Urban Flooding Baseline Tool: Qualitative Methods

Community engagement is a vital part of development projects and promoting resilient communities. It is important to understand stormwater impacts not only based on how it affects infrastructure but especially the effects on residents. Between March 2021-May 2022, CNT hired 15 residents (data collectors) from within the Calumet Region to collect photos of stormwater concerns after storm events in the communities of Dixmoor, Dolton, Harvey, Markham, Phoenix, Posen, and Riverdale. These municipalities were chosen because MWRD prioritized these in a Stormwater Master Plan process, which was eventually published in 2022. The goal was to build out the process to compensate residents for data collection so that municipalities or other groups could hire residents to collect qualitative data for stormwater management planning processes.

Photo Collection

Data collectors were trained to use an app developed by CNT to upload photos, determine location, and share concerns about the impact of the stormwater. Data collectors were typically deployed after storms in which the USGS National Water Information System identified an average of 0.2 inches of precipitation or greater at the USGS precipitation stations in or surrounding the target communities. These stations were located at Harvey, South Holland, Markham, and West Pullman. Data collectors were requested to upload 8-10 different stormwater concerns per storm and were advised to take photos of public rights of way during daylight hours, within 24-36 hours of the end of the storm event. The data collectors were deployed for a total of 6 storms during the pilot, and 31 storms during the rest of the project.

Below is the distribution of storm deployments by month and year:

Year	Month	Number of Deployments
2021	March	1
	April	3
	May	2
	June	5
	July	2
	September	1
	October	6
	November	1
	December	1
2022	February	3
	March	3
	April	4
	May	5

The following is a graph of the average precipitation level for all deployments.
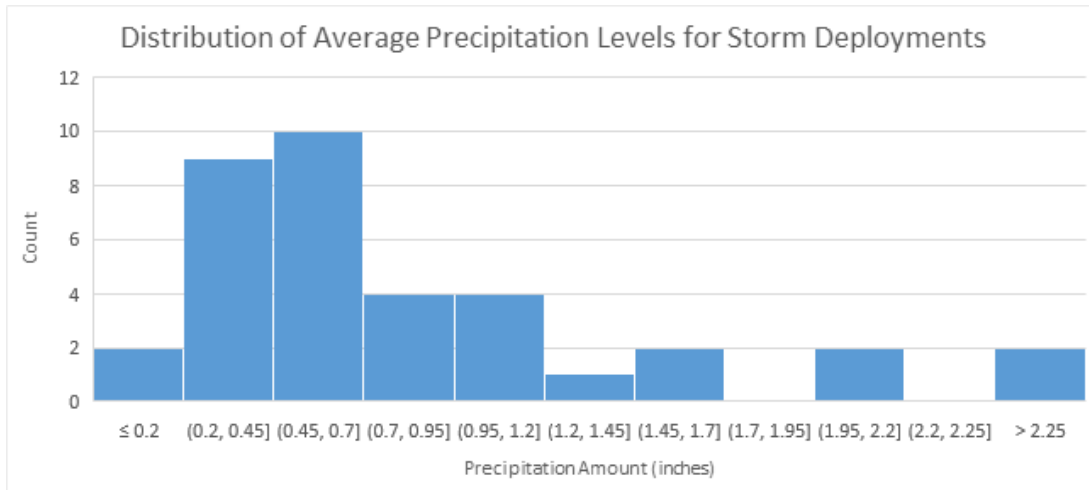
Most deployments occurred when there was an average of between 0.2 to 0.7 inches of rain, with the most rain during the storm averaging greater than 2.25 inches of rain.

Photo Analysis

A stormwater photo analysis was performed for approximately 4,684 photos collected by data collectors within Dixmoor, Dolton, Harvey, Markham, Phoenix, Posen, and Riverdale. In the data some additional communities are included because pictures were taken at shared border with these 7 communities. This photo analysis began with the processing of each photo, determination of photo quality (photos that were cut off or blurry, for example, were labeled as low quality, while those that were perfectly visible and clear were labeled as high quality), removal of identifying information (such as license plates and addresses), and ended with determination of the flooding impact, all of which was documented in an Excel Spreadsheet. To determine flooding impact, photos were ranked as "low", "high", or "very high." Photos that showed only a small puddle or two of stormwater were ranked as "low" impact, those that had larger puddles and/or had water partially blocking a sidewalk, crosswalk, or driveway as "high" impact, those that had very large puddles that completely covered/blocked sidewalks, crosswalks, parking lots, or driveways as "very high" impact, and photos that showed no stormwater pooling as "no flooding".

After photos had been categorized by impact level, data collector responses' to concerns about the flooding were cataloged within the same Excel spreadsheet and summarized. Textual analysis of data collectors' responses was done using an inductive approach. This inductive process began by organizing data collectors' responses based on CNT's flood impact ranking. Then these responses were examined to identify themes and resulted in a conclusion of the most common stormwater concerns: limited access to infrastructure, worsened pedestrian experience, increased dangerous conditions, among other concerns.

Surveys

CNT also distributed a survey through the resident advisory group to their social media networks to gather flood stories from residents during the summer of 2021. This survey, composed of 15 questions, allowed Calumet Region residents to document and describe major storm events they experienced in their communities. The purpose of this survey was to gain insight into various residents' experiences of flooding in the Calumet Region, to humanize their experiences for those who do not frequently experience flooding, and to build personal stories surrounding these flood events. 14 residents responded, which was not large enough to represent the region, so select quotes were used in the stormwater stories section to highlight a few residents' experiences.

Limitations

It is also important to recognize the limitations of this data collection and analysis. The data collectors took photos where they saw stormwater concerns and only focused on public access areas. The method used was convenience sampling and did not collect any information on private property, and therefore is not representative of the whole region. The collectors' responses are based off their own experiences and opinions, so this data does not

cover the full breath of concerns a resident may have regarding flooding. Additionally, through analysis, the categorization of flooding impact is subjective based on CNT perception of the image. Lastly, the flood survey responses were limited, so this data also does not fully represent the community's experiences.