



## The Climate-Ready Infrastructure and Strategic Sites Protocol (CRISSP)

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## Executive Summary

The Climate-Ready Infrastructure and Strategic Sites Protocol (CRISSP) is a municipal adaptation tool developed to address two challenges that municipalities face: 1) the lack of reliable data on anticipated weather changes due to climate change; and 2) limited municipal financial and staff resources to devote to identifying and assessing vulnerability. The CRISSP provides a simplified, expedited method to evaluate and address vulnerability to climate change and extreme weather of critical infrastructure and strategic sites in your municipality, using existing internal and external resources. The CRISSP was jointly developed by the Cities Initiative, AECOM, and the City of Gary (IN), with technical and financial support from the Great Lakes Integrated Sciences and Assessment (GLISA) at the University of Michigan. The project benefited from the review and advice of the CRISSP Advisory Committee consisting of representatives from four municipal members of the Cities Initiative.

While the initially conceived process to develop the CRISSP was largely followed, two modifications were made. Firstly, rather than develop the methodology and matrix first and conduct the Gary case study afterwards, these two actions were done simultaneously. Secondly, the advisory committee was engaged later in the process, which allowed a completed draft matrix to be test run in four municipalities in addition to Gary. These modifications gave better more timely feedback to the methodology and matrix.

In our effort to provide a simplified evaluation tool for community-wide assets and facilities, we created a valuable bottom-up resiliency evaluation tool that can be free standing or can also complement a more comprehensive broad scale vulnerability analysis. A key lesson in this process was to recognize the importance of investing in relationship building and engagement at the front end to secure buy in internally when conducting a CRISSP evaluation. We also learned that when evaluating vulnerability and resiliency, it is important to factor in both critical dependencies (e.g. electricity disruptions, road closures) and opportunities (e.g. identifying vacant or abandoned sites that may be used as green infrastructure).

While created for the Great Lakes and St. Lawrence Region, the CRISSP methodology and matrix can be applied anywhere. The Cities Initiative will promote its use amongst its membership, and share it with like-minded climate and municipal organizations, like the Urban Sustainability Directors Network. For more widespread use, the CRISSP would benefit from a platform or application that could facilitate easier management and integration of data and information gathered through the CRISSP methodology and matrix.

## Introduction

The Climate-Ready Infrastructure and Strategic Sites Protocol (CRISSP) is a municipal adaptation tool developed to address two challenges that municipalities face: 1) the lack of reliable data on anticipated weather changes due to climate change; and 2) limited municipal financial and staff resources to devote to identifying and assessing vulnerability. The CRISSP provides a simplified, expedited method to evaluate and address vulnerability to climate change and extreme weather of critical infrastructure and strategic sites in your municipality, using existing internal and external resources.

The CRISSP methodology and matrix are outlined in a technical paper prepared by AECOM, which is being submitted to GLISA upon completion of this project, and will be posted on the Cities Initiative website.

The CRISSP was jointly developed by the Cities Initiative, AECOM, and the City of Gary (IN), with technical and financial support from the Great Lakes Integrated Sciences and Assessment (GLISA) at the University of Michigan.

## Intended Project Design, Methods, and Engagement

### Project Design

This project design was comprised of three main components, which were completed over a 12-month timeframe: i). Develop the CRISSP; ii). Pilot the CRISSP; and iii). Outreach and Education.

### Methods and Engagement

- i. *Develop the CRISSP*  
To develop the CRISSP, our intended method was to start by convening an advisory group comprised of the pilot municipality's staff, as well as staff from other municipalities that intend to use the CRISSP in their own preparedness planning, representatives from AECOM, the Cities Initiative, and GLISA. This group was to meet over a period of three months to draft the CRISSP.
- ii. *Pilot the CRISSP*  
To truth test the CRISSP, we intended to work with one mid-sized Cities Initiative member municipality to conduct a pilot to apply the CRISSP in an on-the-ground real situation. The Cities Initiative and AECOM were to lead this representative municipality through the CRISSP analysis, including providing guidance to

the municipality on collecting the necessary data and utilizing tools, such as NOAA’s ERMA, to facilitate determination of sensitive site locations and critical infrastructure requiring protection during storm events.

iii. *Outreach and Education*

This project’s lessons learned, training and outreach were all to be incorporated into the Cities Initiative’s existing Municipal Adaptation and Resiliency Service. Specifically, the Cities Initiative planned to:

- Create a webpage devoted to Coastal Storm Readiness on the MARS portal which will showcase this project
- Host a training workshop for municipalities on the CRISSP, to be held at our 2015 Annual Meeting in Sarnia;
- Host a webinar for municipalities on the CRISSP
- Prepare a case study on the pilot city experience using CRISSP;
- Prepare a white paper to be draft in partnership with GLISA; and
- Additional one-off outreach efforts like presentations, etc. as they arise.

## Expected Outcomes

There were four expected outcomes from the CRISSP project:

- i. The project team will work with AECOM, an engineering consulting firm with coastal hazard mitigation expertise, and an advisory committee comprised of municipal representatives to **draft a sensitive sites and infrastructure protocol (SSIP)**.
- ii. The project team will work with one representative city to **pilot the SSIP** to truth test the SSIP and refine it as necessary.
- iii. **Recommendations will be made to the pilot city decision makers** on short and long term actions to address their SSI in climate change preparedness planning.
- iv. The Cities Initiative will **educate and inform** our more than 110 member cities on the SSIP and SSI analysis through a training workshop, a webinar, a case study and additional outreach.

## Process for fulfilling the project goals

### What worked well and what needed to be reworked as our project unfolded

The process as outlined above in section 3 was largely followed. Each member of the core team brought his or her considerable experience and knowledge to the table and

everyone devoted a significant amount of their time to monthly and at times bi-weekly calls. The team worked very well together and worked through many issues as the methodology was developed. As we entered the work, we made two major changes to our workplan.

First, we chose to develop the CRISSP simultaneously with conducting the pilot, rather than sequentially. This allowed the pilot to inform the development of the matrix and methodology. By doing these two activities simultaneously, we benefited enormously from the advice and input from Gary.

For example, we started with developing a list of necessary data that would serve as an illustrative list for CRISSP users. By working through an actual list of data with Gary, we learned how accessible this data is, and identified other sources of data that Gary knew of that were added to the list.

The same approach was used in developing an illustrative list of community assets. By using Gary as an example, we were able to test source of information, like FEMA maps and the Department of Homeland Security definitions of critical infrastructure to identify critical community assets in Gary. By combining the development of the methodology and matrix with the Gary case study, the development of the methodology and matrix took longer than our original timeline, but we were able to keep to the overall timeline by doing two major tasks simultaneously.

Second, and partly as a result of the above decision, we involved the advisory group later in the process, after the initial CRISSP methodology and matrix had been developed rather than during the development process. This meant that we did not benefit from the advisory committee’s advice during the development of the CRISSP. However, it did mean that the CRISSP matrix was ready to be tested by each advisory group member in their community. The workshop for the advisory group was therefore less of a training session, and more of a direct feedback session on the CRISSP matrix. This raised more issues to be addressed later in the process, but in the end provided stronger feedback than we otherwise would have received earlier in the process.

### Key 'A-ha!' moments

#### Engaging municipal staff

By engaging the City of Gary from the start of the development of the protocol, we quickly learned of the challenges for the lead city staff to engage other municipal staff in considering climate change vulnerability and resilience. The internal engagement approach and

messaging in a municipality therefore became a more important element to our discussions. This expanded our consideration of internal engagement as part of the CRISSP methodology. A webinar was developed and Gary staff were invited to participate. A fact sheet was prepared that was used to inform staff of the project and its purpose.

### Limited resources can lead to more bottom-up resiliency planning

As we approached this project, our intention was to provide a methodology for assessing vulnerability in a way that was less resource intensive and required less outside expertise, particularly for medium and smaller sized municipalities. We did this by developing a set of evaluative questions in a matrix that could be used by managers at the facility level, using existing information and data. In our discussions with the advisory group, we realized that this approach not only provided a cheaper, faster way to conduct a vulnerability assessment, it also provided a powerful tool to build a resiliency plan from the bottom up. Notwithstanding the challenges in engaging staff internally, noted above, the advisory group stressed the benefits of applying the CRISSP to facilities that may not otherwise be included in an infrastructure-oriented vulnerability analysis. For instance, Evanston focused on its library, Gary focused on a park and athletic center, both of which are prominent community-oriented assets.

### Cascading Effects

From the beginning the CRISSP acknowledged that cities worked as a 'system of systems', and the inter-relationships of these systems had to be taken into account to understand the cascading effect of one or more of them failing during an extreme weather event. However, the matrix itself focused on a single facility. In discussions with the advisory group, the matrix was modified to add Section G 'Critical Dependencies', which helps a facility manager consider these inter-relationships and cascading effects, particularly with respect to loss of power and other energy sources, water and wastewater services, IT and communications systems, and transportation networks. One advisory group member noted that this is particularly important because the inter-relationships and cascading effects were often common to any weather event, whether it be a flood, wind event or heat wave.

## Lessons learned/Key findings

### Managing data

With the participation of AECOM and Daniel Brown of GLISA, the team was able to identify existing data sources that were accessible to municipalities. There were lengthy

discussions about how to represent and integrate climate and hydrologic data. The whole point of the CRISSP was to keep it simple enough that managers of facilities could undertake their own vulnerability assessment. In the end, it was agreed that representing two scenarios, a management scenario depicting a typical weather event, and an extreme scenario, using a signature event in the municipality or environs. In the case of Gary, this was their 2008 storm and flood event.

Another way of predicting a future flood event was to build on FEMA flood maps by adding 2 feet to the flooding levels. However, another issue was raised by Gary. Having collected a significant amount of data from different sources, Gary had no way of managing and integrating this data onto one platform. A major recommendation coming out of this project is to find a platform or application that is generally accessible to municipalities that could manage and integrate this data, possibly through existing land use mapping programs or infrastructure asset management programs.

## From Sensitive Sites to Strategic Sites: Consider both opportunities and liabilities

By working with Gary, we learned that our focus on 'sensitive sites', that is, natural sites such as wetlands or contaminated sites, was too limited. We were looking at the 'negative' side of the equation, rather than the positive side. That is to say, we were considering the liability of losing wetlands or of releasing contaminants during a storm event. The City of Gary, with a number of vacant and abandoned properties, was turning their mind to using these sites as part of their strategy to build resiliency, possibly by directing water to these sites, or identifying these sites as possible areas to build green infrastructure. In order to capture the use of these sites as strategic assets that could strengthen resiliency, we renamed our project, Climate Ready Infrastructure and Strategic Sites Protocol.

## Integrate climate readiness into existing planning process

A number of advisory committee members underlined the importance of integrating climate readiness into existing planning processes instead of trying to launch an entirely new process. This was due to the number of planning processes already underway and the difficulty of securing financing and support for a new planning process. By integrating into an existing planning process, whether it be emergency planning or land use planning or infrastructure planning, climate readiness could move forward and may also benefit from an existing budget line to complete the

work. It would also help in securing buy-in from overstretched municipal staff.

## How well are we doing?

During the technical workshop, one of the advisory committee members raised the issue of how to use the matrix to evaluate how well a facility or municipality is doing in terms of climate readiness. While the matrix provided an excellent method for prompting facility managers to consider various aspects of climate readiness, it did not offer a means to weigh different criteria in a way that identified which issues were most critical in terms of readiness. One advisory committee member characterized it as a ‘what keeps you up at night’ question. As a result, the matrix was modified to include a ‘competency measurement for internal benchmarking’. This self-evaluation function in the matrix allows facility operators or managers to evaluate their readiness on each topic using a 1-3 grading. In addition to this grading system, ‘red flags’ were added to indicate which issues were the most critical in terms of readiness. If the self-evaluation indicated a low level of readiness for these specific issues, these are flagged for immediate attention.

## Applicability to future work and other efforts in the region

### Need for platform or app to integrate and manage data

Going forward, the use of the CRISSP methodology and matrix would be aided by an electronic platform or app which would allow municipal staff to manage and integrate the information and data gathered through this process. Preferably an existing platform commonly used by municipalities such as a land use planning mapping platform, an emergency planning platform, or an infrastructure asset management platform such as CityWorks could be adapted for this purpose.

### Promotion of CRISSP methodology and matrix amongst Great Lakes cities

Through the Gary Case Study and the use of the matrix by the advisory committee members, the value of the CRISSP methodology and matrix has been demonstrated. The Cities Initiative will continue to promote the CRISSP methodology and matrix amongst its 120 member cities, through its Municipal Adaptation and Resiliency Service. The Cities

Initiative will host a webinar for members and provide guidance material on our website.

## Sharing CRISSP methodology and matrix with like-minded climate and municipal initiatives

The Cities Initiative will seek out and share the CRISSP methodology with like-minded climate and municipal initiatives. For example, it will be shared with the Urban Sustainability Directors Network, which is currently working on Great Lake Climate readiness. The Cities Initiative will seek to present the CRISSP at the Water Resilient Cities Conference hosted by Cleveland State University. It will also be shared with the Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR), at Laurentian University in Sudbury, Ontario. OCCIAR provides resources to municipalities and other governments and industry throughout Ontario and beyond.

## Conclusion

The CRISSP methodology and matrix was developed to provide small and medium sized municipalities with an affordable, simplified approach to evaluating vulnerability and resiliency to extreme weather events associated with climate change. This project benefited enormously from the expertise of AECOM, the detailed review and practical application by Gary, Indiana, and the review and troubleshooting by members of the CRISSP advisory committee members.

The CRRISP methodology will be promoted amongst the Cities Initiative’s 120 member cities, and with like-minded climate and municipal organizations, such as USDN and OCCIAR.

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