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Resiliency Team Progress
GLWA Board of Directors

February 26, 2025| Navid Mehram, P.E.

United States Record-Breaking Flood Emergencies

- **2024 Major Events**
  - Record number of flash flood emergencies: **91**
  - **27** confirmed weather/climate disaster events with losses exceeding **$1 billion** each
  - **5** Severe Storms, **1** Tropical Cyclone, **1** Flooding, and **1** Winter Storm disaster events that affected Michigan
  - There were at least **45** flood-related major disaster declarations, according to FEMA in 2024
- **2025 Major Event**
  - **21** weather-related deaths due to the Kentucky flood event with 3 – 8 inches of rain almost across the entire state.

- **Impact of Major Events to Michigan**
  - Michigan has historically been affected by such disasters.
  - These events included severe storms, flooding, and winter storms, which have had significant economic and social impacts on Michigan communities.
  - There is an urgent need for enhanced climate resilience and adaptation strategies in Michigan to mitigate future risks.

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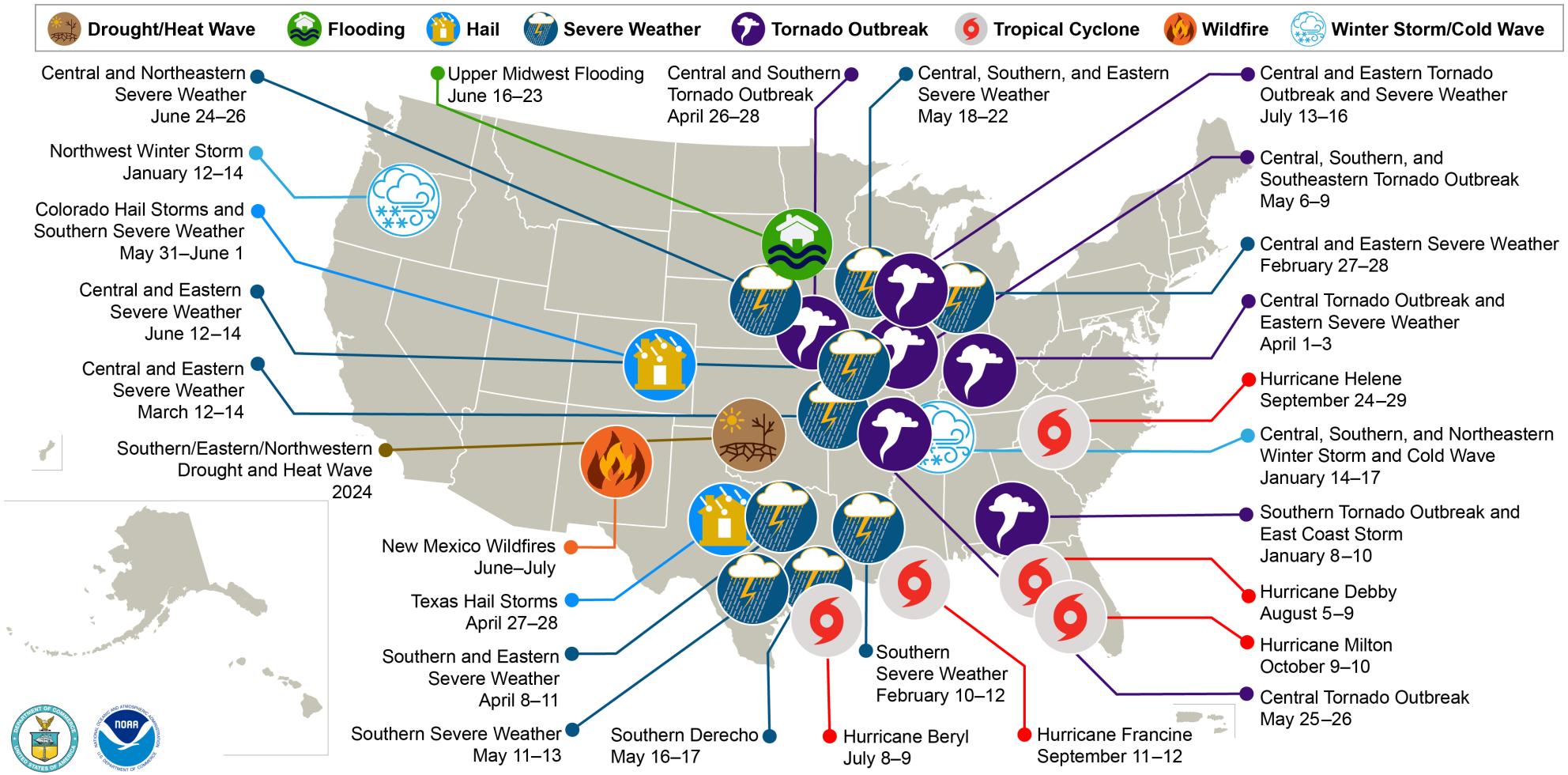
United States Record-Breaking Flood Emergencies

U.S. 2024 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the ***27 separate billion-dollar weather and climate disasters that impacted the United States in 2024.***

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Source: https://shorturl.at/BFybH

Independent Investigation of 2021 Flooding Status of 33 Recommendations

18 of the measures have been **completed**	**13** of the measures are currently **in progress**	**2** of the measures have not started
78% of the short term, 46% of the medium term, 45% of the long term	**8** will be completed **in the Regional Flood Mitigation Study** USACE	The items not started are dependent on the completion of the projects currently in progress.

USACE - US Army Corps of Engineers

Executive Summary - Short Term Measures

Project Milestone	Project Status			
	Not Started	In Progress	Completed	Notes
Short Term Measures				
General Recommendation				
Pump availability during storm events.				GLWA completed monitoring the system closely to ensure no more than 1 pump is out of service at each station.
Pump Stations				
Testing of the Vacuum Priming System.				
Pump sequence testing.				
Operational documentation and communication.				This effort is completed, several standard operating procedures (SOPs) have been implemented with some minor modifications.
Electric Equipment				
Power conversion from Public Lighting Department to DTE.				
Back up generator measures.				This measure is complete, and recommendations are being evaluated for implementation.
Confirm that the power supply for each DTE can support the entire station.				This review is incorporated into the larger electrical resiliency project.
Mechanical Equipment				
Conner Pumpstation Seal Water System.				This work has been completed.
Vacuum Priming System upgrade.				The contract has been awarded.

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Executive Summary - Medium Term Measures

Project Milestone	Project Status			
	Not Started	In Progress	Completed	Notes
Medium Term Measures				
General Recommendation				
Prioritization of the Wastewater Capital Improvement Planning (CIP) projects.				This task is complete and will remain ongoing.
Evaluation of future rainfall beyond the Atlas 14.				This task will be captured within the Water Resource Development Act with USACE.
Take into consideration other climate change factors into the design.				This task will be captured within the Water Resource Development Act with USACE.
Pump Station				
Continue with the Freud Pump Station projects.				In progress/contract awarded.
Electrical Equipment				
Upsize the transformers at each facility to run the entire facility.				This review is incorporated in the larger electrical resiliency project and has been completed.
Electrical reliability study for Freud and Conner Pump Stations.				
Mechanical Equipment				
Complete other scenarios as proposed through the Clemson Engineering scale model.				
Review the idea of vertical pumps for the Conner Storm Station.				
Operational Measures				
Inspection and monitor the Intake Flow Conditioning (IFC) in both the Conner and Freud Pump Stations.				This item is pending improvements to Freud and Conner Pump Stations.
Review of previous studies.				GLWA completed the review of prior studies as new projects progressed.
Studies				
Level of service.				This task will be captured within the Water Resource Development Act with USACE.
Dynamic System Operations Study				This task will be captured within the Water Resource Development Act with USACE.
Stormwater/Wastewater Master Plan				This task will be captured within the Water Resource Development Act with USACE.

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USACE: US Army Corps of Engineers

Executive Summary - Long Term Measures

Project Milestone	Project Status			
	Not Started	In Progress	Completed	Notes
Long Term Measures				
General Recommendation				
Feasibility of moving to a 100-year storm.				This task will be captured within the Water Resource Development Act with (USACE).
Local government program for voluntary purchase of flood prone areas.				
Local government public outreach campaign for flood risk and purchasing flood insurance.				
National research of other large-scale flood reduction projects.				This task will be captured within the Water Resource Development Act with (USACE).
Pump Stations				
Medium-term solutions are not successful.				The project team has incorporated this into the Conner Storm project schedule.
Further automation of the pumping stations.				Steps are being taken toward this effort. An example includes the seal water system for Conner.
Regional System Coordination				
Review of the member partners' optional strategy to find alternative operations.				GLWA has started discussion around the Regional Operational Plan. Additionally, GLWA coordinates with member partners during major storm events.
Local government engagement in the National Flood Insurance Program (NFIP).				
Local government should consider updating the flood maps.				
GLWA community outreach.				A regular cadence has been established.
Community flood collection data to provide guidance into modeling validation.				This task will be captured within the Water Resource Development Act with USACE.

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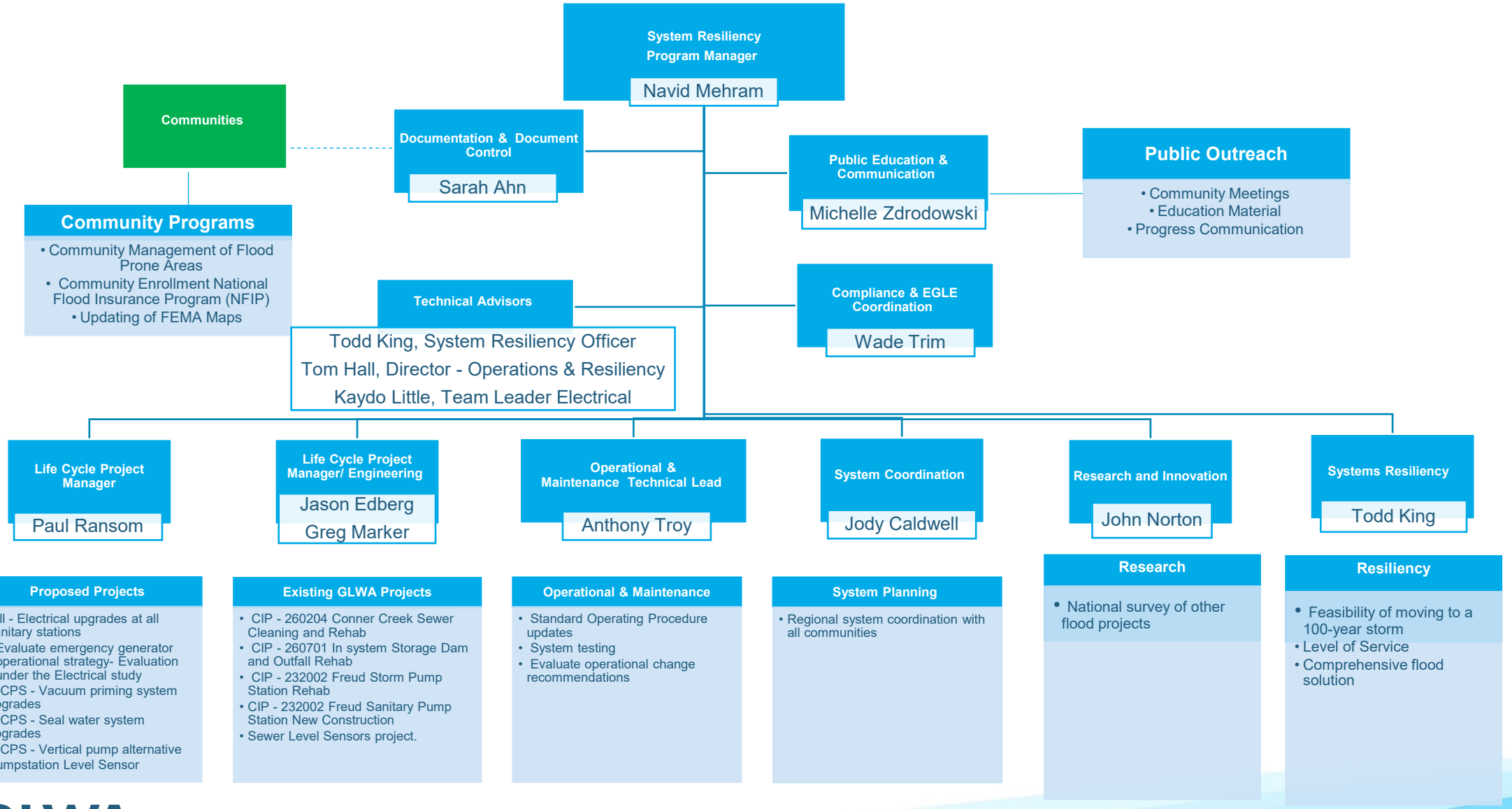
USACE: US Army Corps of Engineers

Resiliency Delivery Team



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Sewage Pump Station Power Reliability Study

Storm Conner Creek Pumpstation

$4.0 Million (OPCC)

- Reliability and Availability from 95% to 99.4%
- Reconfigure Vacuum Pump Power Distribution
- Replace Utility Transformers W/ same size
- Configure Generators system to Backup All Utility Transformers

Storm Freud Pumpstation

$8.0 Million (OPCC)

- Reliability and Availability from 97.3% to 99.4%
- Upgrade Primary Switchgear
- Configure Generator System to Backup all Utility Transformers

Table 1. Final Recommendations

Station	Recommended Improvements	Existing Availability	Future Availability	Cost *
Belle Isle	Alternative 1: Do Nothing	99.7%	N/A	N/A
Blue Hill	Alternative 2A: Configure Generator System to Backup Both Transformers	98.9%	99.8%	$3M
Connor Creek	Alternative 2A: Reconfigure Vacuum Pump Power Distribution Replace Utility Transformers w/ Larger Size Configure Generator System to Backup All Utility Transformers	95.0%	99.4%	$4M
Fairview	Alternative 1: Do Nothing	99.7%	N/A	N/A
Fischer	Alternative 2: Upgrade Generator (Station Firm Capacity) Upgrade MCC (M-T-M)	99.8%	99.8%	$700K
Freud	Alternative 2: Configure Generator System to Backup All Utility Transformers Upgrade Primary Switchgear (M-T-M-T-M)	97.3%	99.4%	$8M
Northeast	Alternative 2: Add Transfer Scheme Between MV MCC-1 and MV MCC-2	99.5%	99.6%	$500K
Oakwood	Alternative 1: Do Nothing	99.7%	N/A	N/A
Woodmere	Alternative 1: Do Nothing	99.8%	N/A	N/A

**The estimate includes the improvements identified in the alternative. Replacement of obsolete equipment is not included in the estimate.*

**Blue Hill evaluation does not include ongoing after-action analysis of rain events associated flooding claims.*

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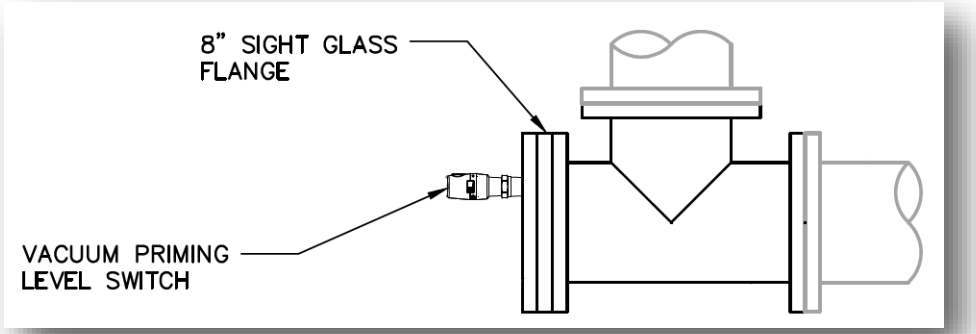
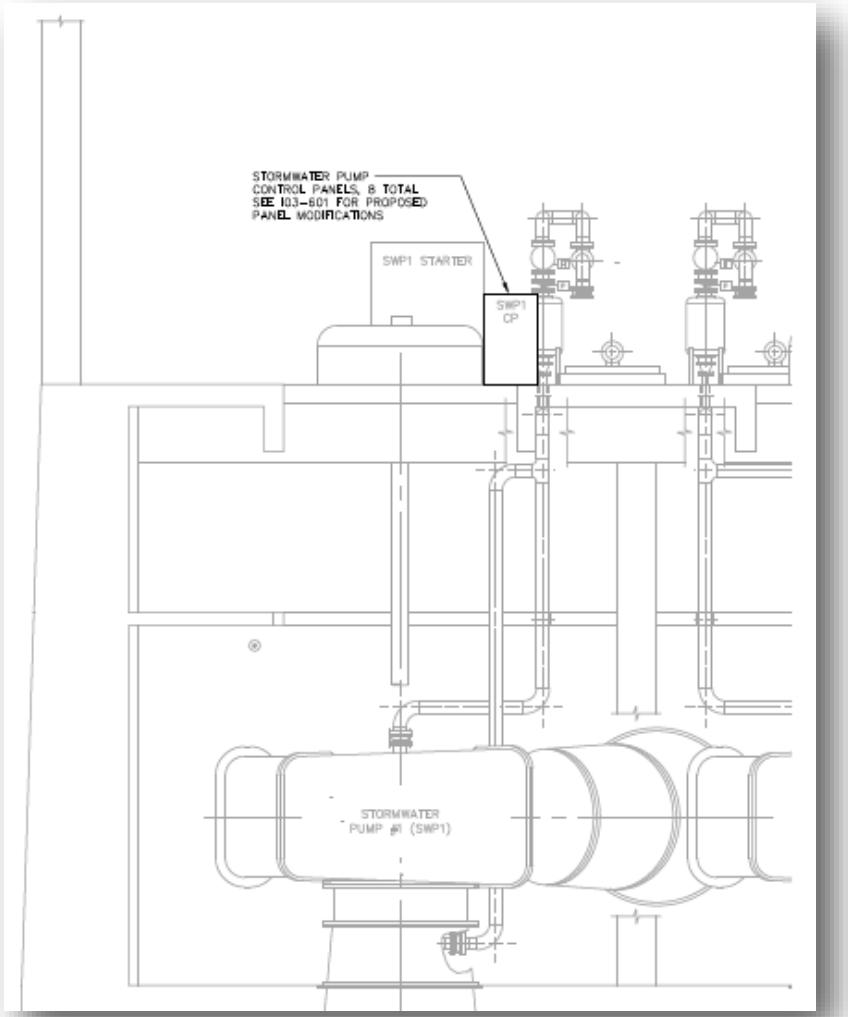
OPCC: Opinion of Probable Construction Cost

Conner Creek Pump Station – Vacuum Priming Level Switch Addition

- 06/25/24 – Project Posted on Bonfire
- 07/18/24 – Solicitation Meeting/Site Tour
- 07/25/24 – Questions Due
- 08/01/24 – Bid Submissions Due
- 10/07/24 – Notice to Proceed
- 02/13/25 – Pre-Construction Conference Meeting
- *02/24/25 – Begin Electrical Work*
- *03/03/25 – Begin Mechanical Work*
- *07/04/25 – Substantial Completion*
- *08/03/25 – Final Completion*

We are here





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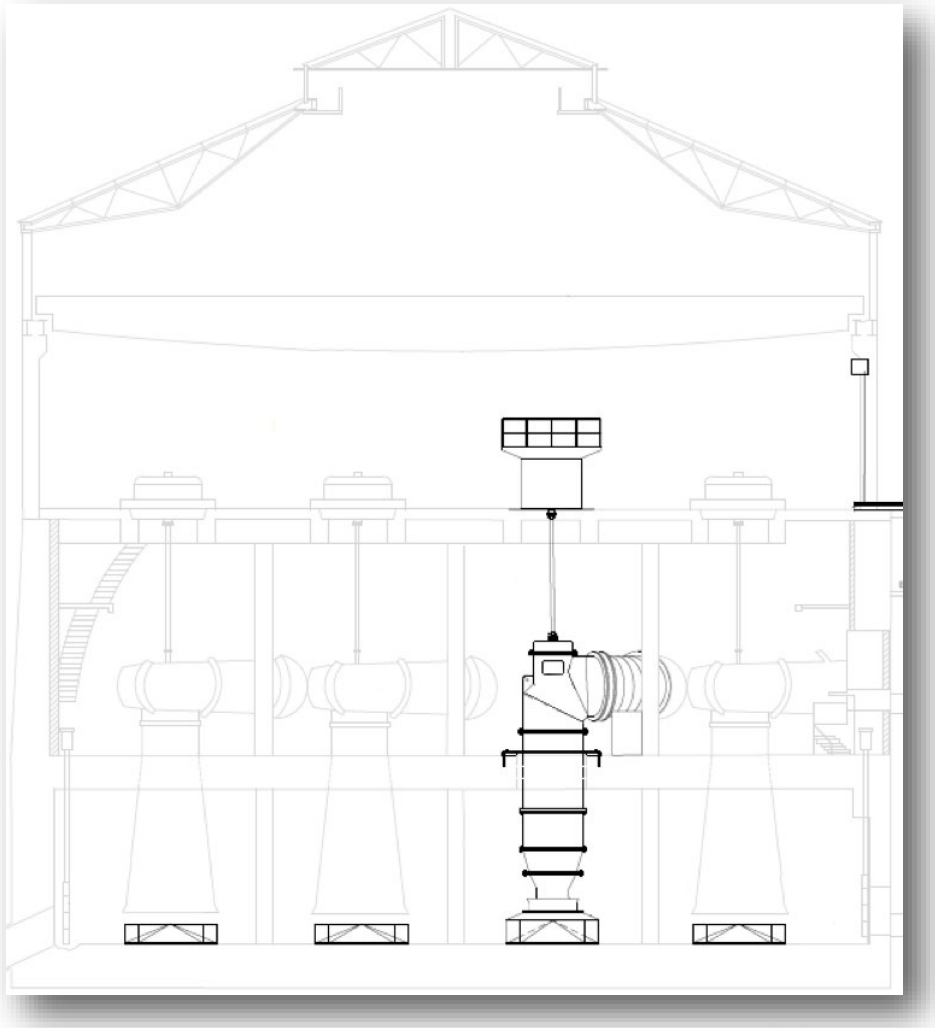
Conner Creek Pump Station – Pump Replacement Design

- 02/08/24 – Design Memos 1, 2, 3, 6, 7, & 10 Finalized
- 02/15/24 – 60% Design Workshop
- 04/12/24 – Design Memos 4, 5, 8, & 9 Finalized
- 05/15/24 – 90% Design Workshop
- 06/21/24 – 100% Design Submittal
- 08/09/24 – Issue for Bid Design Complete
- 10/23/24 – Project Posted on Bonfire
- 11/06/24 – Pre-Bid Meeting & Site Tour
- 12/12/24 – Additional Site Tour
- 01/10/25 – Bid Submissions Due
- 01/21/25 – Bid Clarification Meeting
- 02/07/25 – Bid Evaluation
  - Kokosing Industrial, Inc.
  - $35,360,000
- *03/12/25 – Operations & Resources Committee Presentation*
- *03/26/25 – Board Presentation*
- *04/21/25 – Notice to Proceed*

We are here



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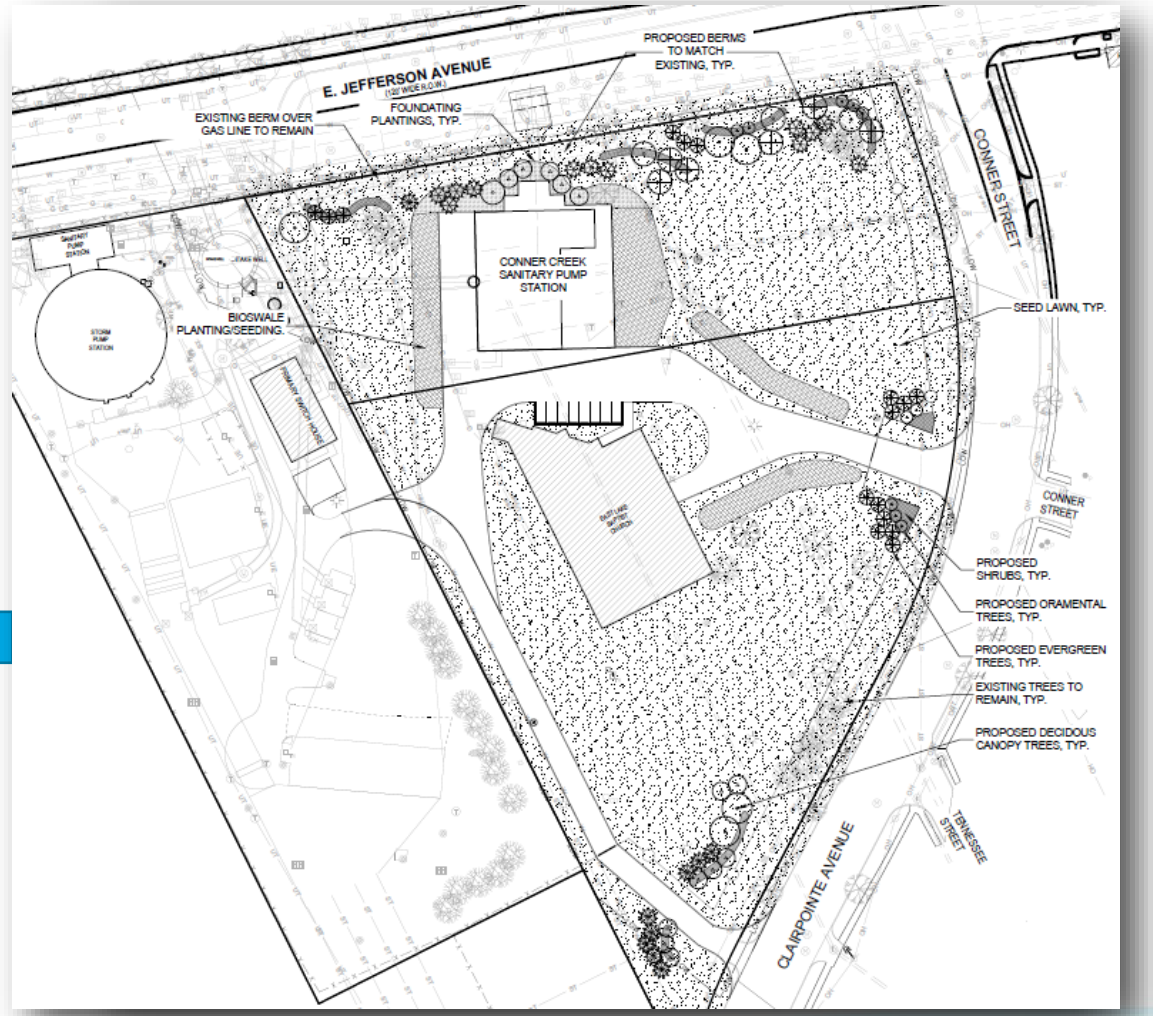
Conner Creek Pump Station – Sanitary Pump Station Design

- 12/22/23 – Design Memo 1 Submitted
- 01/19/24 – Design Memos 2, 3, & 4 Submitted
- 01/26/24 – Design Memos 5 & 6 Submitted
- 02/02/24 – Design Memo 7 Submitted
- 04/17/24 – 30% Design Workshop
- 09/18/24 – 60% Design Workshop
- 12/05/24 – Introductory Meeting
- 12/11/24 – Community Engagement Event
- 02/14/25 – 90% Design Submittal ← We are here
- 02/19/25 – Hydraulic Analysis Witness Test
- *03/14/25 – 90% Design Workshop*
- *03/19/25 – Community Engagement Event*
- *04/18/25 – 100% Design Submittal*



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Freud Pump Station – Improvements

- 07/05/24 – Right-of-Way Vacation & Dedication Approved
- 07/15/24 – Notice to Proceed Date
- 07/31/24 – Community Engagement Event
- 09/16/24 – Traffic Circulation Study Complete
- 11/21/24 – City Planning Commission Public Hearing
- 12/02/24 – Structure Abatement & Demolition Complete
- 12/11/24 – Community Engagement Event
- 01/16/25 – City Planning Commission Public Hearing
- 02/10/25 – Freud Street Closure
- 02/13/25 – DTE Gas & Electric Relocation Complete
- 02/17/25 – Begin Overhead Users (6) Relocation
- *03/06/25 – City Planning Commission Meeting*
- *03/19/25 – Community Engagement Event*
- *05/05/25 – Begin DWSD Relocations*

We are here

Meeting Dates & Time:
5:30 – 7:30 pm

12/11/24
03/19/25
05/21/25
09/17/25

Meeting Location:
Eastlake Baptist Church
12400 E. Jefferson Ave.
Detroit, MI 48215

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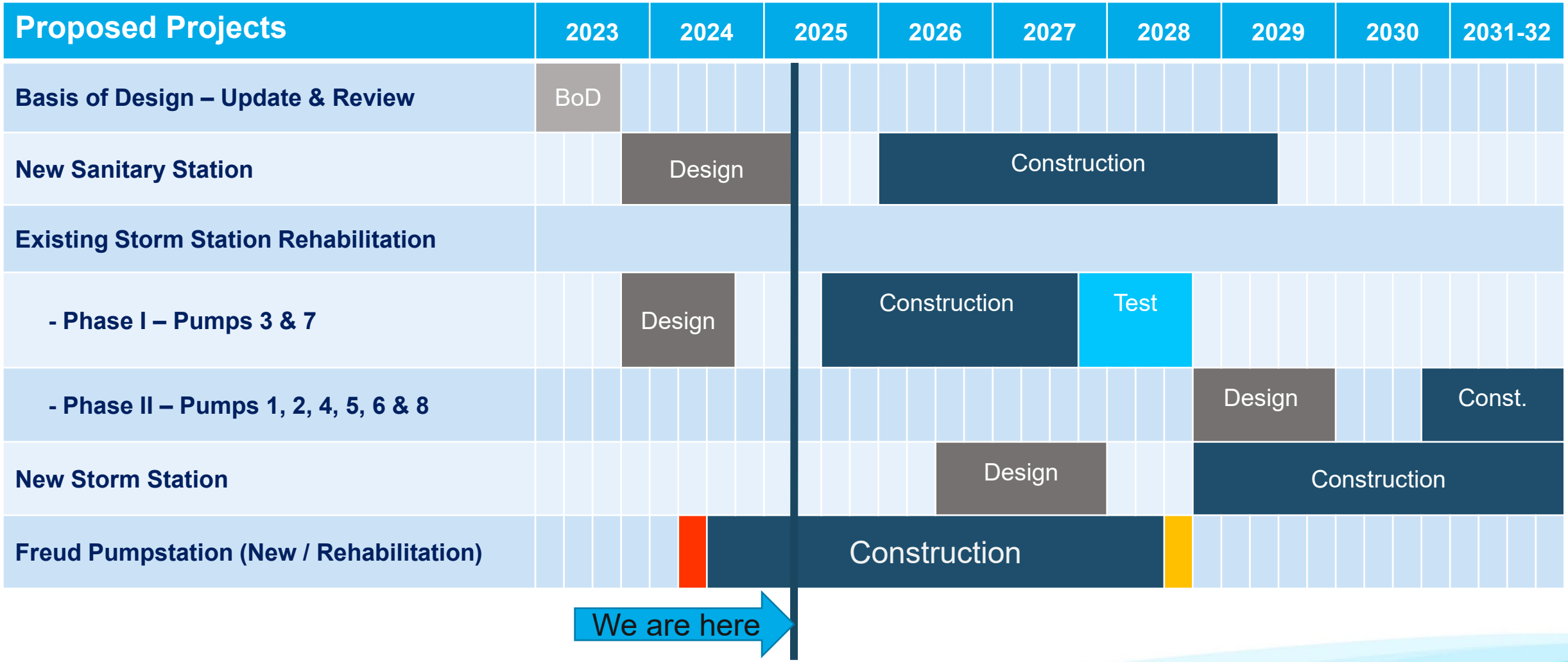
Conner Pump Station Design/Construction Road Map



- Revised Basis of Design – Critical Path
  - Workshops: May – July
  - Review: August – September

Existing GLWA Projects

- **CIP - 260701 In System Storage Devices (ISD), Valve Remotes (VR), and Outfall Infrastructure Elements Rehab**
  - **Outfall Infrastructure Project (73% complete through January)**
    - Structural improvements and modifications to the regulators are completed at 24 of 36 outfalls.
    - Backwater gate fabrication and installation is nearing completion.
    - Instrumentation and controls are being installed throughout, with B-5, B-6, and B-21 having been tested and approved.
    - Site modifications at the United States Coast Guard facility on outfall B-7 are complete, and the outfall improvements are ongoing.

  - **ISDs and VRs Project (64% complete through January)**
    - ISD equipment installation is complete or nearing completion at ISD 1 through 13.
    - Improvements at B-25, B-48, B-83, B-86, and B-95 are complete.
    - Equipment startup and testing by the contractor and GLWA staff is ongoing.
    - Improvements and repairs to VR gates are ongoing.
    - All ISD sites manhole modifications are complete.
    - Engineer-directed repairs to the inflatable dams are nearing completion.

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Existing GLWA Projects Continued

- **CIP - 260204 Conner Creek Sewer Cleaning and Rehab – 55% complete**
  - Grouting, rebar coating, and spot repairs continue under the cemetery north of the airport. Grouting will begin from Warren toward Jefferson in the triple barrel beginning in May.
  - The project is close to starting the access hatch that will be permanently located in the Stellantis green space just north of Jefferson for sewer cleaning access to facilitate this work and the upcoming Freud and Conner pump station replacement project.
  - Slip lining between Six and Seven Miles is nearing completion, Slip lining by Seven Mile is complete.
  - The project has added design of forebay modifications upstream of Conner Combined Sewer Overflow to allow the facility to perform debris removal in the future for better maintenance operations. The work is being added to the current project.

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Recommendations to be included in the Southeast Michigan Flood Resiliency Study

- Level of Service
- Dynamic System Operations Study
- Stormwater/Wastewater Master Plan
- Feasibility of Moving to a 100-year storm
- Evaluation of Future Rainfall beyond the Atlas 14/ take into consideration other climate change factors in the design
- National research on other large-scale flood reduction projects
- Community flood collection data to provide guidance on modeling validation.

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Southeast Michigan Flood Resiliency Study

- GLWA's Office of Resiliency is teaming with USACE to perform a General Investigation Study.
- USACE has been funded from the President’s approved budget of $500K for FY 24 and $600K for FY 25.
- GLWA will match USACE funding efforts on a 50/50 basis with in-kind services.
- GLWA has selected LimnoTech to provide the in-kind contribution services for the study.
- The current scope is estimated to be approximately $10.5 million over 7.5 years.
- Formal approval from the USACE Vertical Team (formal approval of the study's scope, schedule, and budget) is being awaited.

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Southeast Michigan Flood Resiliency Study – MAJOR MILESTONES

- ✓ USACE and GLWA have executed a Feasibility Cost Sharing Agreement
- ✓ Received USACE funding to begin the Southeast Michigan Flooding Study
- ❑ A feasibility study is completed that identifies a recommended plan.
- ❑ The Chief's report was submitted to Congress requesting construction authorization & appropriations.
- ❑ Engineering/design and construction follows, pending availability of funds.

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FEMA Urban Flooding Data

**Includes a 21,762 increase after 2 federally declared disasters in 2023*

IA Repetitive Loss (RL)

Top 5 IA Flood Loss Areas in Nation

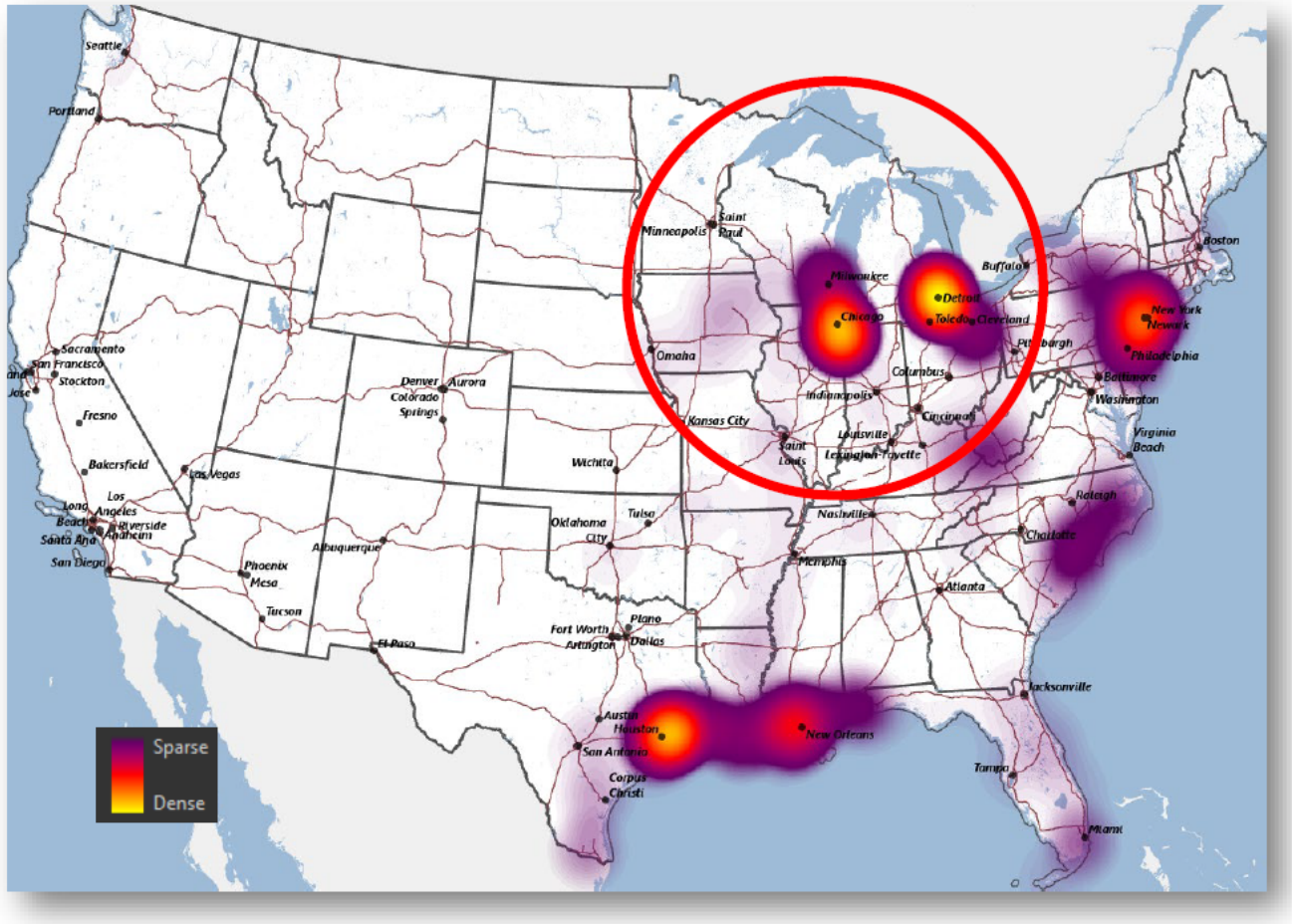
State	Area	Structures
IL	Chicago Cook County	*54,202
MI	Detroit Wayne County	41,114
TX	Houston Harris County	29,061
WI	Milwaukee Milwaukee County	8,185
OH	Cleveland Cuyahoga County	5,907

4 of the top 5

are in FEMA Region 5.

5th Highest Loss Area in Region 5

State	Area	Structures
IN	Gary Lake County	3,356



FEMA

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IA – Individual Assistance
Slides provided by FEMA Region 6, presented at Urban Flooding Workshop, April 2024

CONGRESSIONAL AUTHORIZATION

Sec. 8201 of Water Resources Development Act of 2022:

(45) SOUTHEAST MICHIGAN, MICHIGAN.—Project for flood risk management, Southeast Michigan.

Sec. 8106(a) of Water Resources Development Act of 2022:

(a) FLOOD RISK MANAGEMENT OR HURRICANE AND STORM DAMAGE RISK REDUCTION.—In carrying out a feasibility study for a project for flood risk management or hurricane and storm damage risk reduction, the Secretary, at the request of the non-Federal interest for the study, shall formulate alternatives to maximize the net benefits from the reduction of the comprehensive flood risk within the geographic scope of the study from the isolated and compound effects of—

(1) a riverine discharge of any magnitude or frequency;

(2) inundation, wave attack, and erosion coinciding with a hurricane or coastal storm;

(3) flooding associated with tidally influenced portions of rivers, bays, and estuaries that are hydrologically connected to the coastal water body;

(4) a rainfall event of any magnitude or frequency;

(5) a tide of any magnitude or frequency;

(6) seasonal variation in water levels;

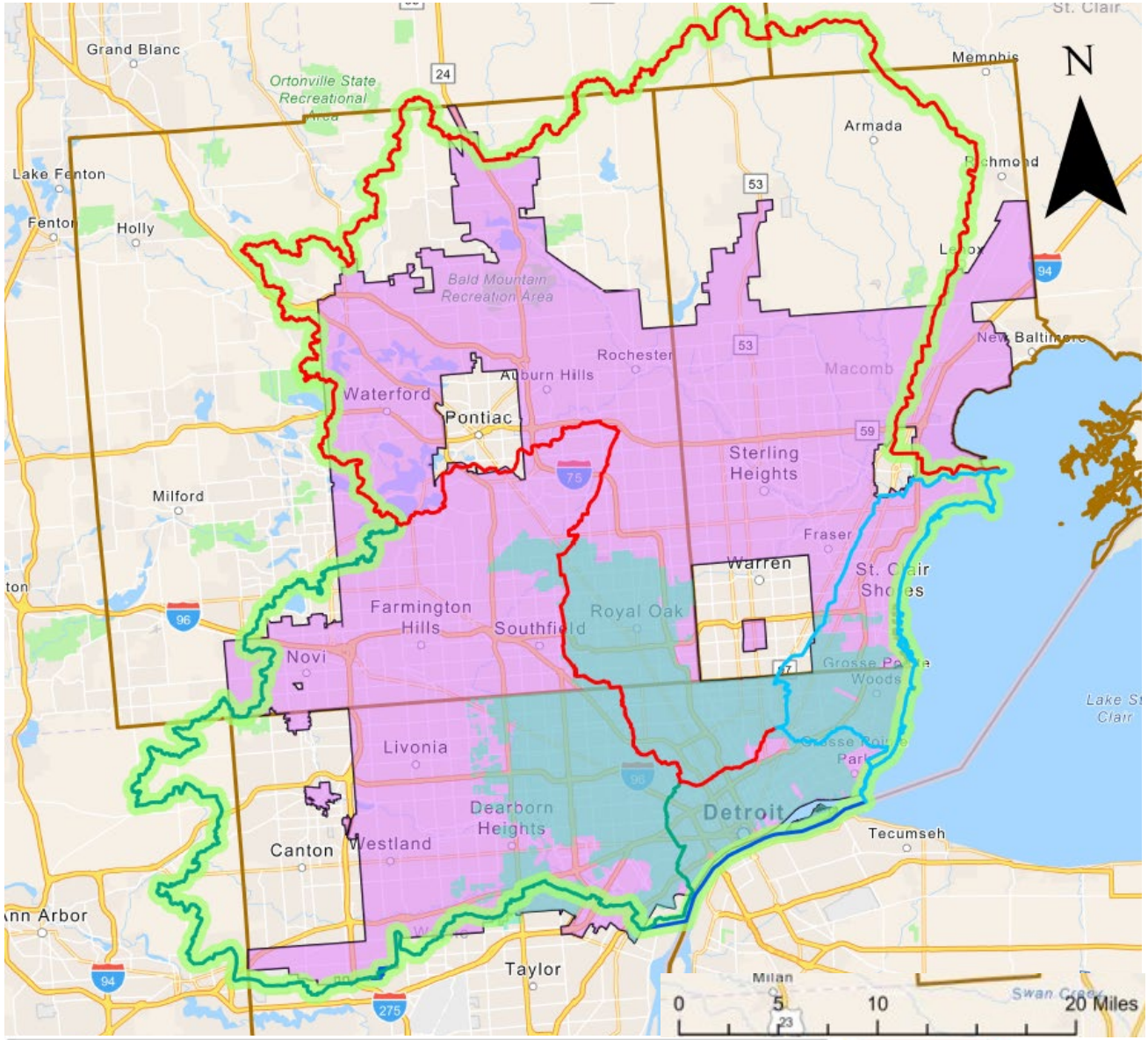
(7) groundwater emergence;

(8) sea level rise;

(9) subsidence; or

(10) any other driver of flood risk affecting the area within the geographic scope of the study.

STUDY AREA OVERVIEW: LOCATION



Study Area
GLWA Service Area
Combined Sewer Area
Separated Sewer Area
Clinton River Watershed
Lake St. Clair Watershed
Rouge River Watershed
Detroit River Watershed
Ecorse Creek Watershed
Michigan County Boundaries

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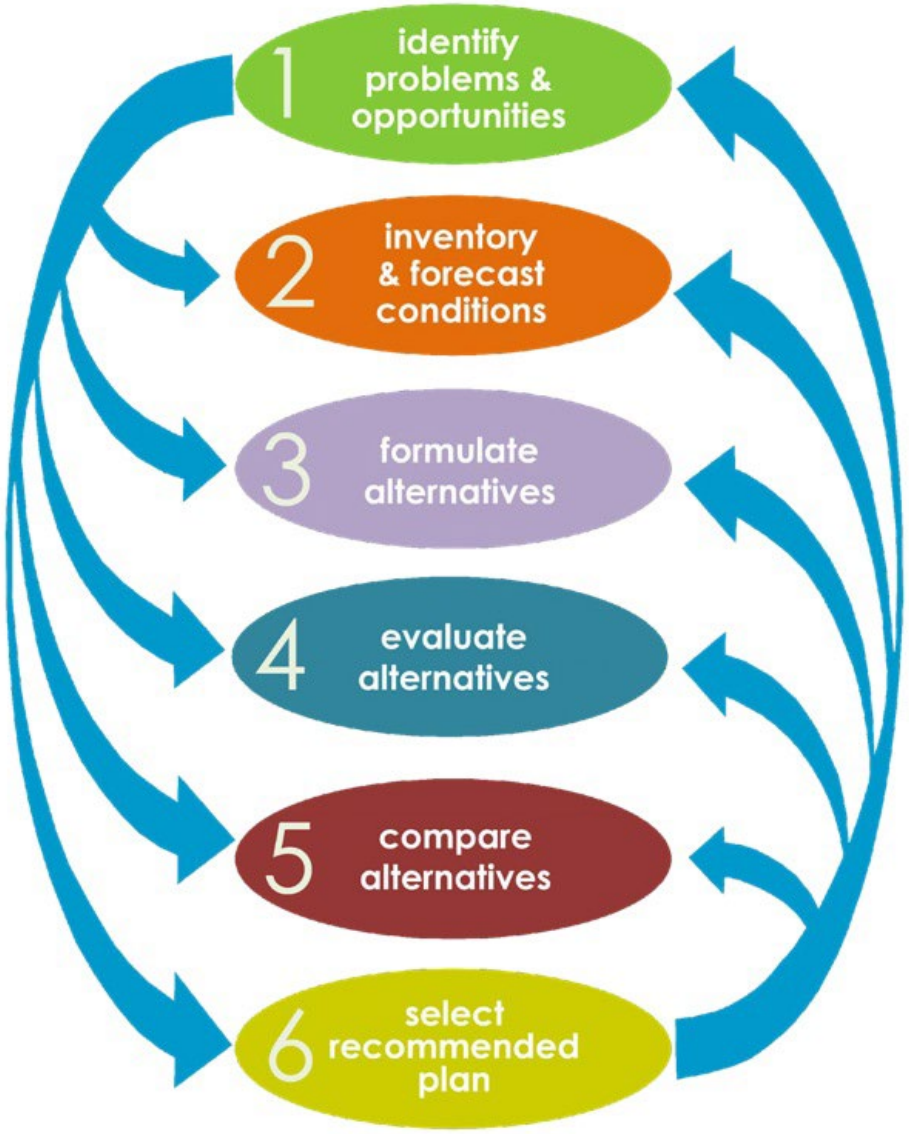
USACE GENERAL INVESTIGATION STUDY PROCESS

The Six-Step Planning Process

- The USACE planning process is a structured approach to problem-solving.
- A six-step planning process is used iteratively, allowing steps to be repeated as needed for better problem understanding.
- Planning is performed by an interdisciplinary group of engineers, scientists, economists, and others.
- Stakeholder and public engagement play a major role, and public input in the decision-making process is valued.



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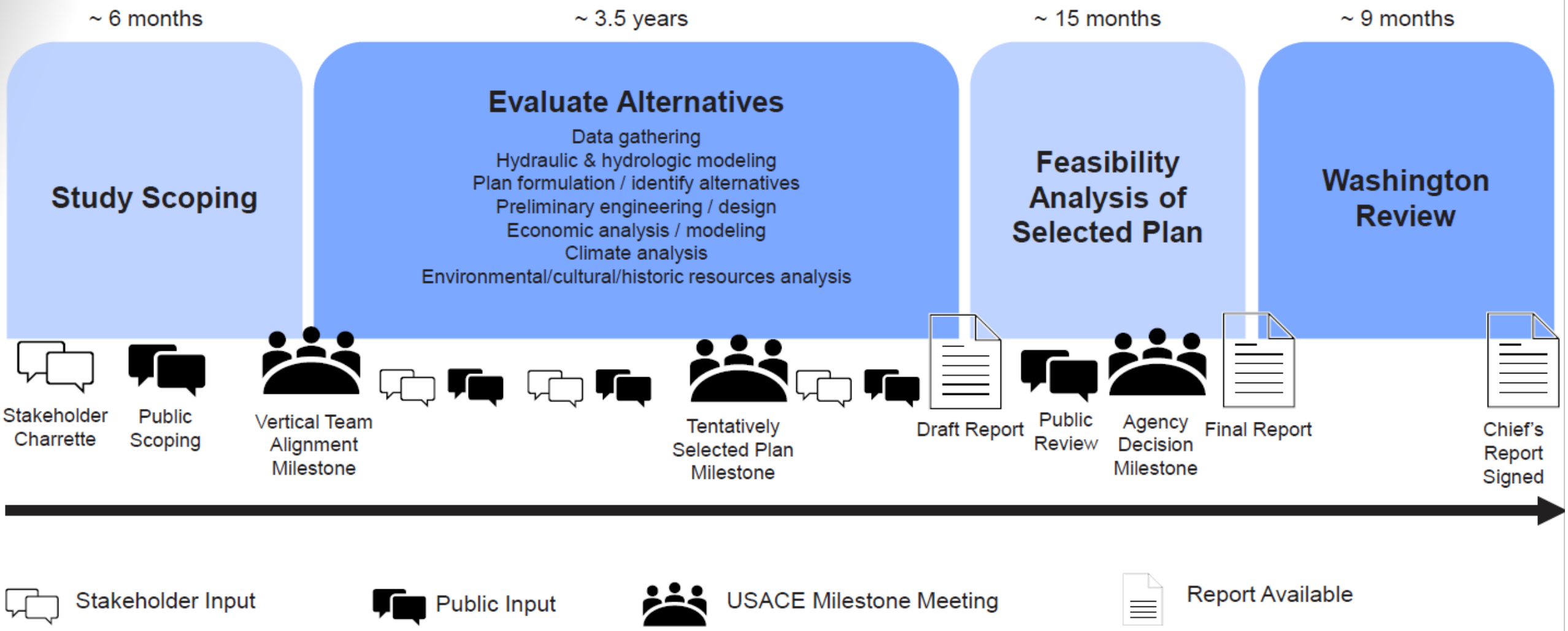
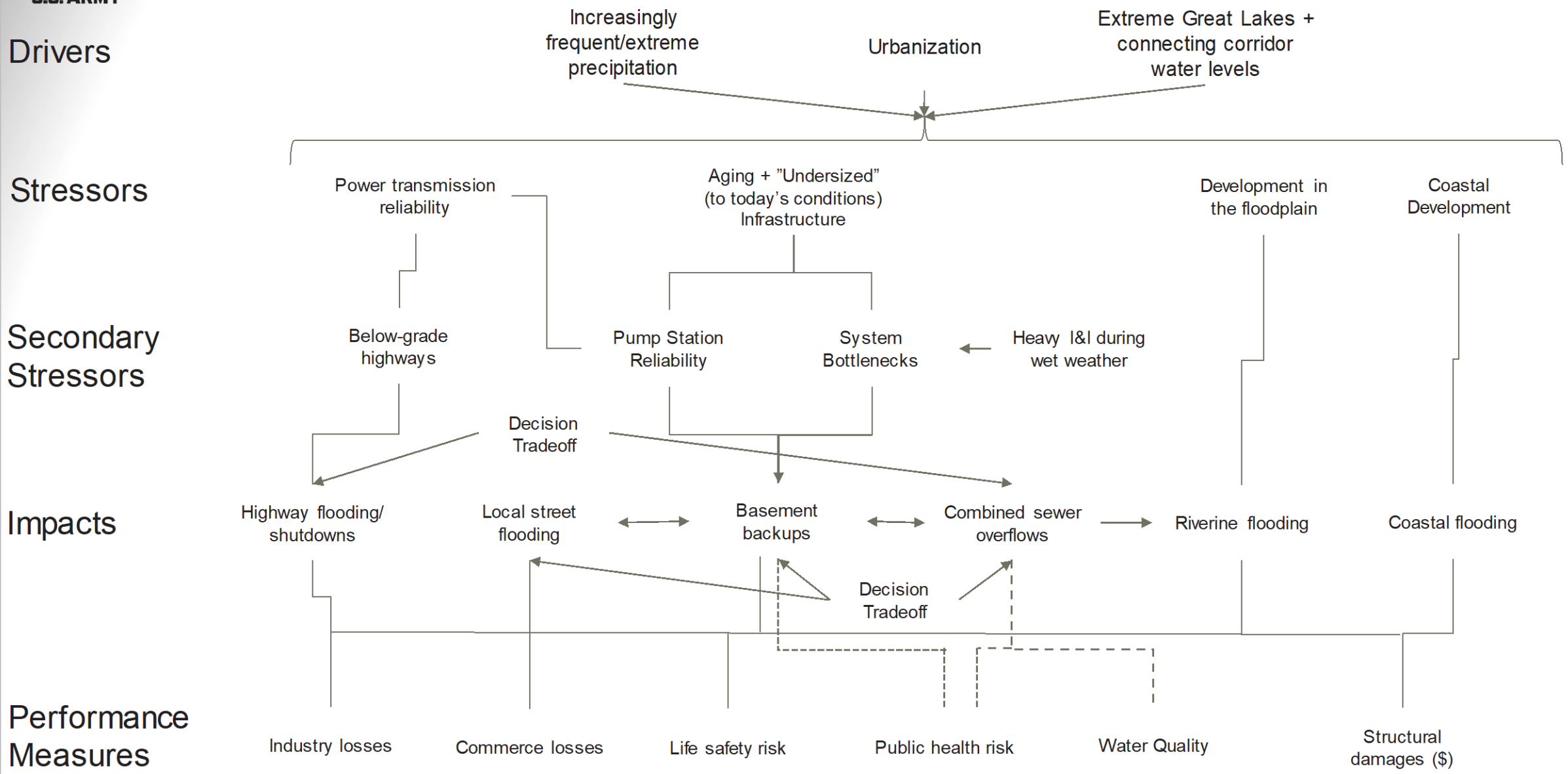
TENTATIVE SOUTHEAST MICHIGAN FLOOD RISK MANAGEMENT STUDY TIMELINE



SE MI FRM CONCEPTUAL MODEL



PATH TO TSP – H&H

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Existing Conditions

Climate Analysis determine events to model → Construct HEC-RAS 2-D Mesh and run rainfall events → Export RAS results → Run EPA-SWMM with new inflows for each rainfall event → Map HGL Results → Impacts

FWOP Modeling

Mesh with FWOP and run rainfall → Export RAS results → Run EPA-SWMM with new inflows for each rainfall event → Map HGL Results → Impacts

Alternatives Modeling

HEC-RAS Modeling of High Complexity Area → Impacts

EPA-SWMM Modeling of non-surface alternatives → Map HGL Results → Impacts

Legend

- HEC-RAS Task
- EPA-SWMM Task
- Python Code
- GIS Process /Python Code?
- Quantify Impacts

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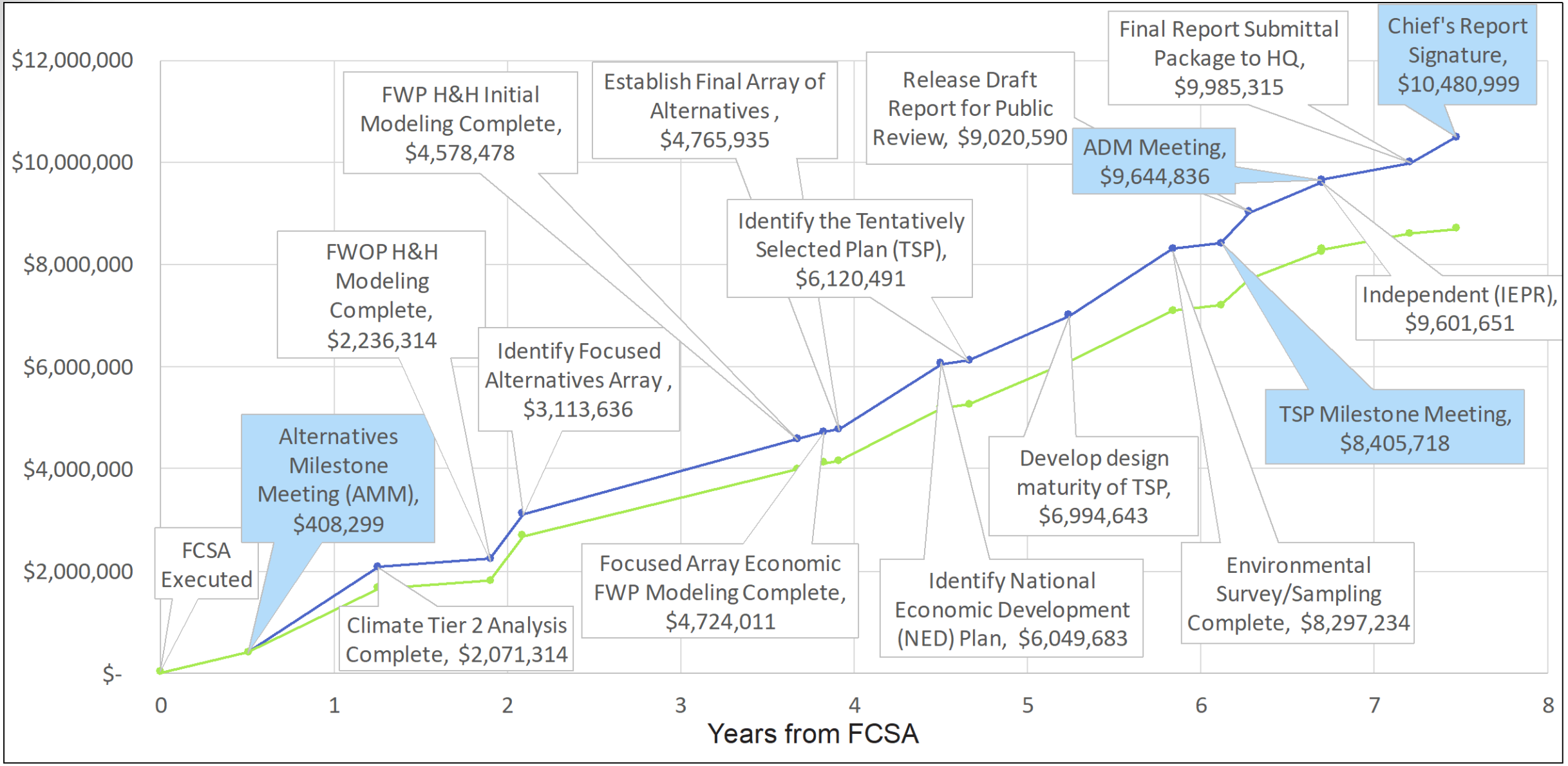
TIMELINE REQUEST – 7.5 YEARS



BUDGET REQUEST

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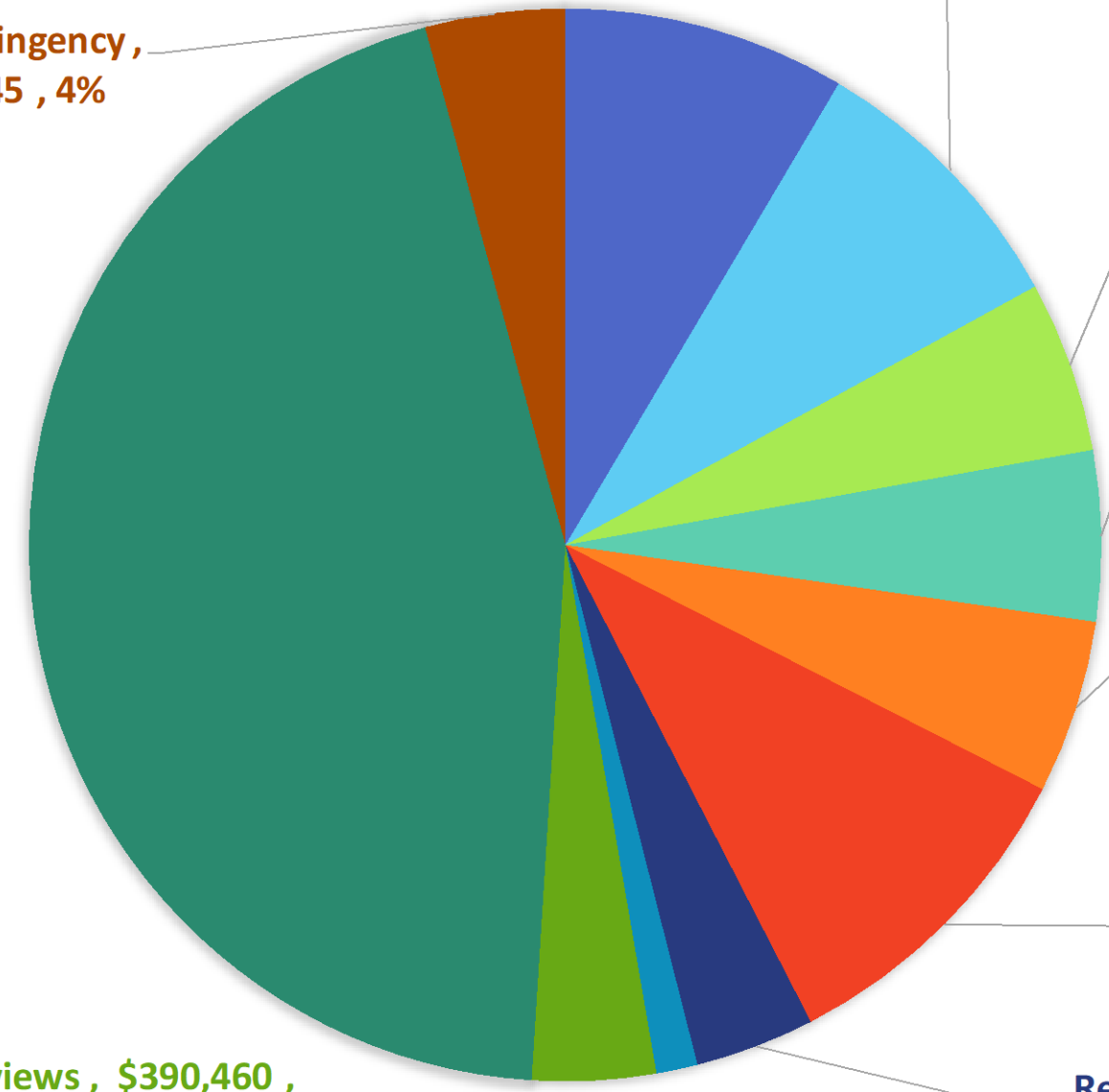
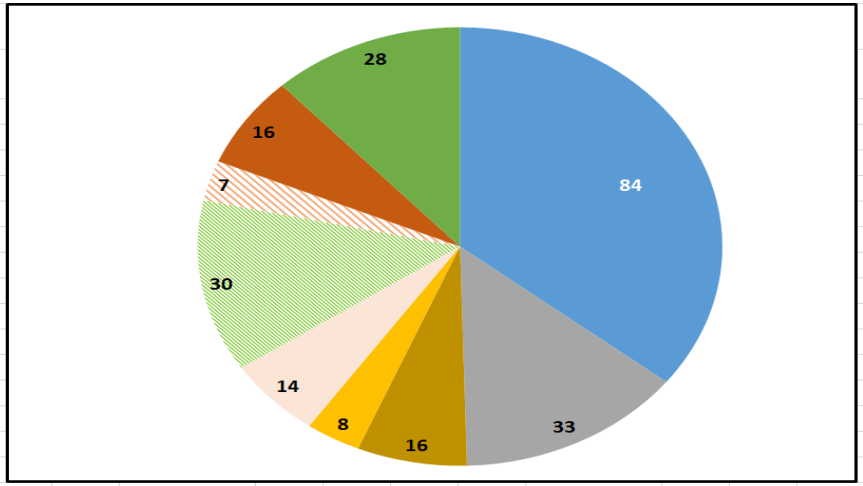
TOTAL
$10,481,000

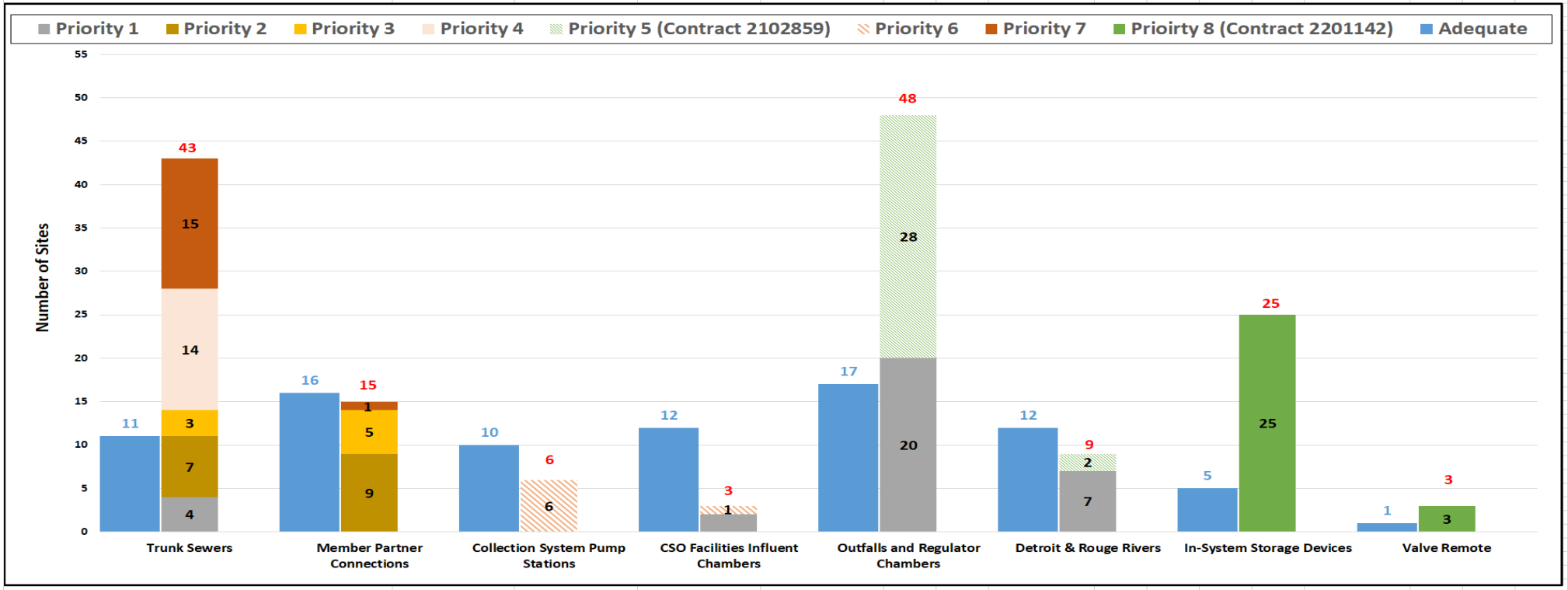


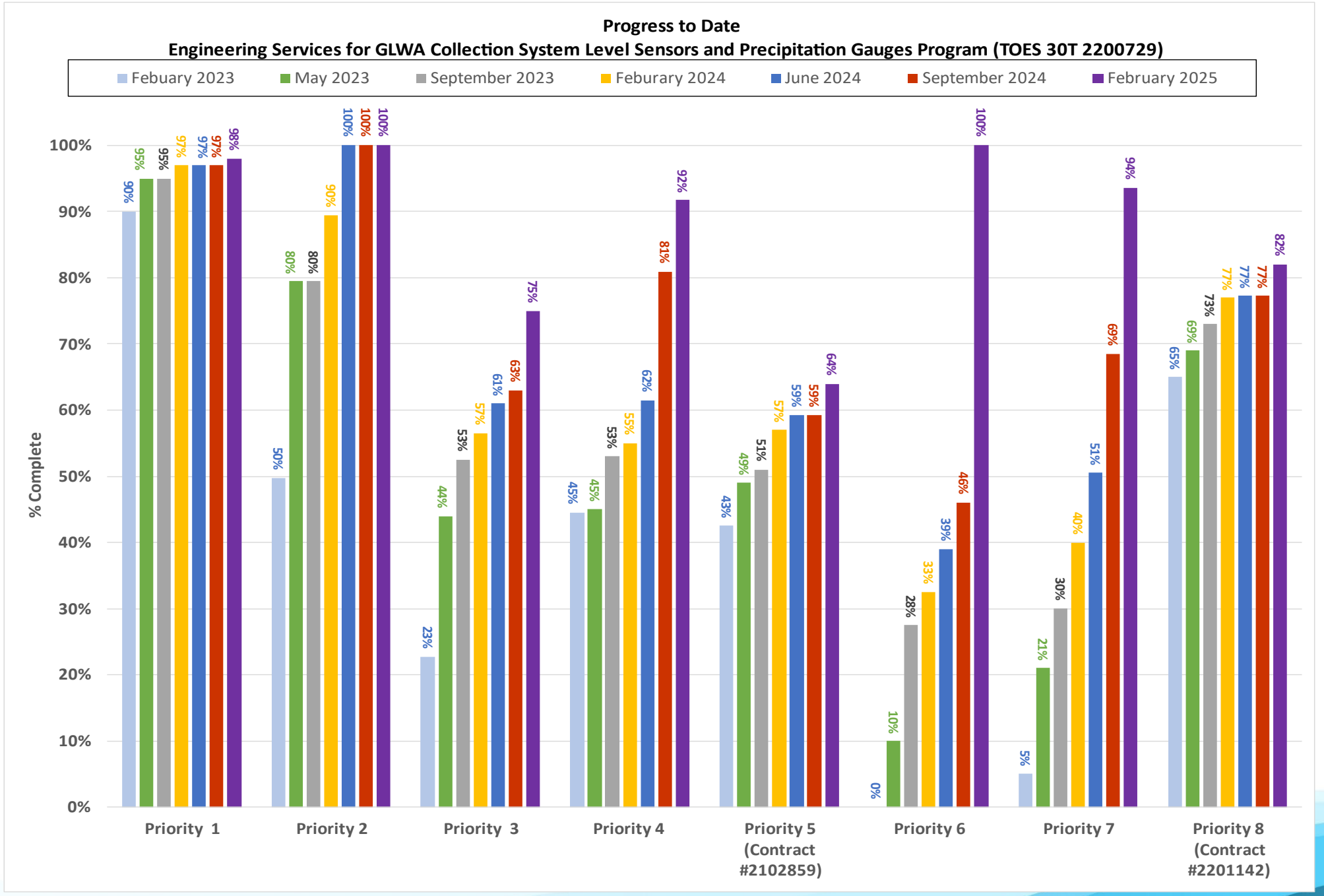
- GLWA continues to review the sewer system instrumentation and make corrections in a phased approach.
- GLWA released around $3.55M for revisions to nearly 87 sites. This will complete Priority 1, 2, 3, 4, & 7 sites.

Baseline Conditions
Engineering Services for GLWA Collection System Level Sensors and Precipitation Gauges Program (TOES 30T 2200729)

Level Sensor Group	Priority #	No. of Sites (some sites may include multiple sensors)		
		Adequate Installation	Need Improvement (or New Installation)	Total
Trunk Sewers				
Original L-Series	1, 4, 7	7	24	31
10 L-Sites Surveyed in 2022	1, 2	2	8	10
Sewage Meters (DT-S-00)	1, 4, 7	2	8	10
Hydraulic Viewers	3	0	3	3
Member Partner Connections				
Existing Flow Meters	3, 7	16	6	22
9 Additional Sites (L-Sites & Flow Meters)	2	0	9	9
Collection System Pump Stations	6	10	6	16
CSO Facilities Influent Chambers	6	12	3	15
Outfalls and Regulator Chambers (Contract #2102859)	1, 5	17	48	65
River (Detroit & Rouge) Level Sensors	1, 5	12	9	21
In-System Storage Devices (Contract #2201142)	Other Contracts	5	25	30
Valve Remote (Contract #2201142)	Other Contracts	1	3	4
TOTAL		**84**	**152**	**236**







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Thank you

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