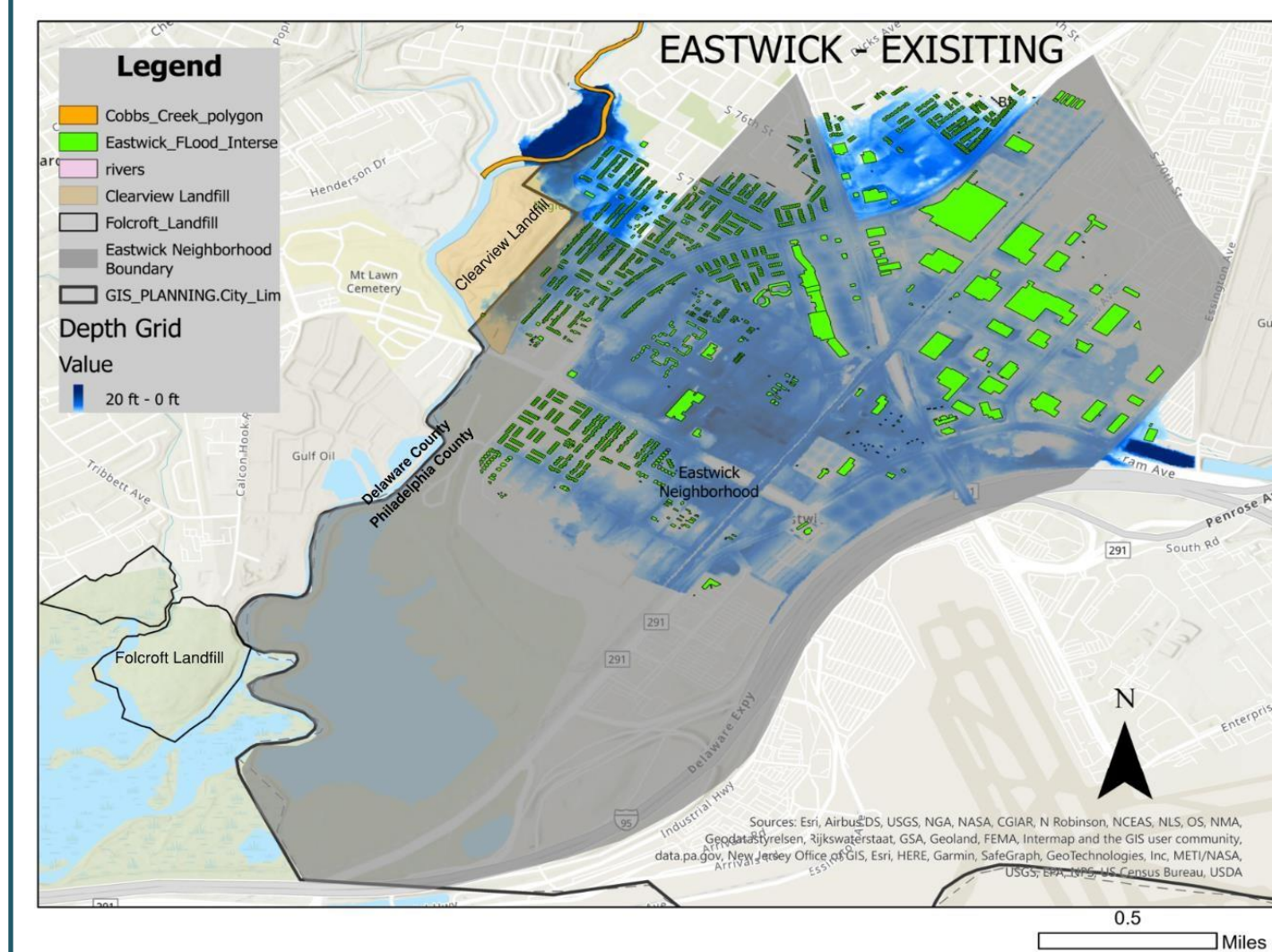


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## OVERVIEW

- ❖ Eastwick is an urban residential neighborhood located in the southwest corner of the City of Philadelphia
- ❖ Historically a low-lying marshland which is susceptible to flooding due to its geographical proximity to water bodies.
- ❖ The area is predominantly residential area consisting of 78.3%.
- ❖ The neighborhood experiences recurring flooding that results in considerable economic damage to homes, businesses, industry, and public infrastructure



The study area is subjected to hydrologic-response analysis, with two research objectives established to identify.

1. What is the difference between high intensity versus high volume storm events in the Cobbs-Darby Creek watershed?
2. How do the upstream and downstream respond to the storm events and their impacts on the Eastwick community?

Figure 1: Existing Eastwick Flood Map (Esri, Inc 2002)

## METHODS

- ❖ Three individual USGS gauge stations selected across the Darby-Cobbs Creek watershed, with two gauges representing the upstream locations and one gauge in the downstream location (Eastwick)
- ❖ Two landfill sites, known as Clearview landfill and Folcroft landfill are also located downstream near Eastwick and the Darby-Cobbs Creek watershed
- ❖ The hydrological data selected for analysis focused on the impact of major storms that led to the formation hurricanes and tropical storms and their impact on the community.
- ❖ Four (4) major storms with available water level data were selected for analysis: Irene (2011), Sandy (2012), Isaias (2020) and Ida (2021)

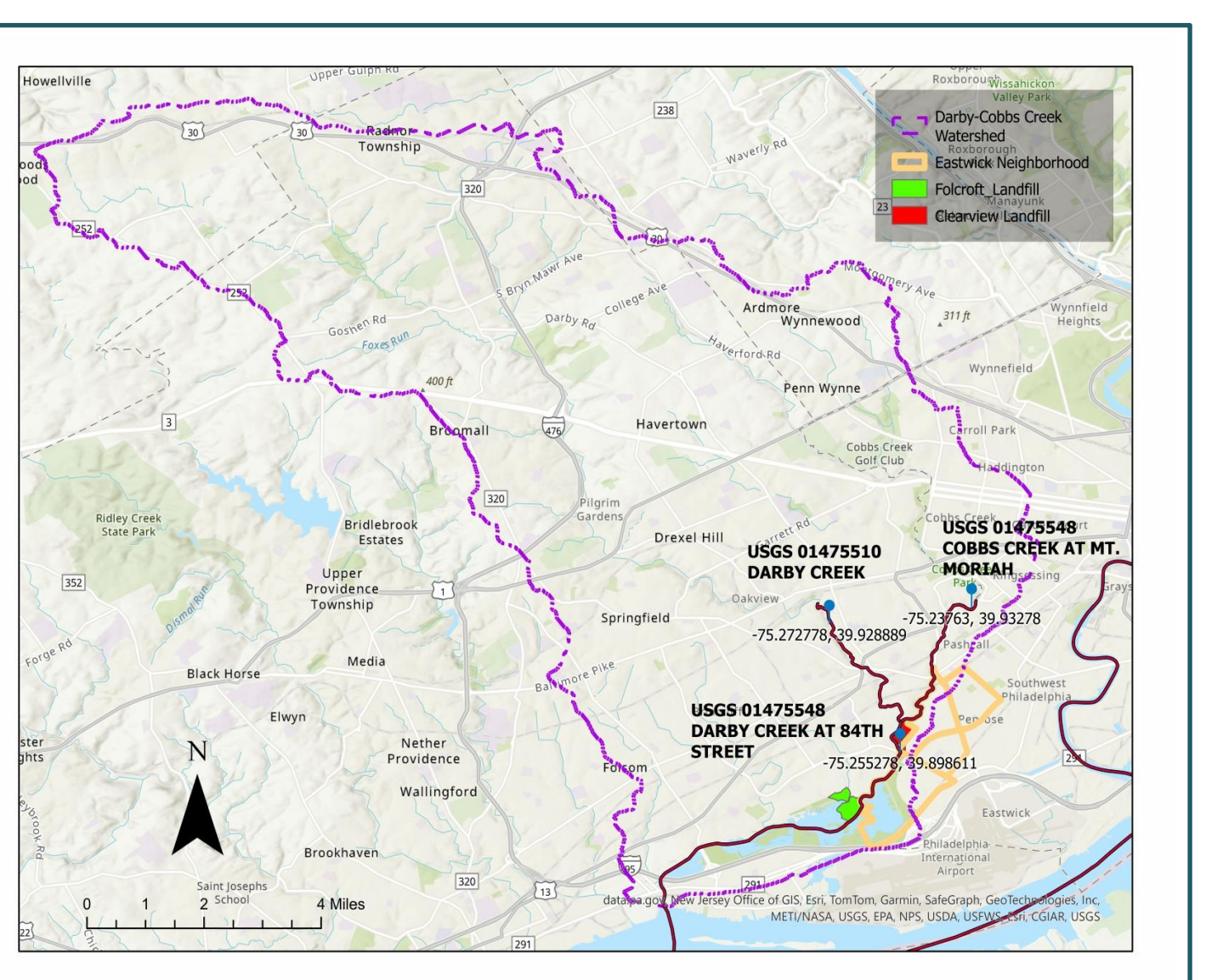


Figure 2: Darby-Cobbs Creek Watershed and the Three USGS Gauges.

## RESULTS

- ❖ Hurricane Isaias had the most devastated impact over Eastwick area with a peak water level of approximately 19 ft in Cobbs Creek, despite being the second-highest daily precipitation event at 4.16 inches.
- ❖ Hurricane Irene characterized by the highest daily precipitation of 4.55 inches, also resulted in substantial flooding, reaching a water level of 15 feet in Cobbs Creek
- ❖ Most of the cases Cobbs Creek had the highest WL rather than Darby.

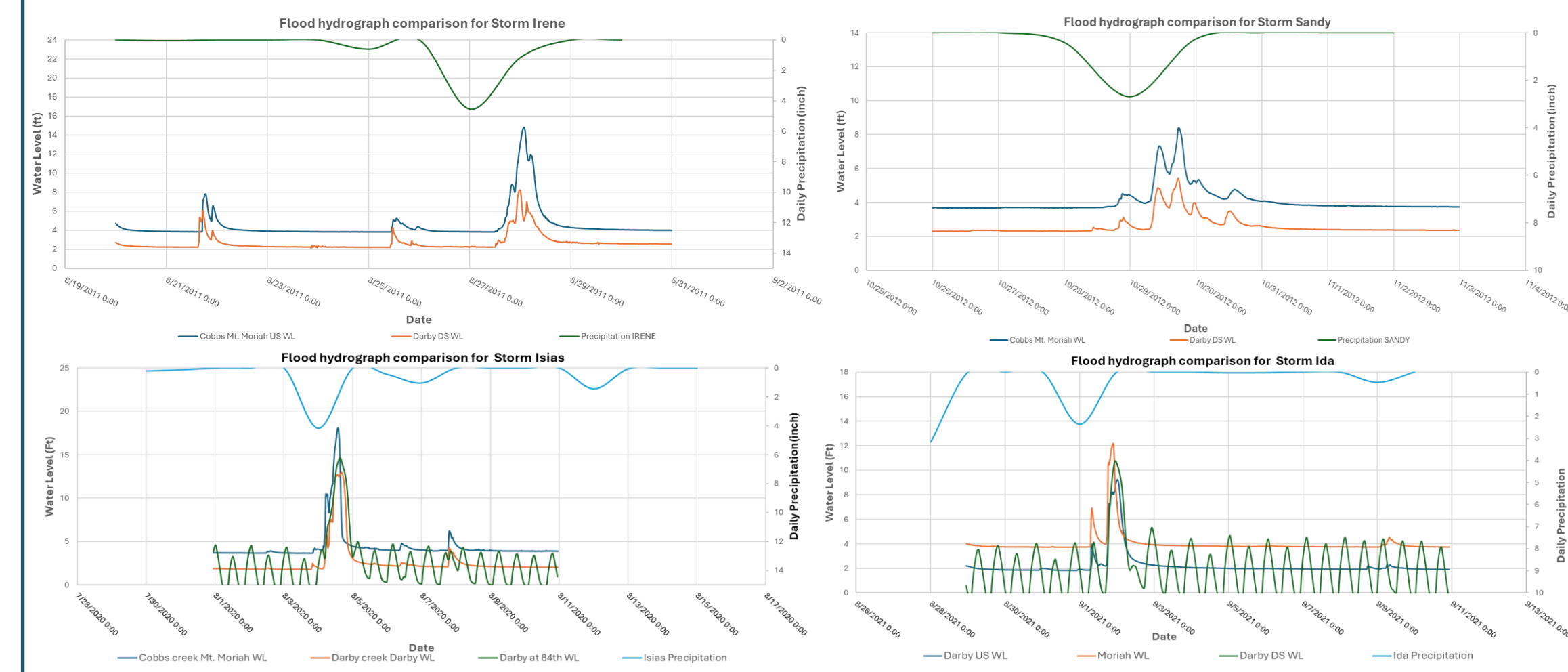


Figure 3: Flood Hydrograph

Table 1: Summary of Selected Storms and Flood Water Level (WL) Hydrograph Comparison.

Storm	Flood Location	Highest Daily Precipitation (in.)	Day of Highest Precipitation	Peak WL (ft.)	Peak Time	Comments
IRENE	Cobbs US	4.55	8/27/2011	14.64	08/28/2011, 02:00	Cobbs at Mt. Moriah location has highest WL around 14.64 ft.
	Darby DS			8.22	08/27/2011, 23:45	
SANDY	Cobbs US	2.68	10/29/2012	8.41	10/29/2012, 17:45	Sandy has lower pick than Irene and Cobbs at Mt. Moriah received around 9 ft. Water
	Darby DS			5.42	10/29/2012, 17:30	
ISAIAS	Cobbs US	4.16	8/4/2020	18.08	08/04/2020, 13:40	Isias produced the highest WL in Cobbs. Highest peak WL in Cobbs creek US, Peak reduced 3.44 ft. in DS
	Darby US			12.95	08/04/2020, 16:20	
	Darby DS			14.64	08/04/2020, 15:00	
IDA	Cobbs US	2.37	9/1/2021	12.2	09/01/2021, 21:35	Highest peak WL in Cobbs creek US, Peak reduced 1.43 ft. in DS
	Darby US			9.26	09/02/2021, 00:25	
	Darby DS			10.77	09/01/2021, 23:00	

## DISCUSSION

- ❖ Precipitation of Hurricane Isaias was short with intermittent rainfall occurring during the period. The highest intensity precipitation was recorded on August 4th with 4.16 inches of rain.
- ❖ The Cobbs Creek region upstream has a smaller surface area and is densely populated due to urbanization compared to the Darby creek upstream. Further, it is characterized by mostly Type C soils with slow infiltration rate. This resulted in high volumes of runoff causing flooding because of inadequate stormwater infrastructure and reduction in pervious areas to facilitate infiltration.
- ❖ In reference to discharge, peak quantities were observed in both upstream locations during storm occurrences. Darby Creek experienced a high discharge peak during Hurricane Ida, while Cobbs Creek reached its maximum peak during Hurricane Isaias
- ❖ Hurricane Ida, having the lowest daily precipitation, did not result in flooding in Eastwick. This highlights the contrasting impact of high intensity storms versus high-volume storms in the watershed.
- ❖ Analysis indicates that Cobbs Creek consistently experiences higher water levels than Darby Creek during these events. Socioeconomic data from the 2020 U.S. Census underscores the vulnerability of Eastwick residents, revealing disparities in educational opportunities and categorizing the community as underserved and vulnerable compared to state and national averages.
- ❖ These findings underscore the urgent need for targeted interventions to enhance resilience and mitigate flood risks in the Eastwick

## SUMMARY & FUTURE WORK

- Findings:**
- ❖ Cobbs Creek densely populated than Darby Creek resulting in high volume of runoff
  - ❖ Implementation of Green Stormwater Infrastructure (GSI) will help reduce runoff and improve water quality
  - ❖ Due to the vulnerability of Eastwick residents the construction of resilience structures such as levee will help mitigate flood risks
- Future Work:**
- ❖ Soil sample collection and analysis from selected sites within the vicinity.
  - ❖ Assess the impacts in Eastwick based on flood models

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