonville for severance liability.

The third column includes only those fund balances that have been specifically identified by the city as intended for creating a risk mitigating reserve. Sharonville’s funding set aside for severance liability is included in this column. It should be noted that since the analysis in Exhibit 6.B.3 is based only upon the information included in each city’s FY 2020 annual financial report, it is possible the amount dedicated to risk mitigation could be higher for some of the cities as a legislative policy document might call for maintaining a given amount in fund balance as a reserve without creating an accounting restriction that would show up in the financial report, which is the case for the Cities of New Albany, Pickerington, and Solon.

Exhibit 6.B.3 – Comparison of Sharonville's General Fund Balances to Peer Ohio Cities

	% of General Fund Expenditures		
	Unrestricted	Available for Risk Mitigation	Dedicated to Risk Mitigation*
Sharonville	126.6%	113.4%	5.5%
Beachwood	88.9%	68.1%	0.0%
Blue Ash	196.8%	190.0%	0.0%
New Albany	178.7%	151.8%	6.2%
Pickerington	381.6%	354.0%	0.0%
Solon	71.7%	66.5%	0.0%
Mean	174.1%	156.3%	2.0%
Median	152.7%	129.5%	0.0%

*The figures are based on details identified in each city's annual financial report. A city may have a legislative policy to maintain a certain amount in fund balances as a reserve without creating an accounting restriction.

Sources: FY 2020 annual financial report of the cities

Exhibit 6.B.4 – Fund Balance of City of Sharonville's Fire Department Fund and City of Pickerington's Police Fund

	Sharonville		Pickerington	
	General Fund	Fire Department Fund	General Fund	Police Fund
Nonspendable	\$23,993	\$3,174	\$246,052	\$108,382
Restricted	\$0	\$6,225,556	\$0	\$529,497
Committed	\$746,872	\$0	\$0	\$0
Assigned	\$1,779,212	\$0	\$1,027,188	\$0
Unassigned	\$14,559,488	\$0	\$13,154,194	\$0
Total Fund Balance	\$17,109,565	\$6,228,730	\$14,427,434	\$637,879

Sources: FY 2020 comprehensive annual financial report of the cities

As shown in Exhibit 6.B.3, 126.6% of Sharonville's general fund balance as a percentage of general fund expenditures is unrestricted and 113.4% is available for risk mitigation. For both of these measures, Sharonville is ahead of the Cities of Beachwood and Solon, but has a smaller percentage than the mean and median across the peer cities. The Cities of Blue Ash, Pickerington, and New Albany maintain a large percentage of unrestricted fund balance as well as portion available for risk mitigation. Across all cities the amount available for risk mitigation represents the unassigned portion of the fund balance, except Sharonville and New Albany which include amounts committed to severance liability.

The figures in the furthest right column represents portions of fund balance dedicated to risk mitigation and of the six cities. As noted previously, only Sharonville and New Albany have imposed a strict

accounting designation for such purposes. At the end of 2020, Sharonville has \$747,000 committed for employee separation. Sharonville also has set aside \$636,000 for fire employee separation. However, as noted earlier, the Cities of New Albany, Pickerington, and Solon have reserve policies to address specific risks, but have not imposed strict accounting designations. New Albany has several reserve funds, including one dedicated to capital equipment replacement and infrastructure replacement. Pickerington's reserve policy is to maintain at least 25% of annual operating expenditures in unassigned fund balance to address unanticipated events. Solon has both a general fund cash reserve policy and a budget stabilization fund that provides resources should a pre-determined economic stress level be reached. At the end of FY 2019, Solon had \$7.6 million in the budget stabilization fund and tapped \$1.2 million in FY 2020 as a result of COVID-19's impact on its finances.

Compared to its peer cities in Ohio, Sharonville is under the median and average for both unrestricted fund balance and fund balance available for risk mitigation relative to general fund revenues. A more deliberate analysis, such as the approach in this report, will provide greater insights into if such level is appropriate given the risk factors that the City faces. The City could impose more stringent accounting restrictions to portions of the fund balance to set aside funds for specific risks it faces.

Section 7 - Putting it All Together

In Sections 4 and 5 we examined individual risks such as recessions, the closure of the City's major employer, and floods. We examined each of these risks individually in order to best understand the nature of each risk and the financial implications. However, to arrive at a final reserve strategy for the City, we need to consider these risks as a group. Considering the risks as a group has important advantages.

The first advantage is that considering risks as a group recognizes the diversity in the risks that the City faces. This diversity actually is an advantage for City finances! Diversity in risks means we should not simply add together a reserve for each individual risk. This may overstate the amount of reserves that the City really needs. This is because it is unlikely that the City will experience a deep recession, severe flood, and the closure of the major employer all within a short time period.

The second advantage of considering all of the risks together is that not all of the risks have an equal chance of occurring over a given time period. Recessions are more common than a 100-year flood. The reserve analysis should reflect this fact. In the bullet points below, we show the relative chance of each of the major risks occurring over a ten-year period. We can use these probabilities to build a model of risks over a long-term time horizon.

- **Revenue loss due to a recession.** Historical data suggests that it is highly likely (over 90% chance) that there will be at least one recessionary year in a ten-year period.¹⁸ The historical data also tells us there is a considerable chance of having more than one recessionary year in a ten-year period.
- **Flood.** Based on the flood data we have available, the model simulates 100-year and 500-year floods. These floods have a 1% and 0.2% annual chance of occurring, respectively. The GFOA Risk Model gives the City the option of increasing the likelihood of these floods, by up to 400%, but we did not assume any increase for the purposes of this report.
- **Closure of major employer.** We estimate a 2% chance of the plant closing each year for the first five years and then an 8% chance after that. The GFOA Risk Model also provides for a chance that the plant significantly curtails operations, but does not close completely. We estimate a 3% chance of curtailment for the first five years and 6% for the next five years.
- **Hotel tax revenue instability.** The most important risk here is recession risk. The chances are the same as noted above for recessions generally. The GFOA Risk Model also accounts for COVID-induced slowdowns, with an 8% chance of such a slowdown occurring.
- **Accrued sick time payouts.** The payouts will almost certainly occur, it is just a matter of how much. The variables used by the model to simulate the size of the payouts were described in Section 4.
- **Income tax base reduction due to remote work.** There will very likely be at least some loss in tax base due to remote work. Again, it is just a matter of how much. The variables used by the model to simulate the size of the losses were described in Section 4.
- **Hazardous material spills.** The chance of a truck spill is less than 1% in a given year. The chance of a major train spill, via derailment, is less than 1% per year. The chance of minor train spill, with no derailment, is 8% per year.

¹⁸ We took economic data since 1950 and used that to calculate the odds of a recession occurring in a ten-year period, including how many of those years would be recession years.

- **Ransomware.** There is about an 8% chance of a successful ransomware attack. This is based on an off-the-record conversation we had with a local government risk pool that insures against ransomware and is thought to be a slightly conservative estimate.

The final advantage of considering all the risks together is that we can consider “risk interdependencies.” This simply means that the occurrence of one risk could impact the probability and/or magnitude of a related risk. In Sharonville’s case, an example of an interdependency is that the size of the surpluses the City generates each year will likely go down if the size of tax base decrease, due to the closure of a major employer.

We built the GFOA Risk Model that considers the City’s risks over a ten-year time horizon. The GFOA Risk Model runs hundreds, thousands, or even ten thousand simulations of possible futures for Sharonville. Below are the key assumptions behind the model. Some of these assumptions are user-definable so that the City can explore alternative scenarios to those described in the report. Below, we have italicized user definable variables and described the default values included in the GFOA Risk Model.

- **Probability of an undesirable event.** The probability of any undesirable event occurring is consistent with the assumptions described in the bullet points on the previous page.
- **Magnitude of an undesirable event.** Should a simulation show that an undesirable event occurs in a given year, the magnitude is generated randomly in a manner identical to how we described for the risks earlier in this report.
- **FEMA and other reimbursement.** The City could recoup some of its losses from extreme events, such as flood reimbursements from FEMA. The model assumes the reimbursements are received *two years after the event occurs*.¹⁹ The model also assumes that any flood would qualify for assistance. The GFOA Risk Model also assumes there is a very good chance that the City could recover costs to respond to a hazardous material spill from the perpetrator of the spill. These chances were developed in conjunction with the Fire Department.
- **The City does cut some spending to help offset the impact of a recession or an extreme event.** At least some of the losses from a recession or extreme event could be absorbed by cutting back on the City’s regular spending. The GFOA Risk Model allows the user to enter assumed amount of budget the City would be willing to cut when faced with financial difficulties. For the purpose of this report the City would be willing to cut 2%.
- **The City will very often generate budget surpluses when there is not a recession.** The City has historically generated surpluses every year. Annual surpluses can be used to offset unexpected cost or help pay for capital projects. The GFOA Risk Model simulates budget surpluses for non-recessionary years based on the range of surpluses generated by the City in the past. The model assumes that if the City’s reserves are high, then the surpluses will be used for purposes like paying down debt, investing in capital projects, etc. This is consistent with the City’s past practices.
- **Critical threshold.** *This is the amount that the City does not want reserves to go below.* For the purposes of this report, we set the amount at \$3.5 million. There are a few parts to the rationale for this amount. First, a simulation of the possible losses in a single year shows that between \$3 million and \$4 million is the upper plausible losses for single year. Thus, a critical threshold of \$3.5 million keeps the City out of striking distance of reaching zero reserves in a single year. Second,

¹⁹ Our research shows that FEMA reimbursements are completed 18 months after the disaster occurs, on average. So, this is a conservative assumption.

bond rating agencies consider reserves equal to 15% to 30% of revenues as indicative of AA credit quality. Reserves equal to 15% would be \$3.2 million for the City, so \$3.5 million provides a little extra room to maneuver. Finally, extra room to maneuver is useful because GFOA's Risk Model cannot be inclusive of every possible risk the City could ever face. The critical threshold provides protection against the unknown risks.

We combined all of the information described above to create a ten-year probabilistic risk model. The City's goal for this analysis was to find an amount that can give the City sufficient comfort that its reserves will cover its risks. The following pages present a series of graphics based on this model, both for the general fund and fire fund.

General Fund Analysis

Exhibit 7.1 shows the chance that the City's current reserve will reach the critical threshold (\$3.5 million) each year. GFOA has observed that most municipalities are comfortable with about 10% to 20% chance of reaching their critical threshold by the end of the analysis period. Sharonville has a slightly higher chance than this. It is important to note that, generally, the blue bars will get higher the further in the future we look because more bad things can happen. In Sharonville's case, the size of the blue bars climbs rapidly after 2026. This is because we assumed that the chance that the city's major employer closes or curtails operations increases dramatically after that time (see Section 4 of this report for more explanation of this assumption).

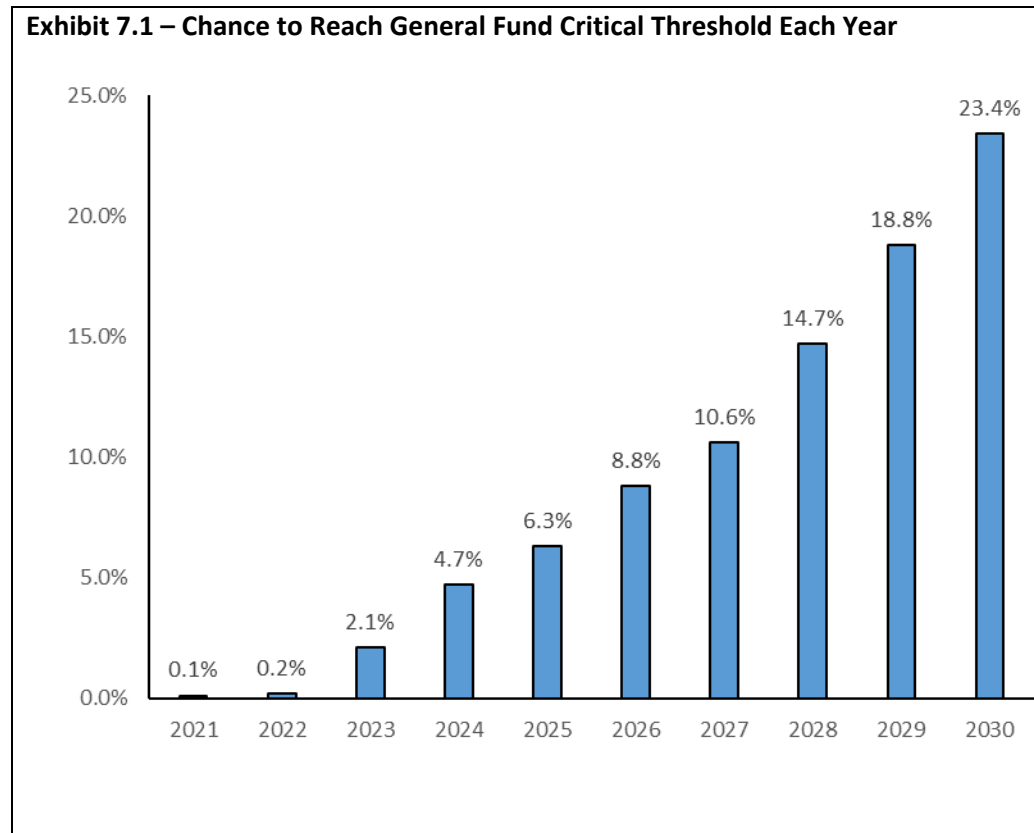
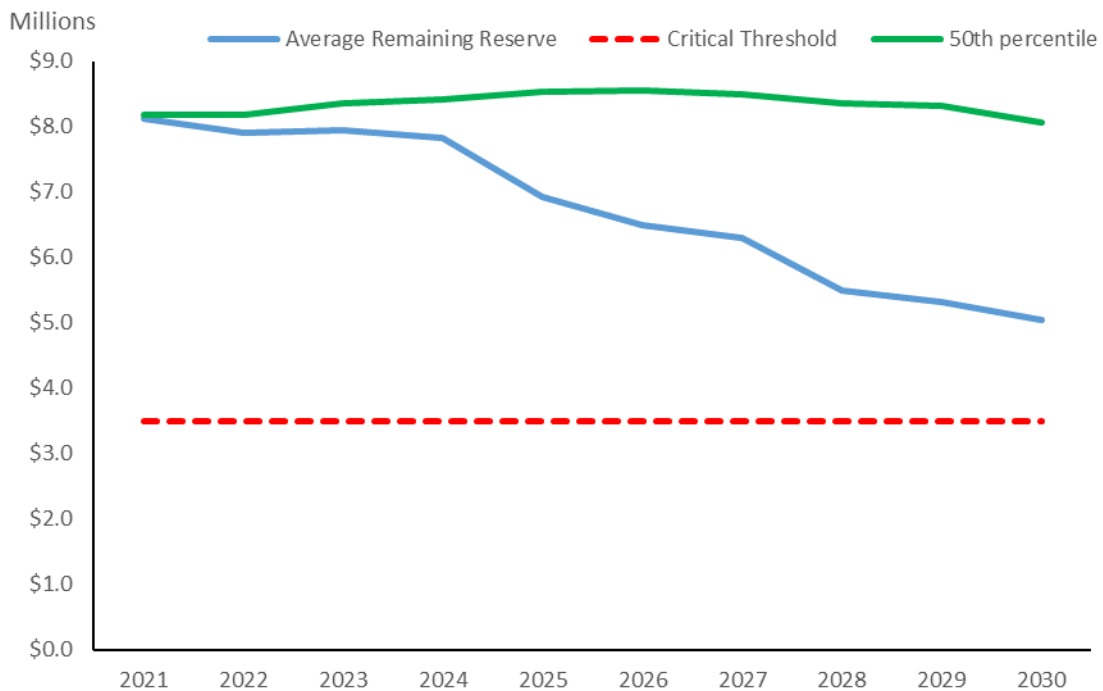
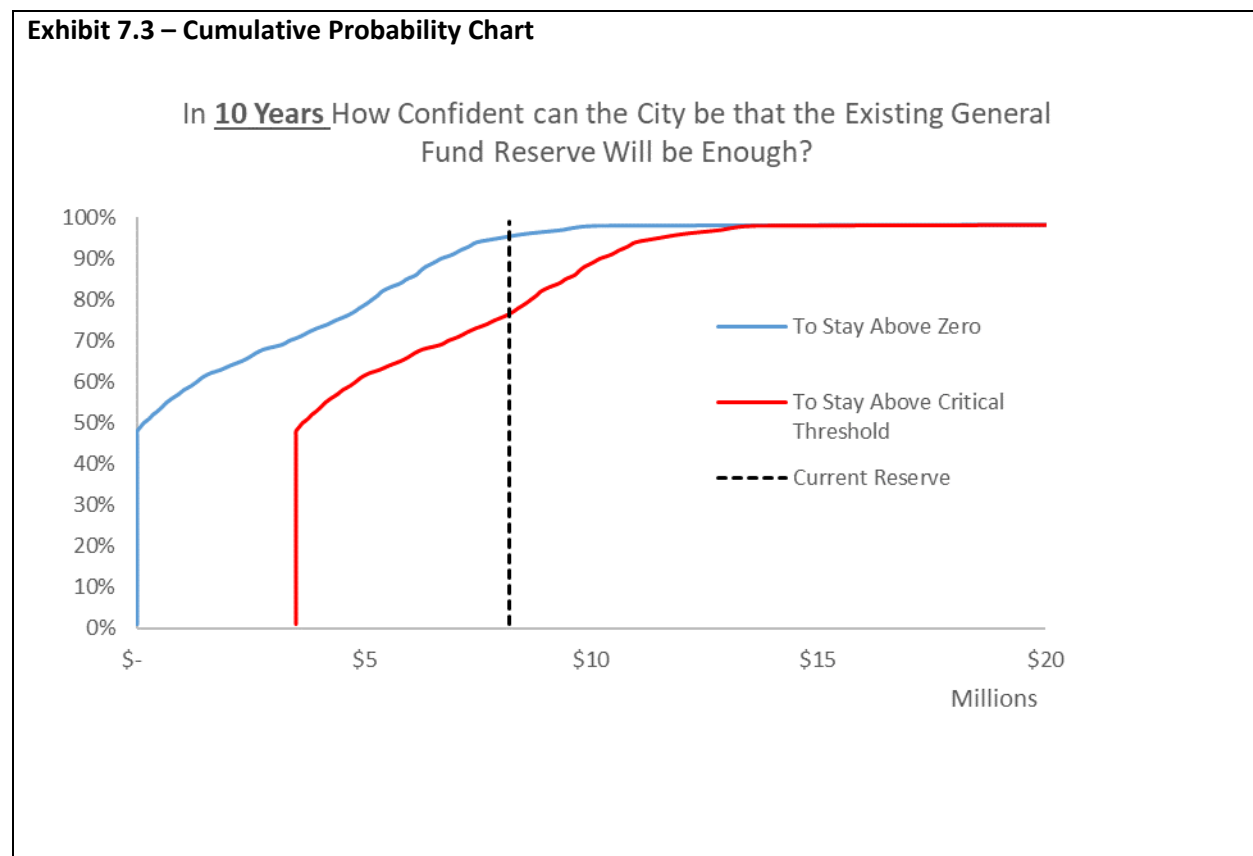


Exhibit 7.2 shows the average remaining reserve per year (blue line). We can see that the simulation shows the City's reserves are simulated to decline under "average" conditions. The chart also shows the 50th percentile (green line), which means the simulation shows reserves to be at or under the green line 50% of the time. This is another way to look at the "average." This illustrates the big impact such events can have, like the closure of the City's major employer or a catastrophic hazardous material spill. Put another way, if the major employer closes that is a serious drag on the City's finances and that drags the "average" down. However, the good news is that the risk model shows that, most of the time, the City's reserves remain relatively steady over the ten year period.

Exhibit 7.2 – Simulated Remaining General Fund Reserve Per Year



Finally, below is Exhibit 7.3. This is a cumulative probability chart. It shows the confidence available from varying levels of reserves over a ten year period. Sharonville’s existing reserve intersects the **red** line at about 75% confidence. The main take-away from this graphic is the reserves have a diminishing return at a certain point because the flatter the line gets, the less confidence an additional dollar of reserve “buys” you. This is because the further to the right you go on the graph, the more extreme the events are that must be covered by reserves. This graphic shows that the City would still get a good “bang for the buck” from higher reserves. This City would not be as well served by accumulating reserves past the point where the line starts to flatten out because more reserves does not move you up as far on the vertical axis, which is chance that the City will be covered by its reserves.



The implication of the line going flat is that not all points on the line are equally cost effective. Let’s examine Exhibit 7.3 to illustrate. According to the graph, to the additional value of reserves appears to drop off at about \$11 million in reserves. \$11 million is equal to about 95% confidence of staying above the critical threshold (\$3.5 million).

However, City officials will need to think about other factors in order to finalize the reserve target range besides our charts. Foremost, the figures shown in the charts are what is needed to protect the City from just the risks described in this report. Usually, municipal governments have other concerns they expect their reserves to address. Here are three examples of such concerns:

- There are risks that are sometimes called “unknown unknowns.” These are risks that are totally unanticipated. For example, five years ago cyberattacks were not nearly the concern they are today. Five years from now, there could be new, unanticipated concerns the City must contend with.
- The City might wish to use reserves for purposes other than mitigating risks – for example, building a capital project using cash financing. The GFOA Risk Model gives the City the ability to estimate the cost of potential projects to see the financial impact on these reserves.²⁰

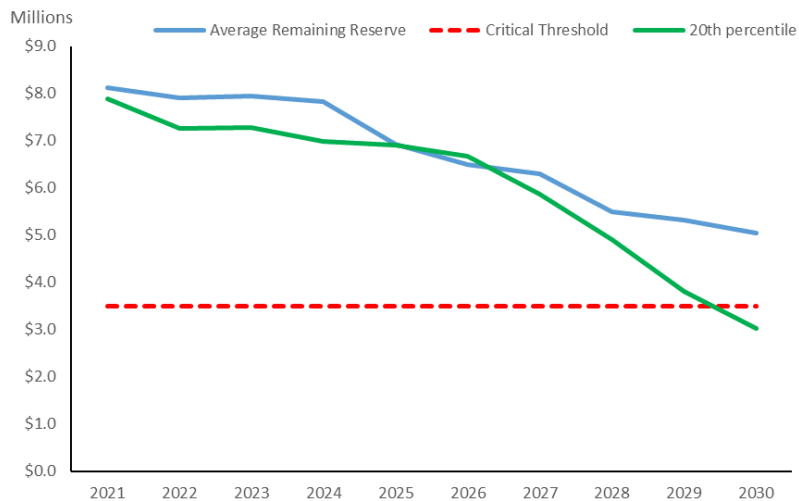
The GFOA Risk Model allows the City to add these considerations to what we call “minimum acceptable reserves” or “critical threshold.” GFOA’s discussions with City staff suggest a critical threshold of \$3.5 million is reasonable. This amount is shown in Exhibit 7.3. The City could choose to vary this critical threshold, which would then change the total amount of reserves the City would need to maintain in order to achieve a given degree of confidence that reserves would stay above the threshold.

Here are some other conclusions we can draw from the graphics presented on the previous pages:

- Sharonville’s existing reserve provides a slightly lower level of confidence for the entire ten-year outlook than GFOA has observed most public officials are comfortable with. Most municipalities are comfortable with around 80% to 90% confidence of the reserve. That is does not mean that Sharonville must adopt the same attitude towards risk. Sharonville could have different goals and circumstances that make its officials willing to accept a lower degree of confidence. Also, we must recall that Sharonville’s risk profile is a bit unusual in that its risk increases much more than many other cities we have worked with, the further we look into the future. For instance, the City has only a 10% chance of reaching the critical threshold 6 or seven years in the future.
- Our analysis of City’s historical budget data shows that the City only has about a good chance of generating a budget surplus in any given year. This means that surpluses are often available to help build the reserve, if the reserve is used. That said, the GFOA Risk Model also recognizes that many of the financial risks Sharonville faces could reduce the chance that the City generates surpluses because the City’s income tax base could be reduced.
- The City should remain mindful of the potential for extreme consequence events. To illustrate, Exhibit 7.4 updates Exhibit 7.2 to change the 50th percentile to the 20th percentile (green line) to show the effect of more extreme events. This shows that 20% of the time the City reaches its critical threshold by 2030. The exhibit suggests the City might consider supplemental strategies to manage its risk, besides reserves.

²⁰ Note that the City has historically done some level of cash financing of projects. The model already accounts for “normal” spending that takes place in the City’s annual budget, so this feature of the risk model would be used for larger projects that exceed what might be considered “typical.”

Exhibit 7.4 – Simulated Remaining Reserve Per Year (showing 20th percentile)



- Exhibit 7.3 showed that additional reserves could be cost-effective up to about \$11 million. This does not mean the City should accumulate that much, necessarily. The City should also consider its risk appetite. City officials might prefer to live with more risk so that reserves do not have to be built so high. However, it would also be perfectly valid position of City officials to prefer to mitigate risk by building reserves.
- Finally, the City can use this report and the GFOA Risk Model to find consensus on reserve strategy all stakeholders are comfortable with. Meaning, are City officials willing to accumulate more reserves? Or, are they comfortable with current levels? This is a personal choice officials must make, but the GFOA Risk Model helps by showing the risk that different choices entail. GFOA suggests the City arrive at range of acceptable reserves and strive to keep reserves in that range.

GFOA discussed all of the factors above with the City's Finance Director and the conclusion of this discussion was that the City of Sharonville would be well served by a policy that calls for reserves equal to between 45% and 58% of its expenditure budget. This gives the City between 80% and 95% confidence of being able to handle the risks included in our analysis. The chart below summarized the recommendation in both total dollars and as percent of the City's budget.

What do these reserve targets look like as a percent of City expenditures?	
A reserve policy typically expresses reserve targets as a percent of expenditures. Below we have converted the dollar figures to a percent of expenditures	
Dollars	Percent of General Fund Expenditures
\$8.5 million (80% confident over 10 years)	45%
\$11 million (95% confident over 10 years)	58%

Fire Fund Analysis

Exhibit 7.5 shows the chance that the fire fund reaches its critical threshold. We set the critical threshold equal to 15% of expenditures for reasons similar to the general fund. We see that the fire fund's current level of risk is less than the general fund. Perhaps most notably there appears to be little to no chance that the fire fund reaches the critical threshold in the next five years. The chances then rise rapidly after five years. This is because our assumptions allow for much greater chance of closure or curtailment of operations at the City's major employer (the Ford plant) during that time.

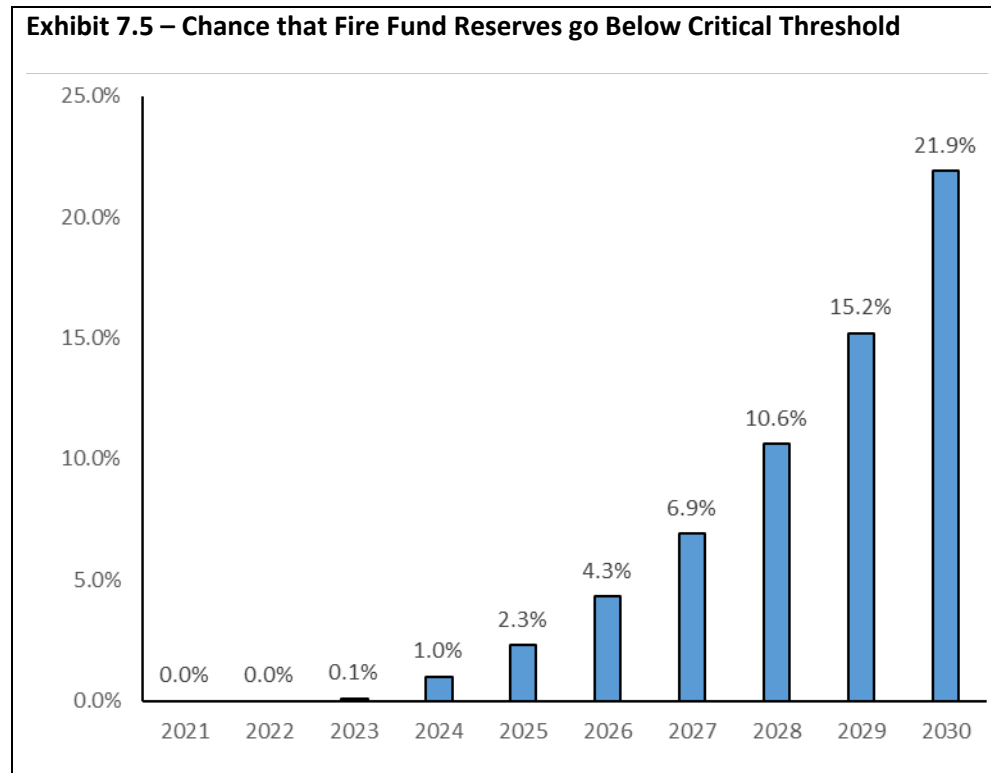
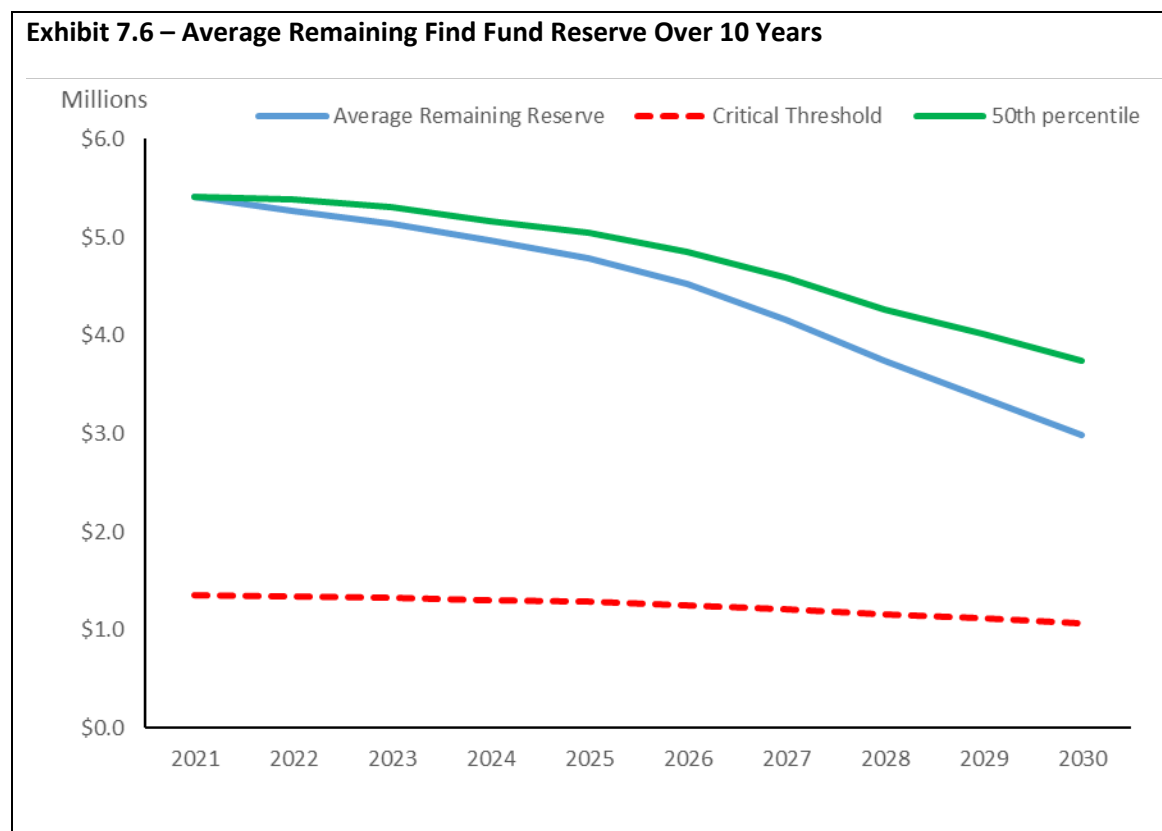
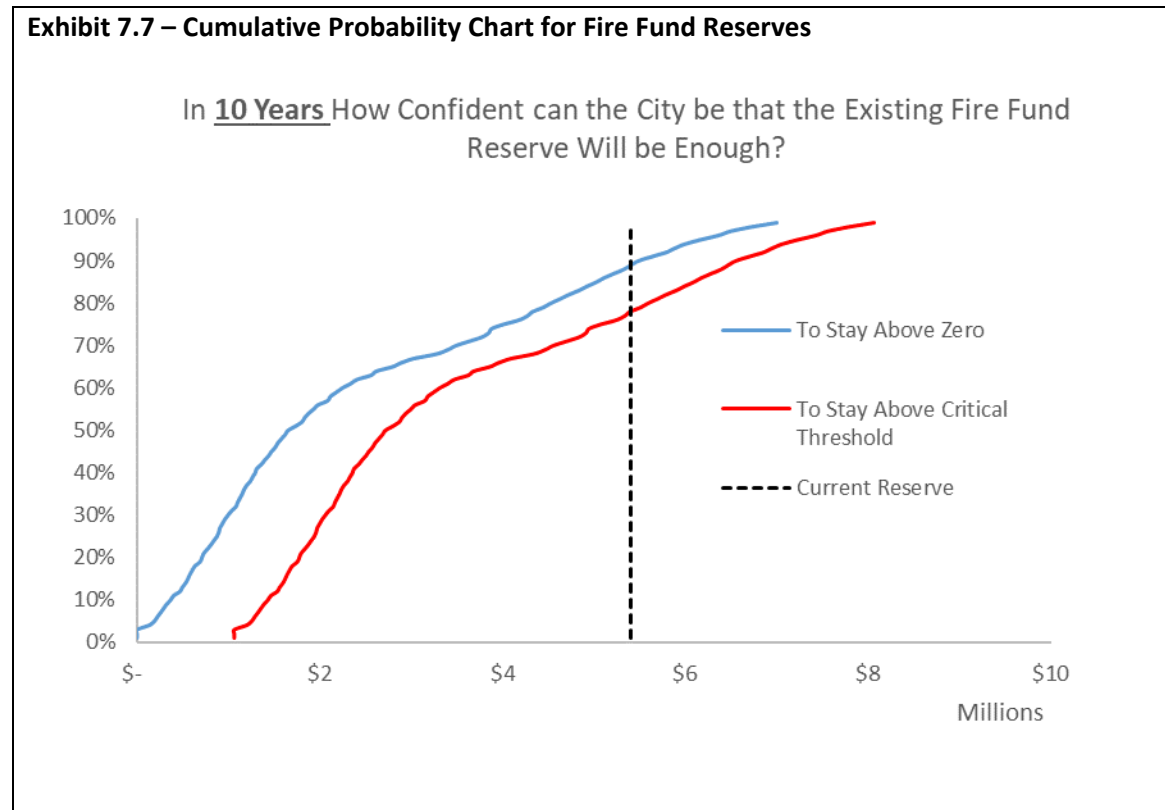


Exhibit 7.6 shows the average remaining reserve over a ten year period, along with the 50th percentile. We see both decline over the ten-year period. In addition to heightened risk of the closure or curtailment of the Ford Plant, the GFOA Risk Model assumes that the City will use a large portion of any surpluses generated by the fire fund, before directing any remaining surpluses to fire fund reserves. We understand this assumption is consistent with the City's current practices. The result is that the reserves decline with use and are not built back up as readily as the might be if the GFOA Risk Model had less aggressive assumptions about the City's use of surpluses.



Finally, we have Exhibit 7.7, which is a cumulative probability chart. We see that reserves are very cost effective up to about \$3 million, but then the slope of the curve changes considerably. There still is some upward slope, so this is not to say that reserves are not valuable past \$3 million, just that the bang-for-the-buck for each additional dollar is considerably less.



So, what conclusions can we draw from what we have just seen about the fire fund? There does seem to be a strong case that the City could hold considerably fewer reserves in the fire fund for the following reasons:

- Very little risk of reaching the critical threshold in the next five to seven years.
- The GFOA Risk Model assumes surpluses will be aggressively used for other purposes besides building reserves. If the City changed this assumption, even the little risk we observe now would be reduced. For example, the baseline assumption in the GFOA Risk Model allows for only up to a quarter (25%) of surpluses to go towards building reserves in a given year. If we increase that to 50%, then the size of the bars in Exhibit 7.5 are cut dramatically. For example, the risk in 2030 goes from about a 20% chance of reaching the critical threshold to about a 12% chance. The size of the other bars in Exhibit 7.5 also decrease proportionately.
- There are additional funds the City has set aside, that are outside the scope of our analysis, that are intended to help buffer the City against the cost of accumulated sick time payouts. This means that the fire fund has some additional “shock absorbers” beyond what our analysis shows.

In considering these factors, **GFOA and the City’s Finance Director arrived at the conclusion that the City’s current reserve could be considered the maximum of what the City would be willing to**

accumulate in its reserves and \$3 million could be established as the floor of the reserves. The chart below summarizes the recommendation in both total dollars and as percent of the City’s budget. You will notice that the confidence levels that these reserves “buy” is less than the general fund. GFOA and the Finance Director agreed this could be appropriate given the considerations listed above, particularly the last two points.

What do these fire fund reserve targets look like as a percent of Fire Fund Expenditures?	
A reserve policy typically expresses reserve targets as a percent of revenue. Below we have converted the dollar figures to a percent of expenditures.	
Dollars	Percent of Fire Fund Expenditures
\$3.0 million (70% confident over 10 years)	35%
\$5.5 million (80% confident over 10 years)	64%

To complement the reserve analysis, we offer the following additional recommendations:

The City should adopt a robust reserves policy. GFOA has conducted extensive research into what it takes for a local government to be financially sustainable. We call this body of work “Financial Foundations for Thriving Communities” (Financial Foundations). This research has shown that local governments require clear decision-making boundaries. A policy on the target level of reserves that the City should maintain and the acceptable use of those reserves provides clear decision-making boundaries for reserves. Furthermore, GFOA has found that a policy that identifies a floor and ceiling for reserves, rather than just a single target number, may provide more useful guidance. This is because a City government will rarely, if ever, have exactly the amount of reserves called for by its policy. Having a range defines the acceptable tolerances the reserves should stay within. The City has done a good job over the years of managing its reserves. The City can enhance this practice by adopting a policy with a range of reserves shown in the table we just saw in the last section.

For the purpose of the policy, the **general fund** range could reference reserves equal to 45% to 55% of the City expenditures, which rounds down the upper end of the range a bit. This would still provide the City with a high level of confidence. The **fire fund** reserves range could be similarly rounded: 35% to 65% of fire fund expenditures.

GFOA can provide a model policy template to help the City with policy adoption.

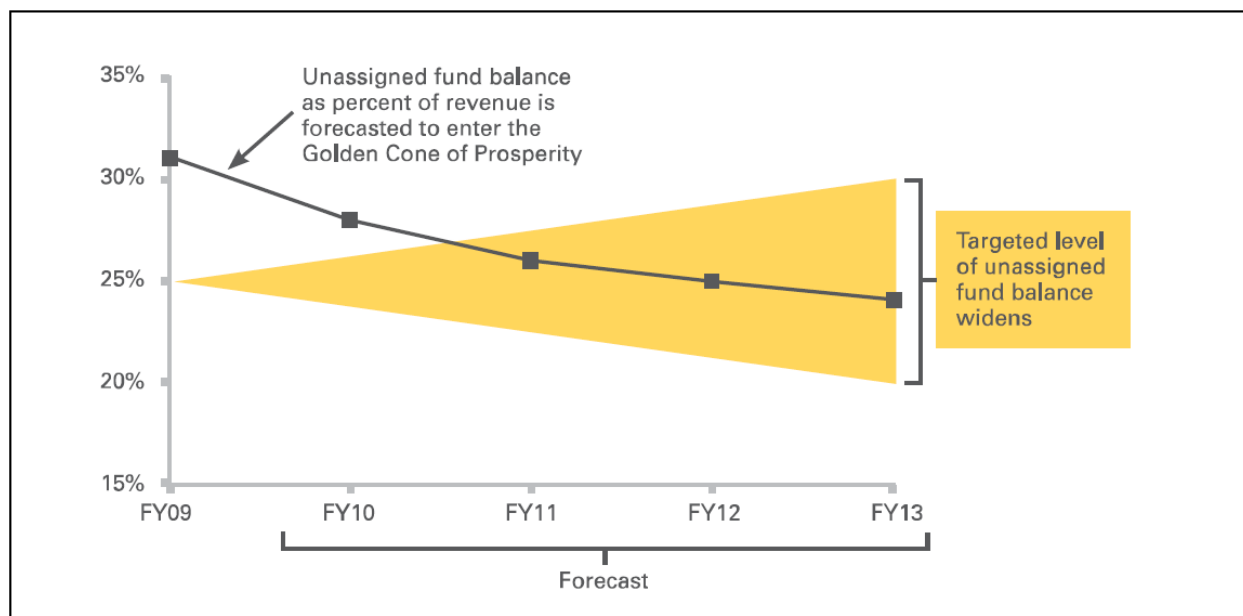
The City should adopt a mechanism to monitor its own compliance with the policy. GFOA’s Financial Foundations research suggests that boundaries (e.g., financial policies) must be monitored in order to be fully effective.

The City of Tempe, Arizona provides a good example of how a reserve policy can be monitored. Tempe’s policy is to maintain the general fund reserve equal to between 20% and 30% of general fund revenues. The general fund reserve policy is combined with Tempe’s five-year financial forecast, where the goal is

to keep reserves within the 20% to 30% boundary during the five-year forecast period. This approach originated in 2009 when Tempe had a policy to maintain reserves equal to 25% of general fund revenues. However, Tempe had been maintaining fund balances above 30%, which was causing some to question why Tempe was not in alignment with the policy and whether Tempe had a fund balance that was too large. City Council and staff agreed to change the policy to set a goal for the reserves to be between 20% and 30% of revenues. This range would provide more discretion, but it would also create clear bounds for what Tempe would consider acceptable maximum and minimum reserves.

Tempe staff developed a presentation of Tempe’s revenue forecast in the context of this new arrangement and informally called it the “Golden Cone of Prosperity.” Exhibit 7.8 shows the presentation as it was in 2009, where the yellow cone representing the range of desired fund balance widens over the forecast horizon as the new policy is phased in and the black line representing actual fund balance gradually enters the cone.

Exhibit 7.8 — Tempe’s Golden Cone of Prosperity in 2009



The meaning of the Golden Cone of Prosperity is straightforward, and its design and name give it a memorable character. As of 2020, Tempe staff still present the Golden Cone twice per year to help public officials to understand the big picture and to show whether Tempe is staying within agreed-upon boundaries. This is a testament to the communicative power of the Golden Cone. Sharonville could develop a similar presentation to help make sure the City stays within its agreed upon financial boundaries. Such a presentation could work for both the general fund and fire fund.

The City should consider further investments in cybersecurity. Cybersecurity is an emerging and growing threat for local governments. As we described earlier, available data suggests a number of sobering points:

- Local governments are the most attractive targets for cybercriminals and ransomware attacks against local governments are becoming more common.

- The amount of damages from an attack appear to only be weakly correlated to the size of the government. Data suggests that the average attack costs around \$100,000 but attacks can and have cost local governments many millions of dollars. The City's current policy limit is \$1 million. This means that even though Sharonville is not as large as cities that have made headlines for the losses incurred by an attack, Sharonville could still suffer a substantial loss – perhaps in excess of its policy limits.
- Cyber insurance policies are getting more expensive and harder to come by. As of this writing, GFOA members are reporting doubling of premiums or being denied coverage altogether.

Given the points above, the City might consider the following recommendations that have implication for the City's reserves:

- Continue planning for enhanced security and make cost-effective investments in cybersecurity controls that both: A) reduce the likelihood of a successful attack; and B) reduce the potential damages, if an attack succeeds. Because reserves are ultimately a form of self-insurance there could be a strong case for using some of the City's reserves to strengthen its cybersecurity. This is because a dollar invested in prevention is usually going to be more effective than a dollar invested in remediation. An example of a resource that is accessible to local governments for improving cyber controls is CIS 18 Critical Security controls, <https://www.cisecurity.org/controls>.
- Be prepared to retain more risk on a cyber insurance policy. If policies get substantially more expensive (or, worst case, unavailable), the City could lower the cost of a policy by retaining more risk. This could be accounted for in the City's reserve amount. As we stated above, there is a plausible risk of a cyberattack costing the city more than \$1 million. Therefore, "retention" of risk is not just the insurance deductible, but also includes the risk of a catastrophic attack that costs more than the policy limit.

Consider a "financial disaster plan". As we have seen, many of the City's foremost risks are financial risks, like the closure of the community's major employer or a recession. The City's ability to restructure and adapt its operations to such an event will have an important impact on its financial health. So, just like the City has a plan for responding to natural and man-made hazards, it could put in place a plan to respond to a financial catastrophe. GFOA's Fiscal First Aid program (<https://www.gfoa.org/ffa>) provides many free resources to help local governments respond to financial challenges. These resources could be used by the City to develop its own financial disaster plan.

The City could consider a robust internal borrowing policy. The City conduct some internal borrowing now for routine operational purposes. Internal borrowing can also be useful as a "last line of financial defense" in a crisis. There will always be some chance that Sharonville could find that it needs access to more financial resources than are available in its general fund reserves. GFOA's research suggests that interfund borrowing could be a practical tool in emergency circumstances. Some other funds might be able to make short-term loans to the general fund in the case of an emergency. The City could develop policies to provide the flexibility to use these borrowing tools while also providing the necessary guidelines and limitations to ensure that borrowing occurs in a fiscally prudent manner.

Sharonville might consider if a policy could recognize internal borrowing's role as a supplementary risk management tool. A policy could address the following points:

- The rationale for using internal borrowing (reserves may not be able to handle every possible contingency);
- When internal borrowing may be used (if reserves are ever exhausted by an extreme event);
- Differentiate between short-term (to be paid back within the same fiscal year) and long-term borrowing;
- How the interest on the borrowing will be calculated (can have multiple alternatives to be determined on a case-by-case basis); and
- General repayment terms (interest only, fully amortized, duration, etc.).

GFOA's analysis has its limits. It is impossible for any risk analysis to be completely comprehensive of all considerations facing the City. Appendix 1 to this report lists the important limitations of this analysis.

Appendix 1 – Limitations of GFOA’s Analysis

This section highlights the most important limitations of our analysis.

Our analysis is not predictive. GFOA does not forecast future recessions, natural disasters, or other extreme events. Rather, our model generates hundreds or even thousands of different scenarios to show how the future could unfold. This helps the City think more broadly about risk so that it can be more prepared for whatever future event does eventually come to pass. Finally, it is important to note that low probability events are still possible events. Hence, even if our model says an event has a low probability, then that does not mean it won’t occur.

GFOA is not a risk management consultant. We worked with the City to find out which risks the City believes are most salient and then modeled those risks quantitatively to judge the potential financial impact. We are not risk managers and it is not our role to tell the City which risks it should be more concerned or less concerned about or what the best way is to manage those risks.

Our analysis is based on historical records. Historical data is often a good way to model potential future outcomes. However, historical data may not be perfect. For example, global climate change could increase the City’s vulnerability to naturally occurring extreme events.²¹ This means that historical data could underestimate the likelihood and/or severity of extreme events in the future. Unfortunately, no one can say precisely what the impact of climate change will be. Hence, GFOA can’t speculate if an upward adjustment to the reserves is necessary and, if so, by how much. However, this does mean that there could be a case for reserving a higher amount than the efficient range described in our report (or pursuing other risk management strategies). Also, GFOA’s Microsoft Excel risk model provides the City with the ability to adjust the likelihood and/or magnitude of floods. This feature could be used to test different scenarios, including ones where climate change is assumed to increase the likelihood and/or magnitude of extreme events.

Our analysis is not inclusive of every risk the City could possibly face. We examined the City’s past history and worked with City staff to identify the risks that posed the most clear and present danger to the City. However, it is possible that the City could experience a shock that no one was expecting. Hence, there is a case for reserving more than our analysis suggest is efficient. This could provide additional protection against risks that no one can foresee. Being prepared for these “unknowable” events is part of the value of the “red line” or critical threshold that our reserve analysis took into account. However, this does not mean that the City doesn’t need to prepare for risks that aren’t included in our model.

Our model is focused on general fund reserves as a risk mitigation tool. Other mitigation tools, such as insurance, can provide additional resources to respond to an extreme event. We did not judge the adequacy of the City’s insurance program.

²¹ According to the Fourth National Climate Assessment created by the U.S. Global Change Research Program (USGCRP) and released in November 2018: “more frequent and extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems.” The report cites climate-related risks to communities “from adverse weather and climate related events such as extreme storms or wildfires.” <https://nca2018.globalchange.gov/chapter/1/>.

Good decisions do not always lead to good outcomes. Excel simulation tools can enhance one's perception and understanding of uncertainty and risk.²² However, when dealing with uncertainty, even the best decision may not lead to a good outcome, if luck goes against you.²³ To illustrate, imagine an insurance company was willing to sell Sharonville an insurance policy against being hit by a meteor for \$50 million. A meteor strike is an extremely remote risk, so spending \$50 million on an insurance policy would not be a wise decision. Imagine Sharonville does then get hit by a meteor that causes \$100 million in damage. Should you criticize the decision not to buy insurance? No, because the decision was reasonable given the information available at the time and there was no way to predict a meteor hitting the City. Similarly, our model may show that a given amount of reserves is reasonable under most conditions, but Sharonville could encounter a confluence of undesirable events that the reserves are insufficient to address.

²² To survive in an increasingly unpredictable world, we need to train our brains to embrace uncertainty, Emre Soyer, Quartz Magazine, January 9, 2017 <https://qz.com/879162/to-survive-in-an-increasingly-unpredictable-world-we-need-to-train-our-brains-to-embrace-uncertainty/>.

²³ This is one of the primary lessons in: Annie Duke. *Thinking in Bets: Making Smarter Decisions When You Don't Have All the Facts*. Portfolio. 2019.