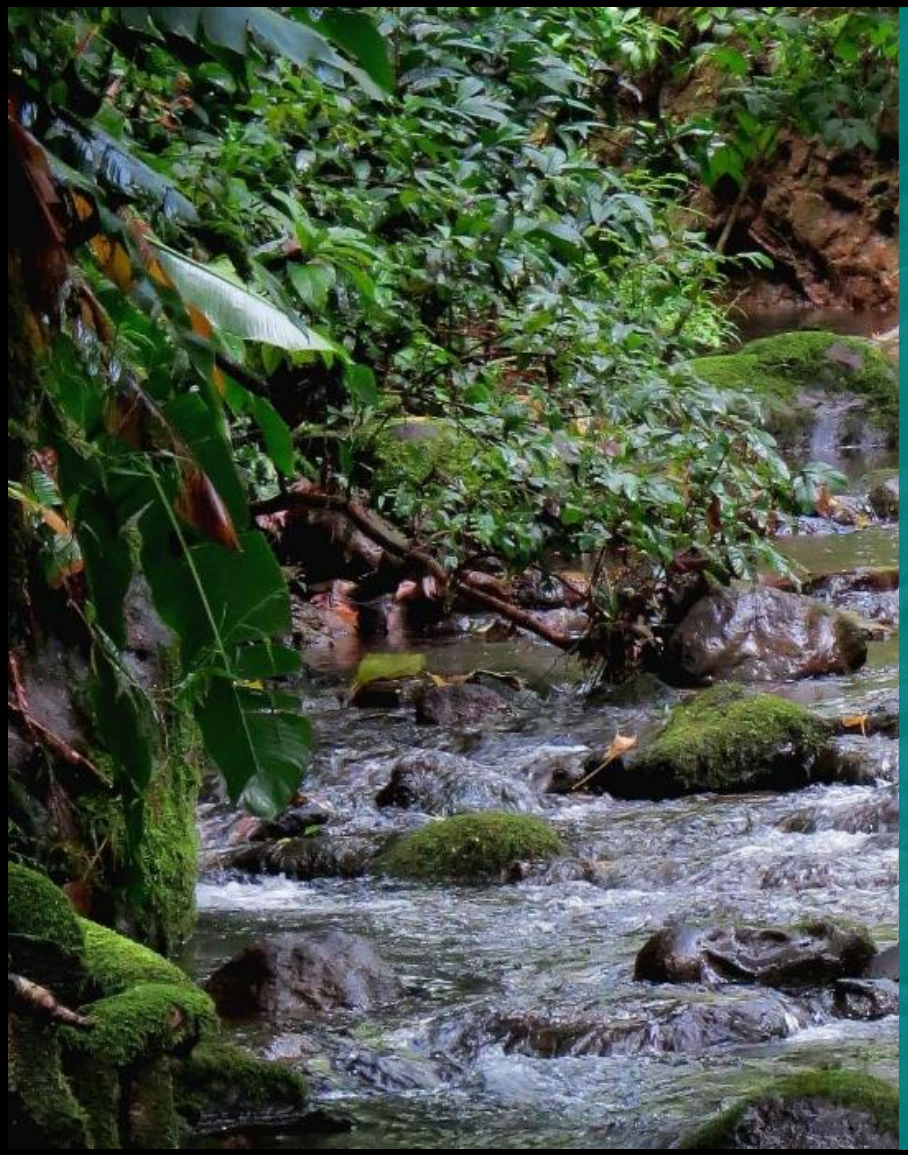


STAKEHOLDER ADVISORY GROUP

Board of Water Supply, City & County of Honolulu
July 17, 2025
Meeting 55

WELCOME & INTRODUCTIONS

DAVE EBERSOLD, FACILITATOR

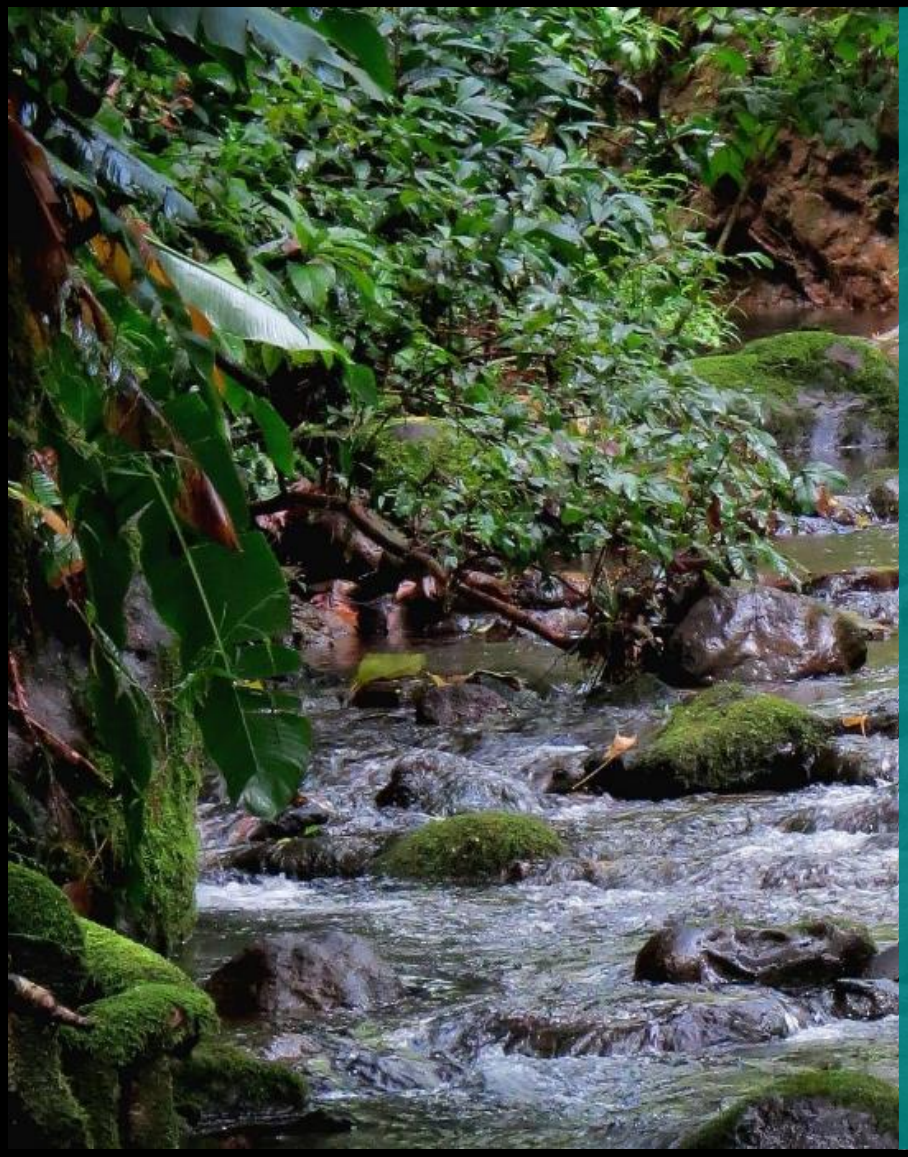
STAKEHOLDER ADVISORY GROUP MEETING 55

JULY 17, 2025

MEETING OBJECTIVES

- Welcome and public comment
- Provide BWS updates
- FY26 Budget
- Explore climate analysis results/condition assessment integration
- Discuss future demand projections
- Accept notes from meeting #54
- Review 2025 meeting dates

PUBLIC COMMENT ON AGENDA ITEMS



BWS UPDATES

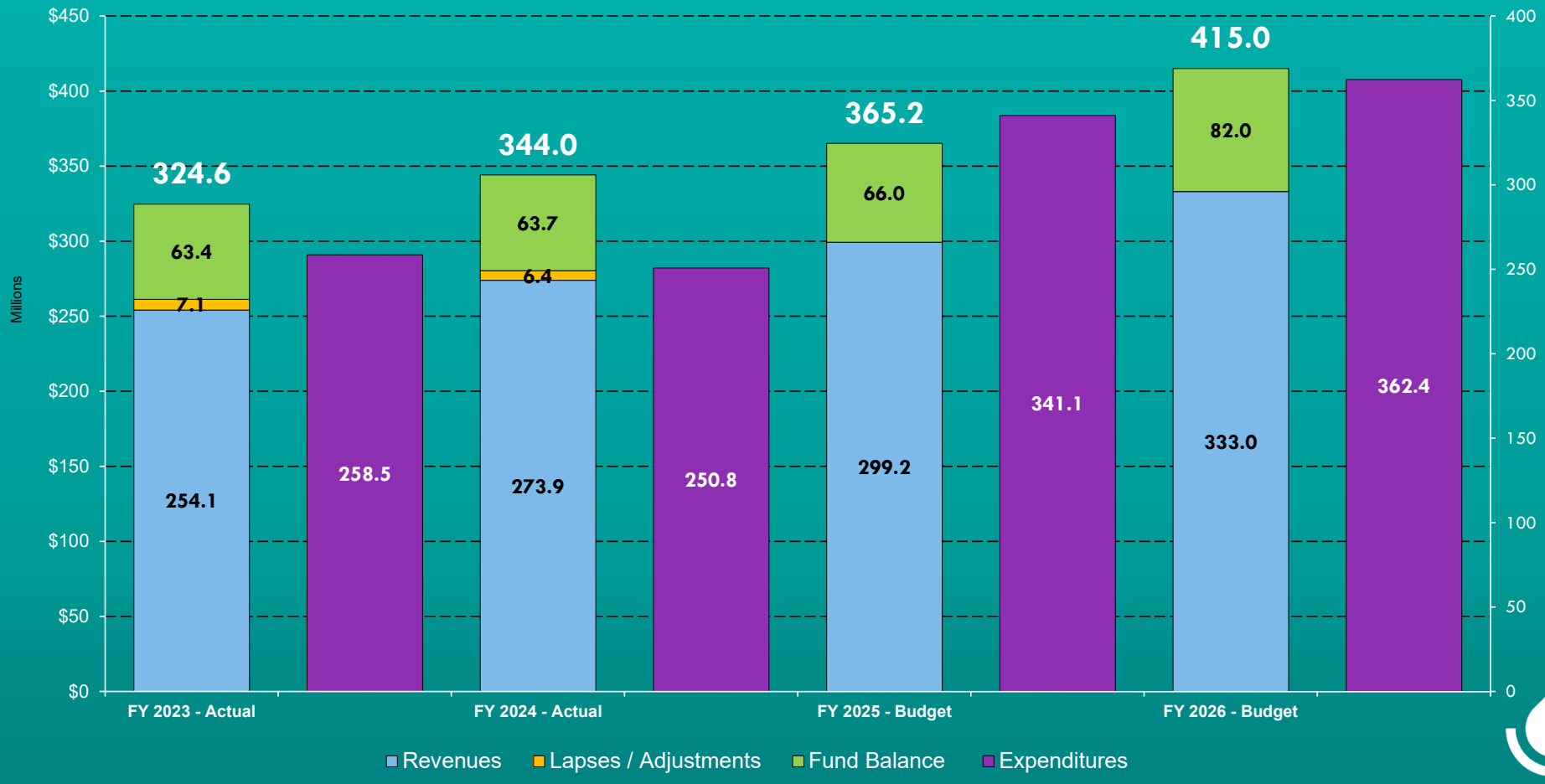
Ernest Lau, PE
Manager and Chief Engineer
July 17, 2025
boardofwatersupply.com

FY 2026 OPERATING BUDGET AND CAPITAL IMPROVEMENT PROGRAM BUDGET

RAELYNN NAKABAYASHI, EXECUTIVE SUPPORT OFFICE

TOTAL RESOURCES VS. TOTAL EXPENDITURES

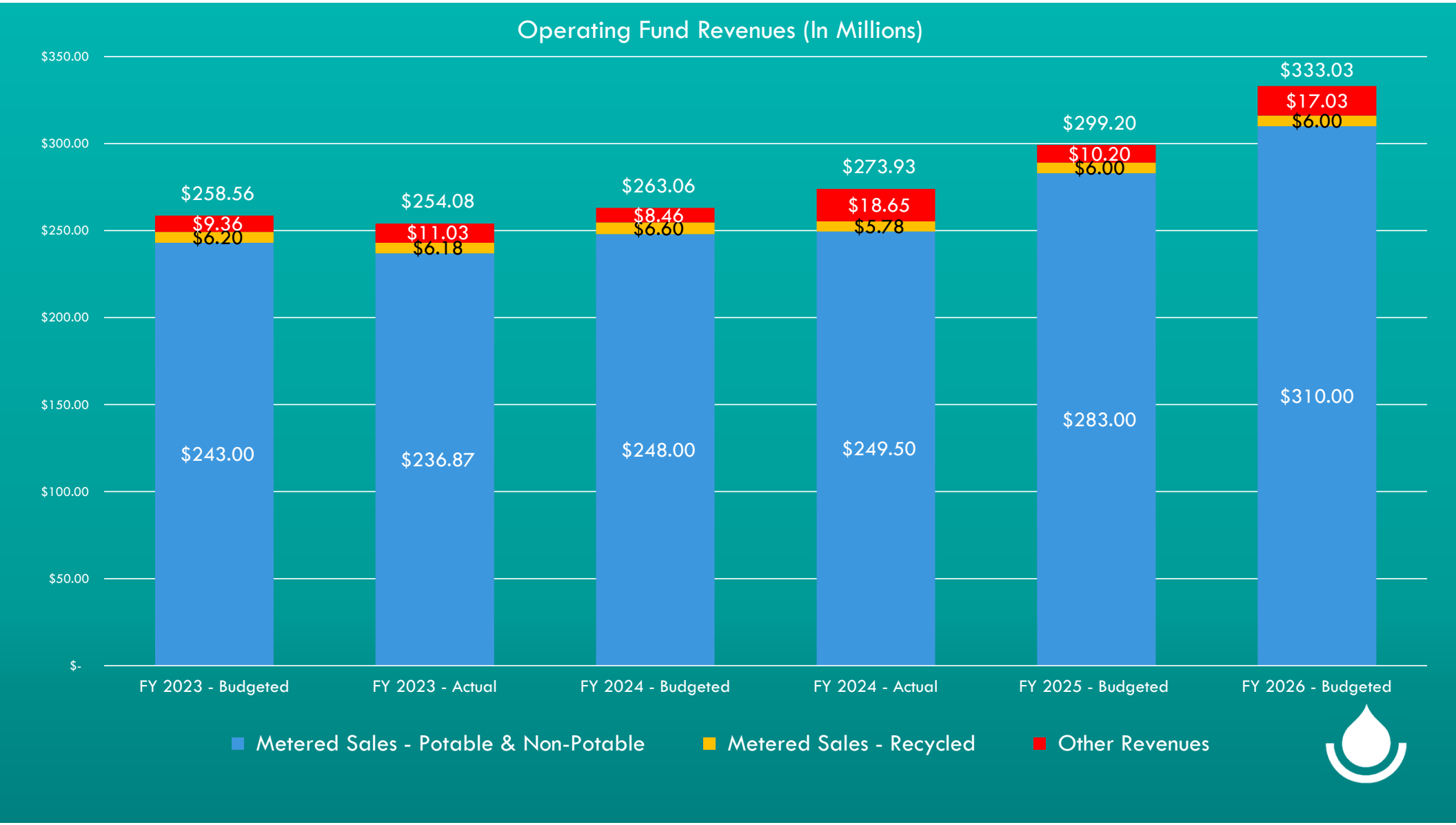
(MILLIONS OF DOLLARS)



OPERATING FUND RESOURCES AND EXPENDITURES

(MILLIONS OF DOLLARS)

	FY 2024 - Actual	FY 2025 - Adopted	FY 2026 - Proposed
	Actual Budget	**Adopted Budget**	**Proposed Budget**
Beginning Balance	**$63.7**	**$66.0**	**$82.0**
Revenues	$274.0	$299.2	$333.0
Lapses/ Adjustments	$6.3	$0.0	$0.0
Total Resources	**$344.0**	**$365.2**	**$415.0**
Operating Expenditures	$222.1	$272.6	$283.3
Capital Improvement Program	$28.7	$68.5	$79.1
Total Expenditures	**$250.8**	**$341.1**	**$362.4**
Ending Balance	**$93.2**	**$24.1**	**$52.6**

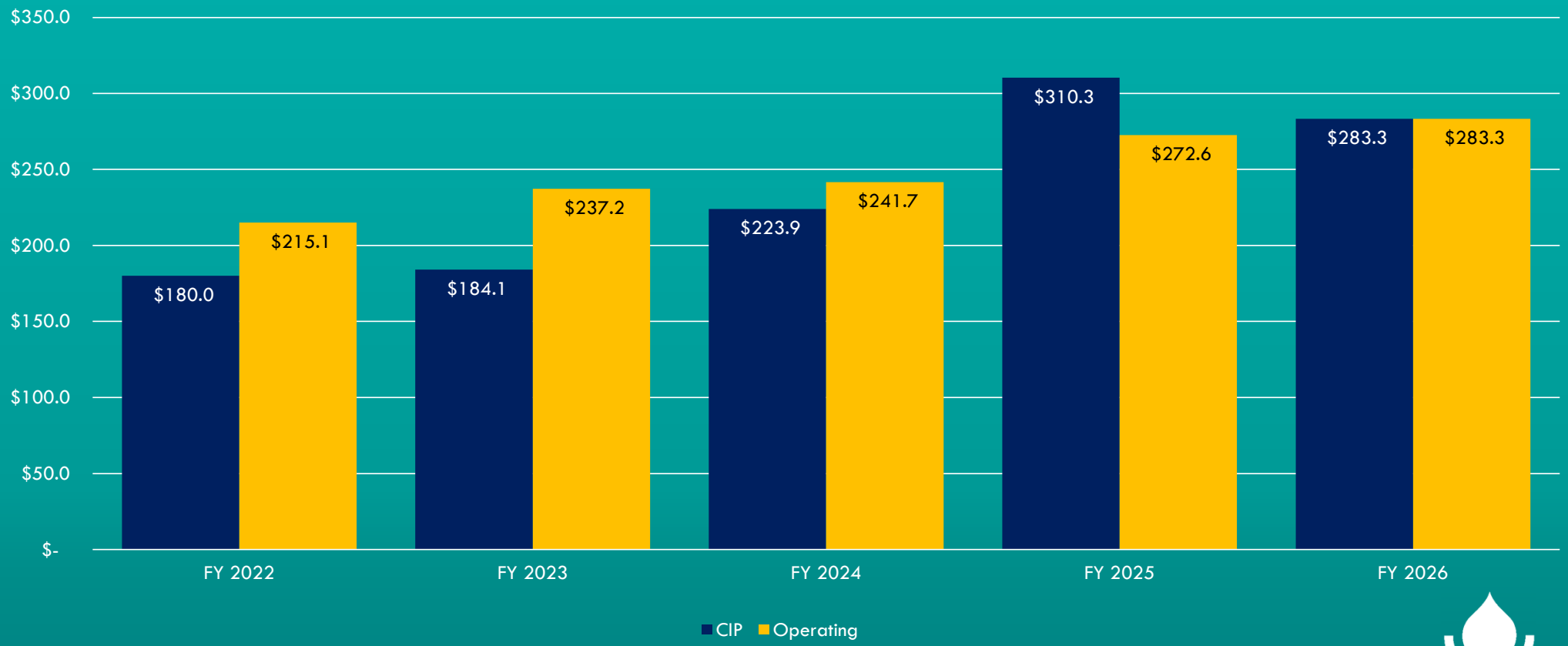

Operating Fund Revenues (In Millions)
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$-
$258.56
$9.36
$6.20
$243.00
$254.08
$11.03
$6.18
$236.87
$263.06
$8.46
$6.60
$248.00
$273.93
$18.65
$5.78
$249.50
$299.20
$10.20
$6.00
$283.00
$333.03
$17.03
$6.00
$310.00
FY 2023 - Budgeted
FY 2023 - Actual
FY 2024 - Budgeted
FY 2024 - Actual
FY 2025 - Budgeted
FY 2026 - Budgeted
Metered Sales - Potable & Non-Potable
Metered Sales - Recycled
Other Revenues

FY 2026 BUDGET SUMMARY

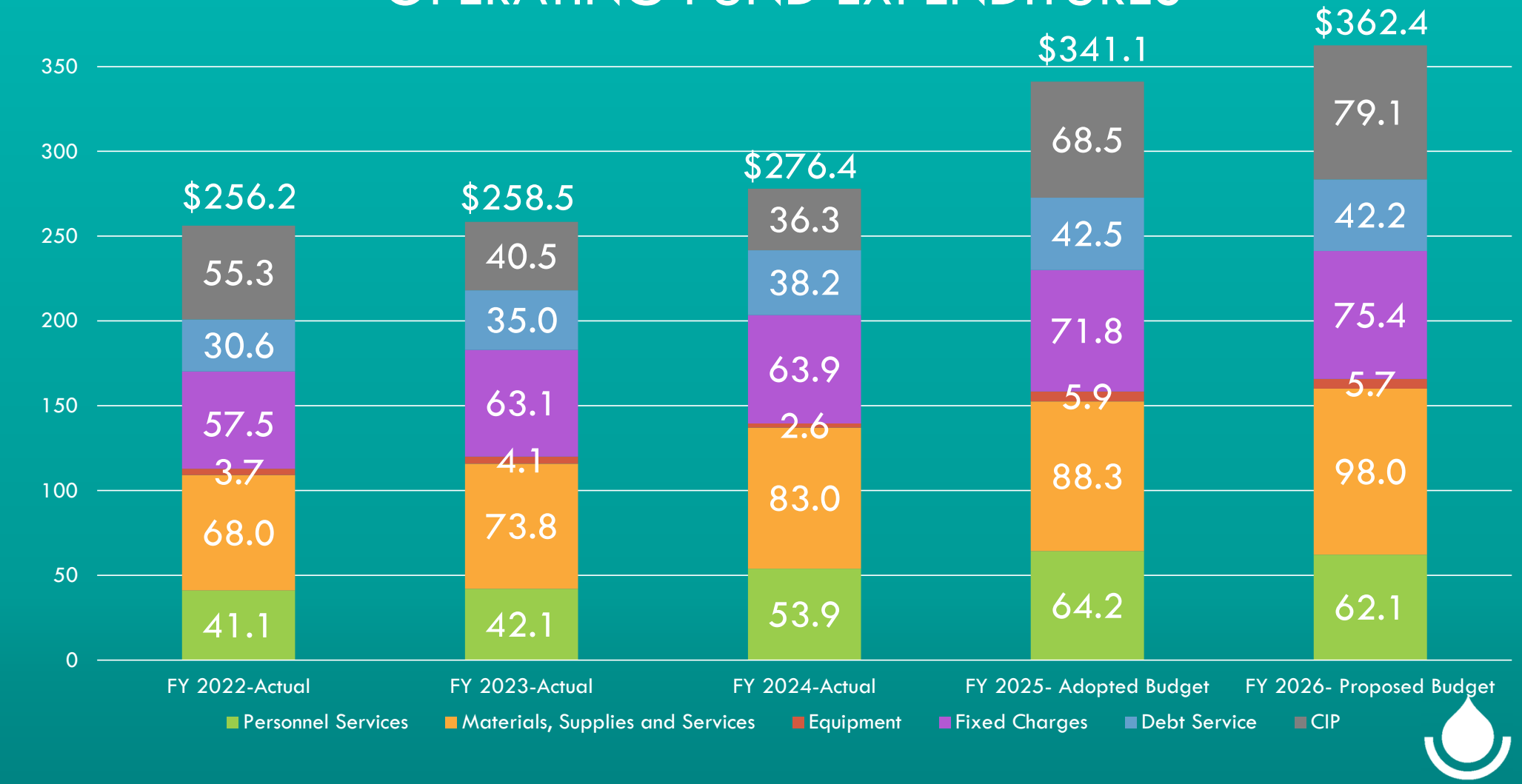
	FY 2025 – Adopted	FY 2026 – Proposed	$ Change	% Change
Operating Budget	$272,619,998	$283,312,488	$10,692,490	3.92%
Capital Improvement Program Budget	$316,391,000	$283,327,500	($33,063,500)	-10.45%
Total	$589,010,998	$566,639,988	($22,371,010)	-3.80%

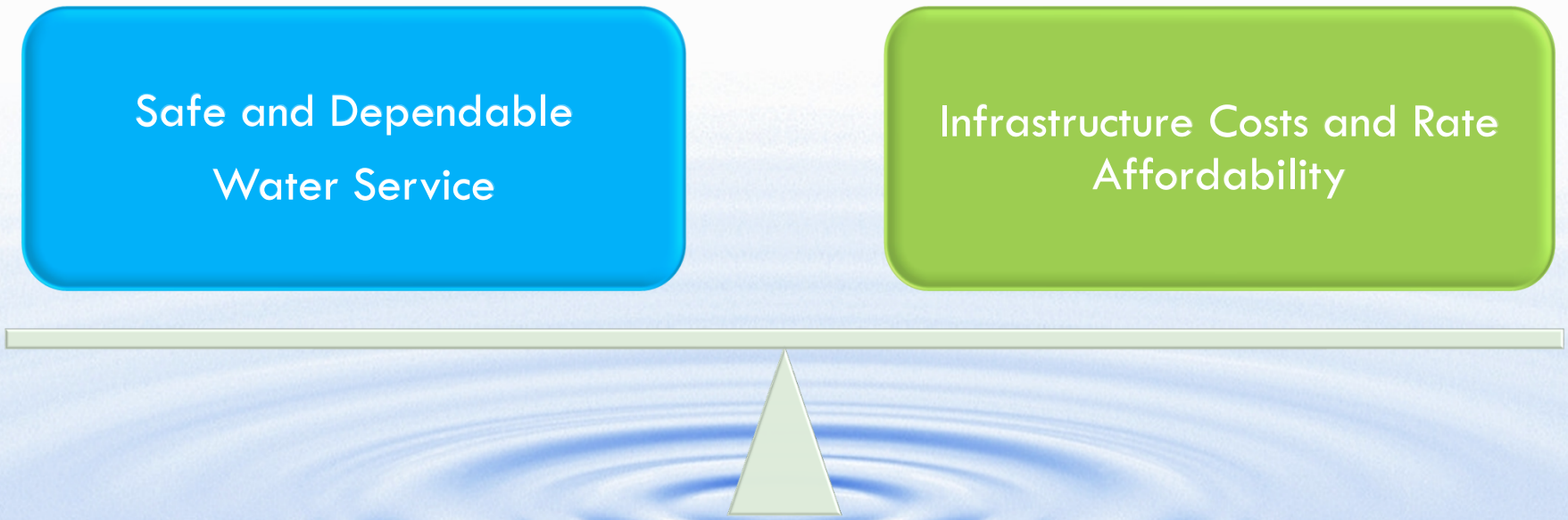
OPERATING & CIP BUDGETS FY 2022 – FY 2026

(MILLIONS OF DOLLARS)



OPERATING FUND EXPENDITURES

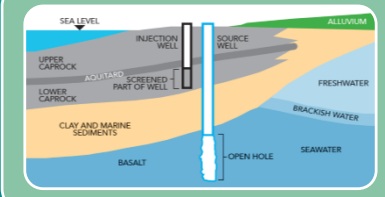



Safe and Dependable Water Service
Infrastructure Costs and Rate Affordability

PROJECT CATEGORIES

I. Research and Development

II. Renewal and Replacement



III. Capacity Expansion

CAPITAL IMPROVEMENT PROGRAM BUDGET FY 2026
IN MILLIONS OF DOLLARS

	Categories	Operating Fund	State Revolving Fund	Special Expendable Fund	Improvement Fund	Extramural Fund	Water Infrastructure Finance and Innovation Act	Total
I.	Research & Development	13.500	0.000	0.000	15.000	0.000	0.000	28.500
II.	Renewal & Replacement	47.650	48.200	0.000	7.500	0.000	0.000	103.350
III.	Capacity Expansion	0.300	10.000	5.725	0.000	19.000	57.000	92.025
	Subtotal	61.450	58.200	5.725	22.500	19.000	57.000	223.875
	Construction Cost Index	6.728	8.130	4.000	3.375	0.000	4.000	26.233
	Contract Adjustment	10.950	1.540	1.190	17.540	0.000	2.000	33.220
	Total	**79.128**	**67.870**	**10.915**	**43.415**	**19.000**	**63.000**	**283.328**

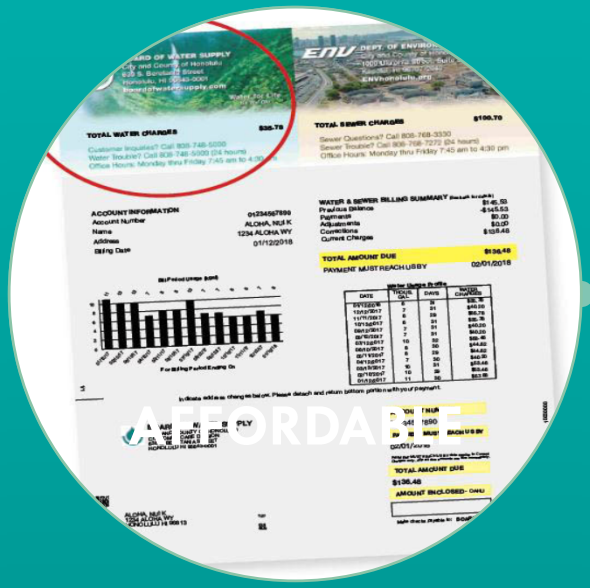
FY 2026 BUDGET SUMMARY

	Operating Fund	State Revolving Fund	Special Expendable Fund	Improvement Fund	Extramural Fund	Water Infrastructure Finance and Innovation Act	Total
Operating Budget	$ 283,312,488						$ 283,312,488
Capital Improvement Program Budget	$ 79,127,500	$ 67,870,000	$ 10,915,000	$ 43,415,000	$ 19,000,000	$ 63,000,000	$ 283,327,500
Total - All Funds	**$ 362,439,988**	**$ 67,870,000**	**$ 10,915,000**	**$ 43,415,000**	**$ 19,000,000**	**$ 63,000,000**	**$ 566,639,988**

FISCAL YEAR 2026 BUDGETS
REMAIN FOCUSED ON OUR CORE VISION – KA WAI OLA

Implementation & Compliance w/ All Drinking Water Regulations

Water Master Plan Update & Implementation of High Priority Projects



AAA Bond Rating & Maximization of Federal & State Funding

Mahalo!

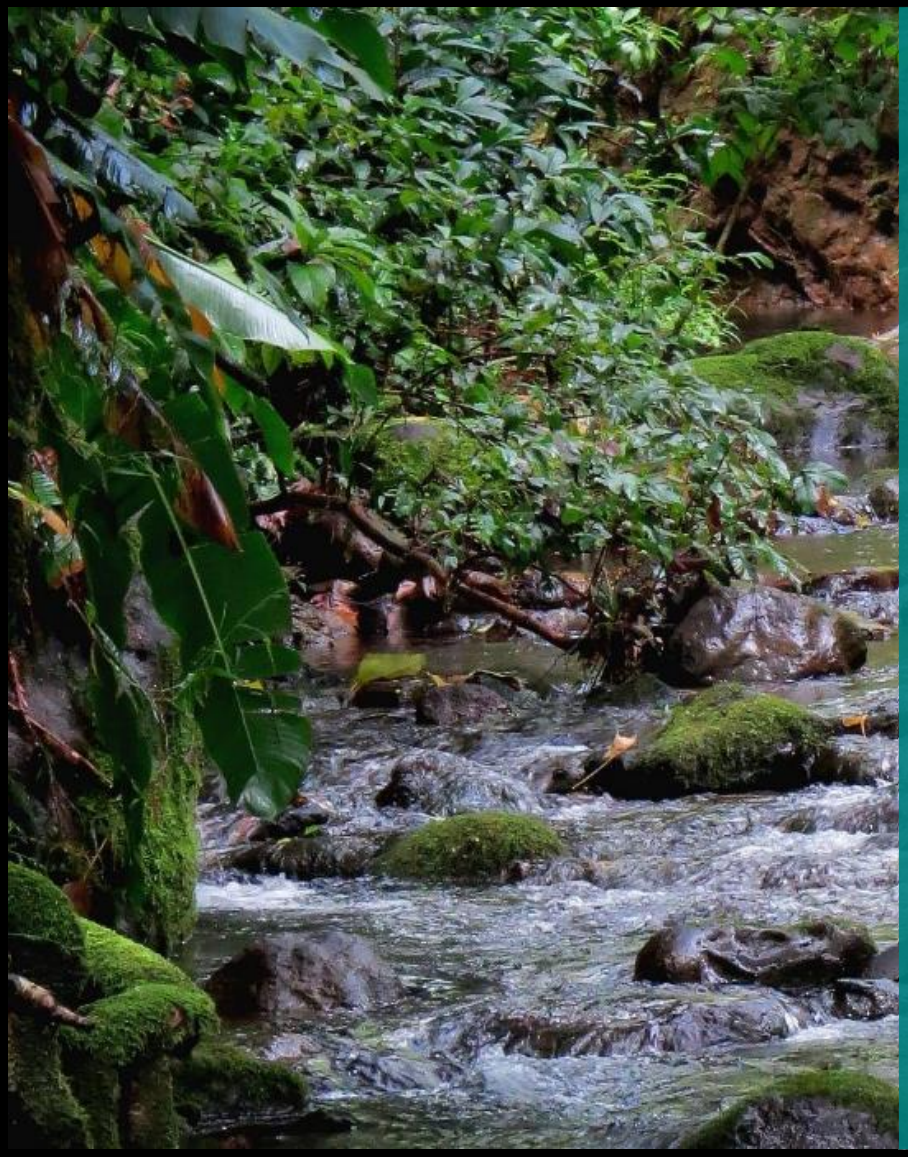
BOARD OF WATER SUPPLY

SAG Meeting

Raelynn Nakabayashi

boardofwatersupply.com

July 17, 2025



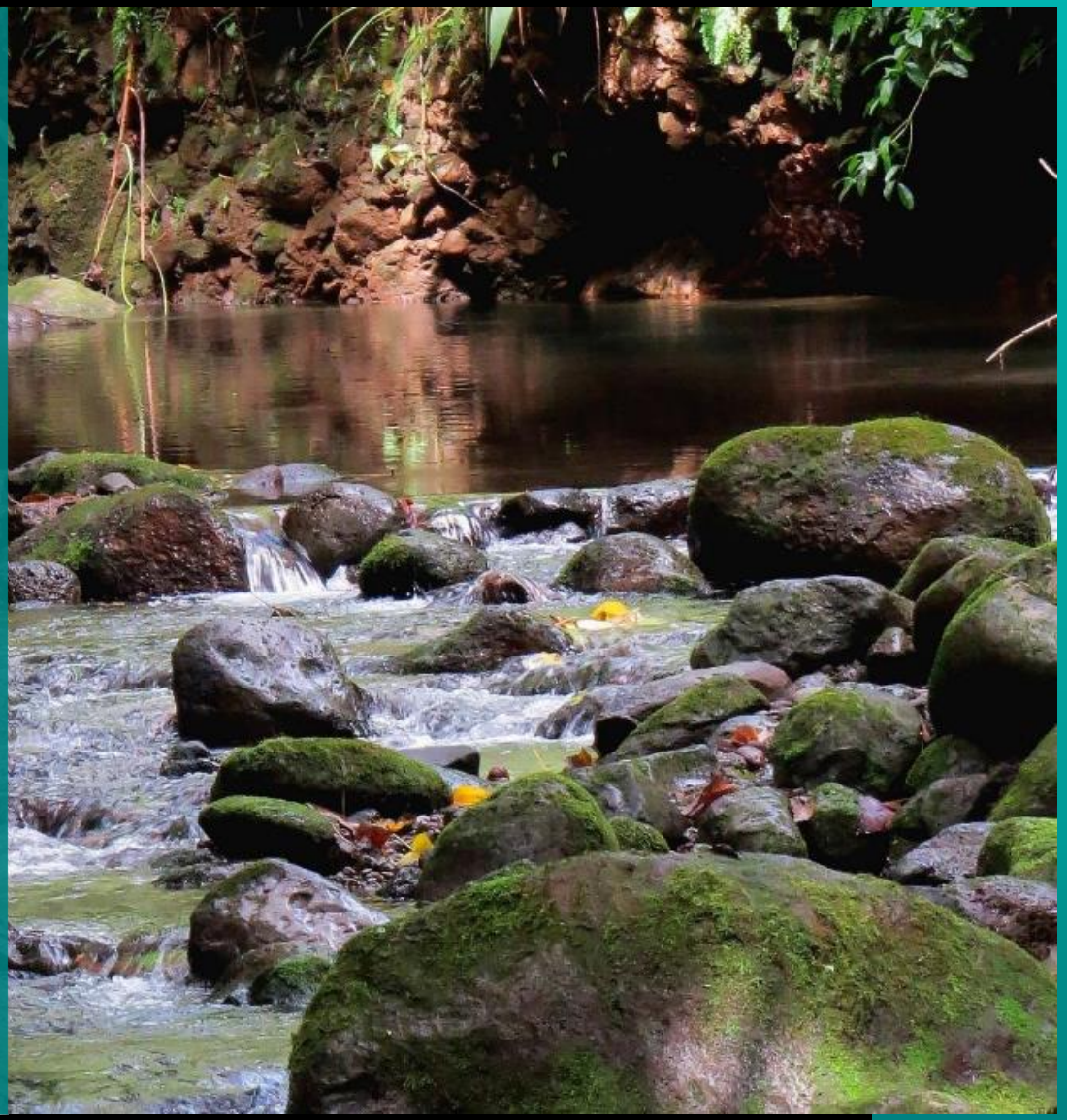
CLIMATE ANALYSIS RESULTS & CONDITION ASSESSMENT INTEGRATION

Brian O'Connor, PE
Sebastian Malter, PE
CDM Smith
July 17, 2025

AGENDA

- Approach
- Hurricane Exposure Analysis
- Flood Exposure Analysis
- Wildfire Exposure Analysis
- Asset Selection
- Summary & Next Steps

APPROACH

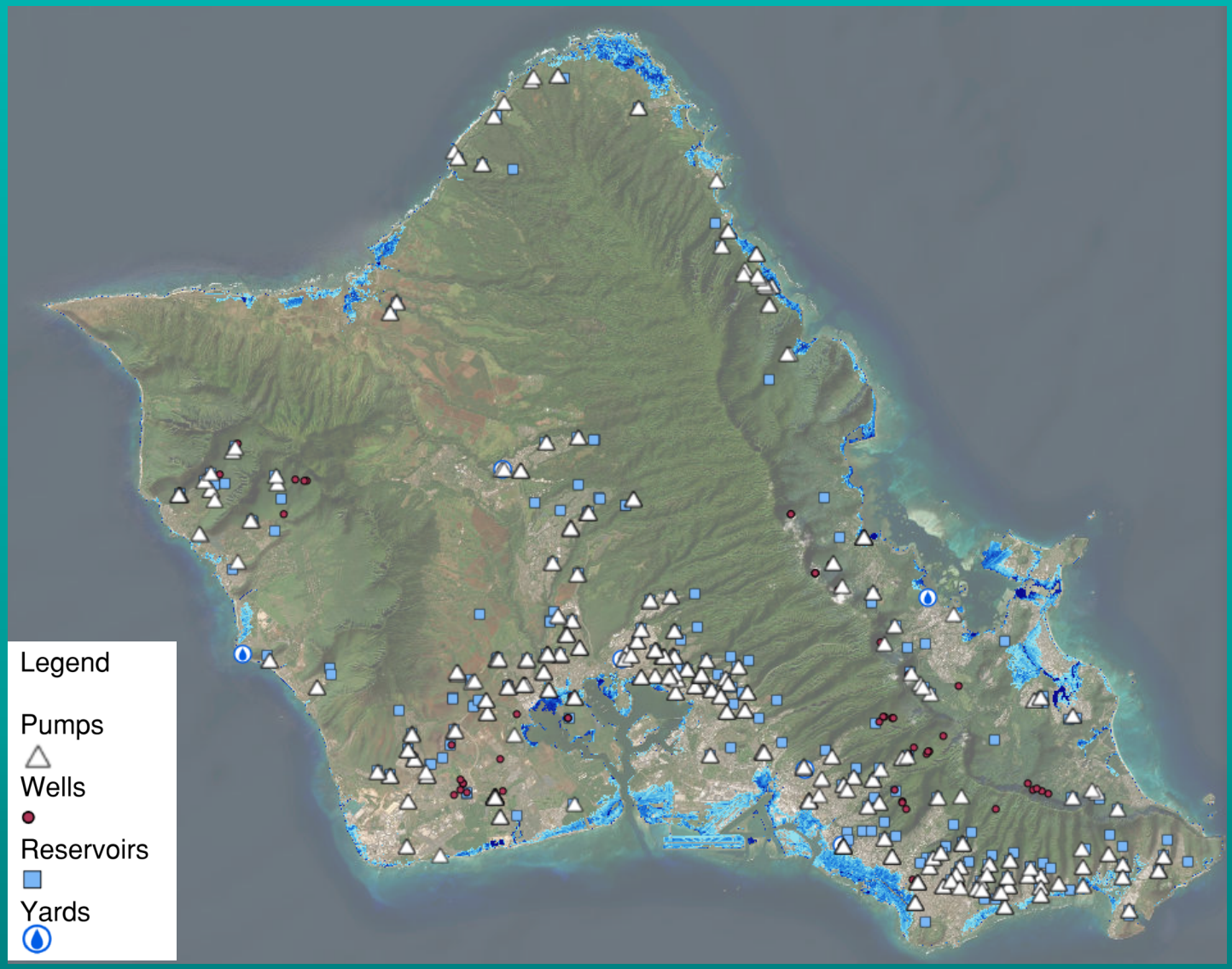


PURPOSE

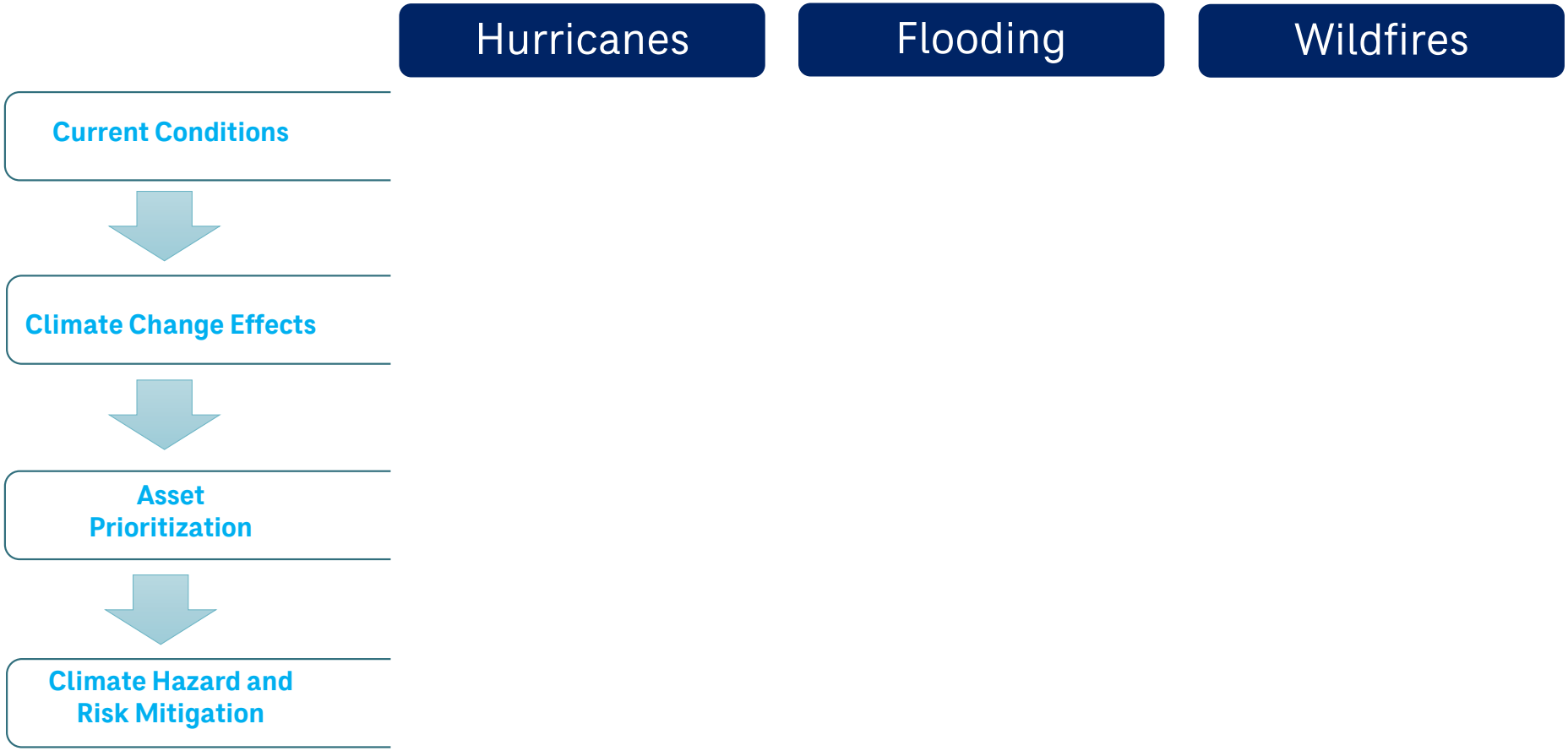
- Identify BWS sites with increased risk due to climate change
- Assess subset of BWS sites to identify vulnerabilities to high winds, flood, and wildfire
- Develop preliminary climate resilient designs to address identified vulnerabilities

BWS HAS OVER 500 MAJOR ASSETS

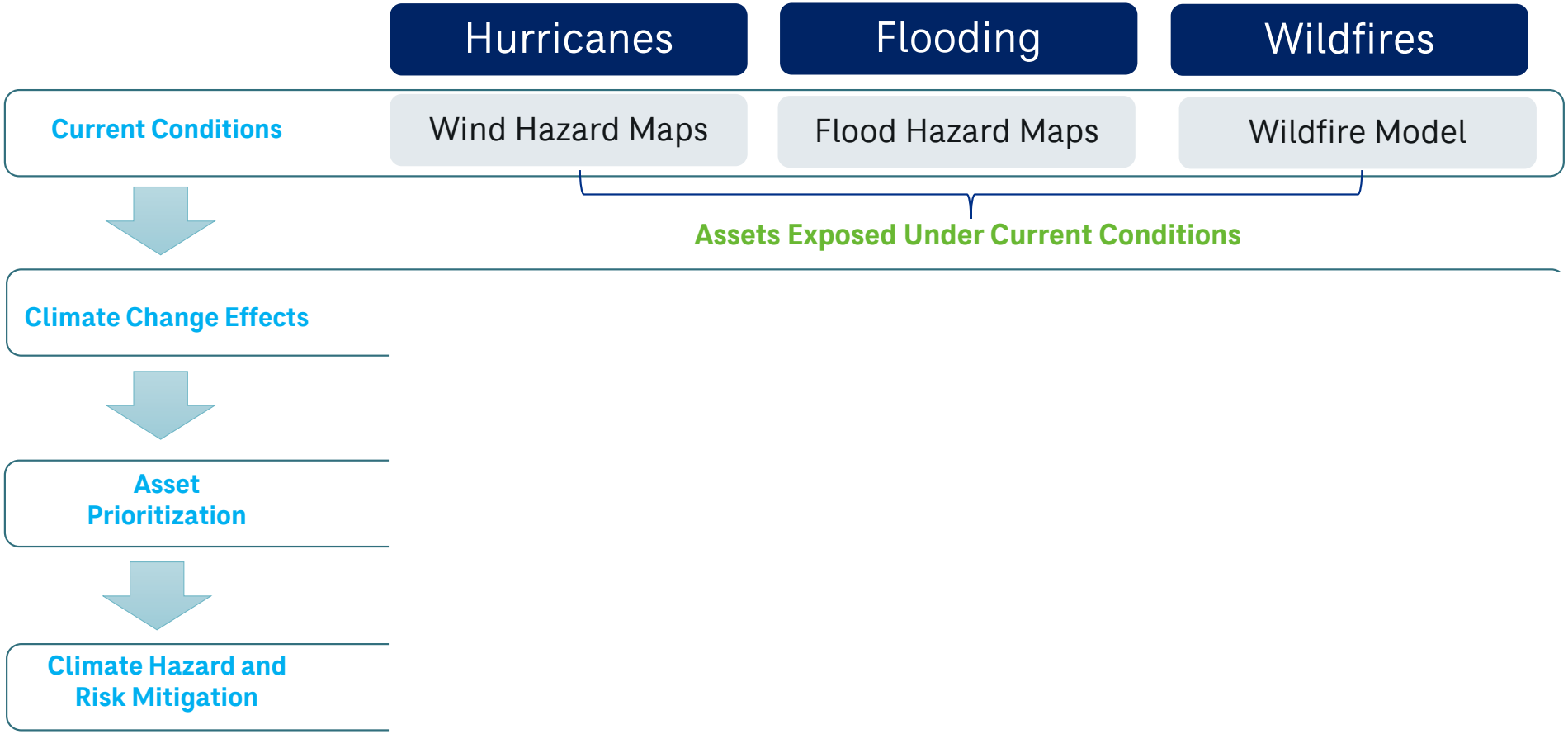
Must filter to highest risk – How?



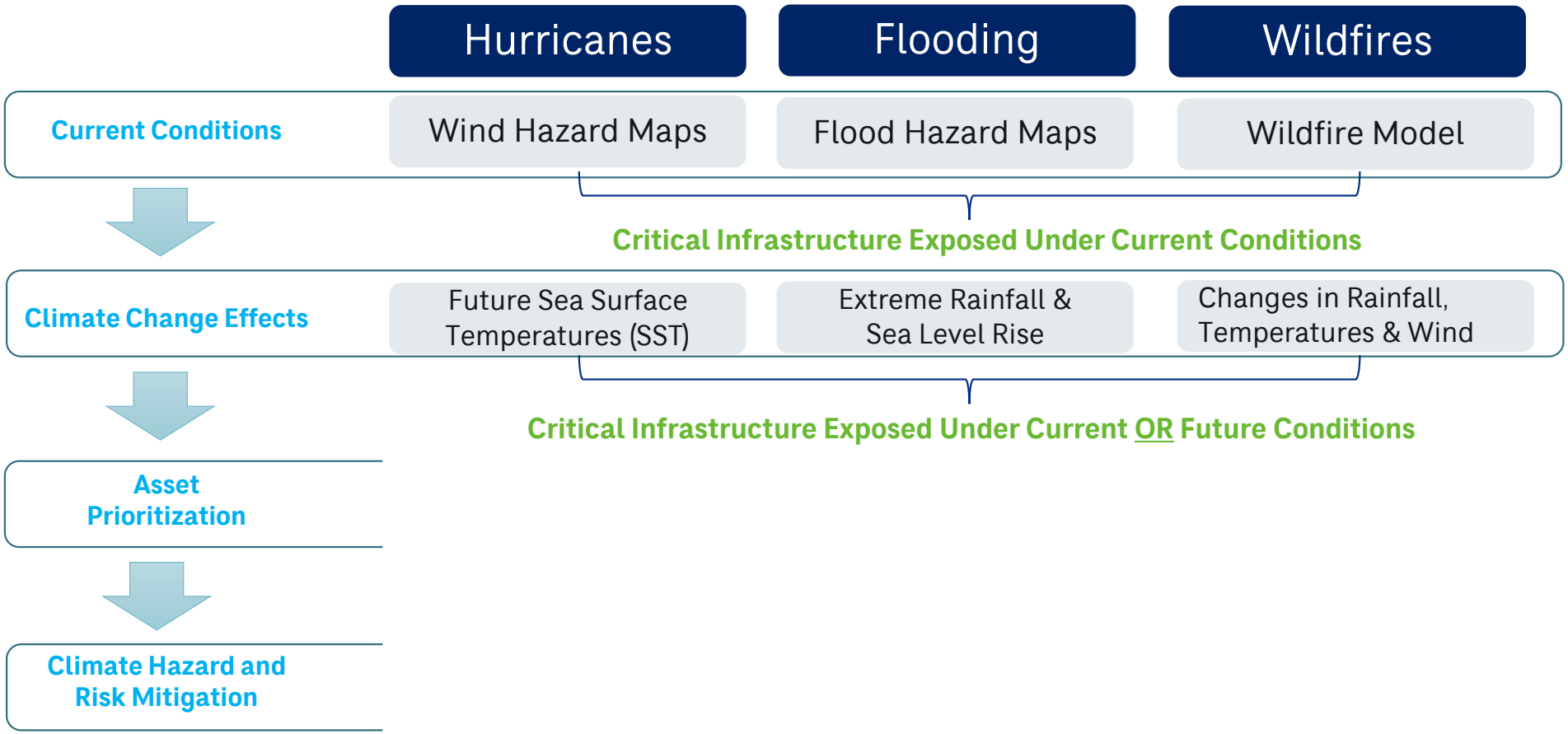
NATURAL HAZARDS AND FUTURE CONDITIONS



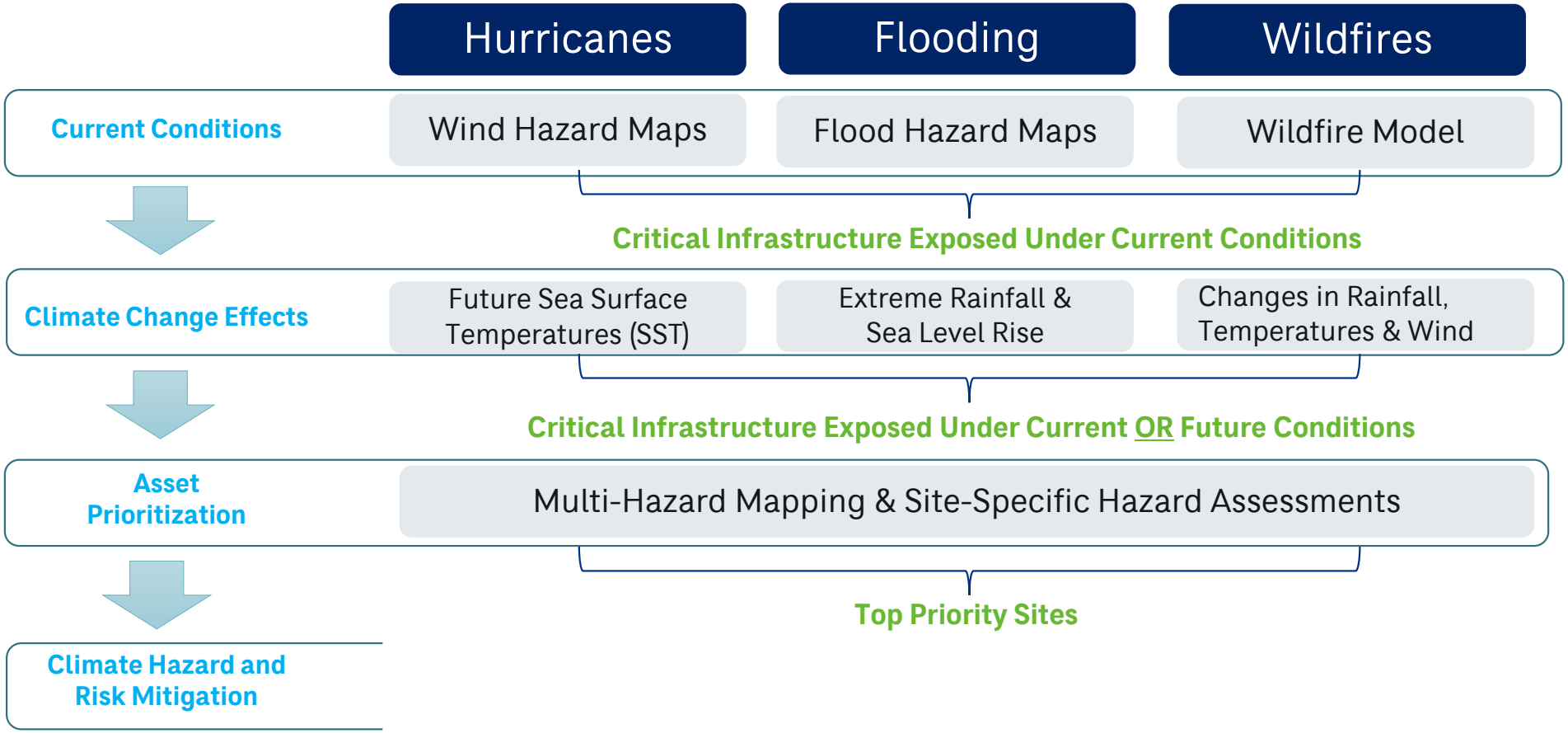
NATURAL HAZARDS AND FUTURE CONDITIONS



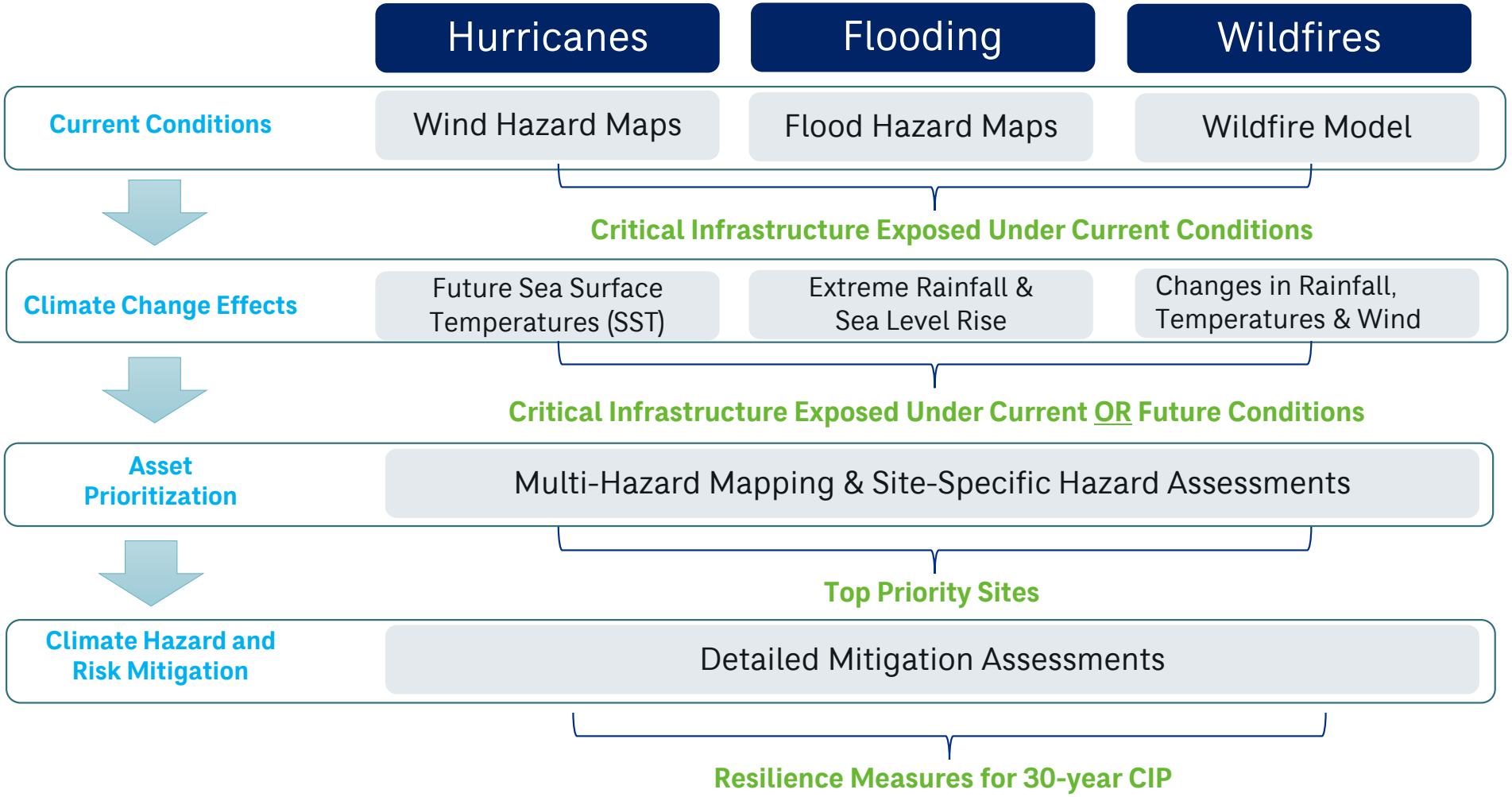
NATURAL HAZARDS AND FUTURE CONDITIONS



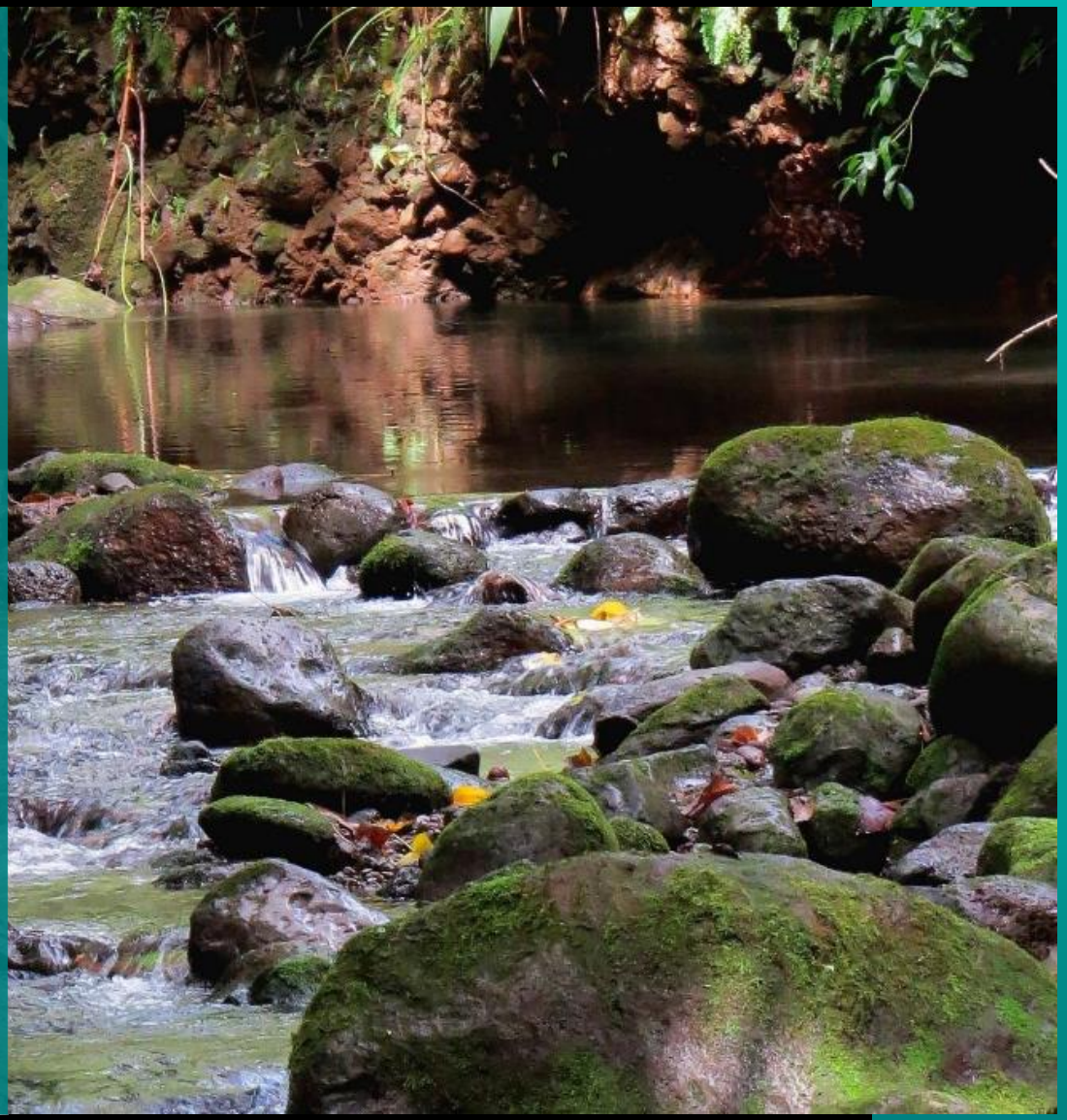
NATURAL HAZARDS AND FUTURE CONDITIONS



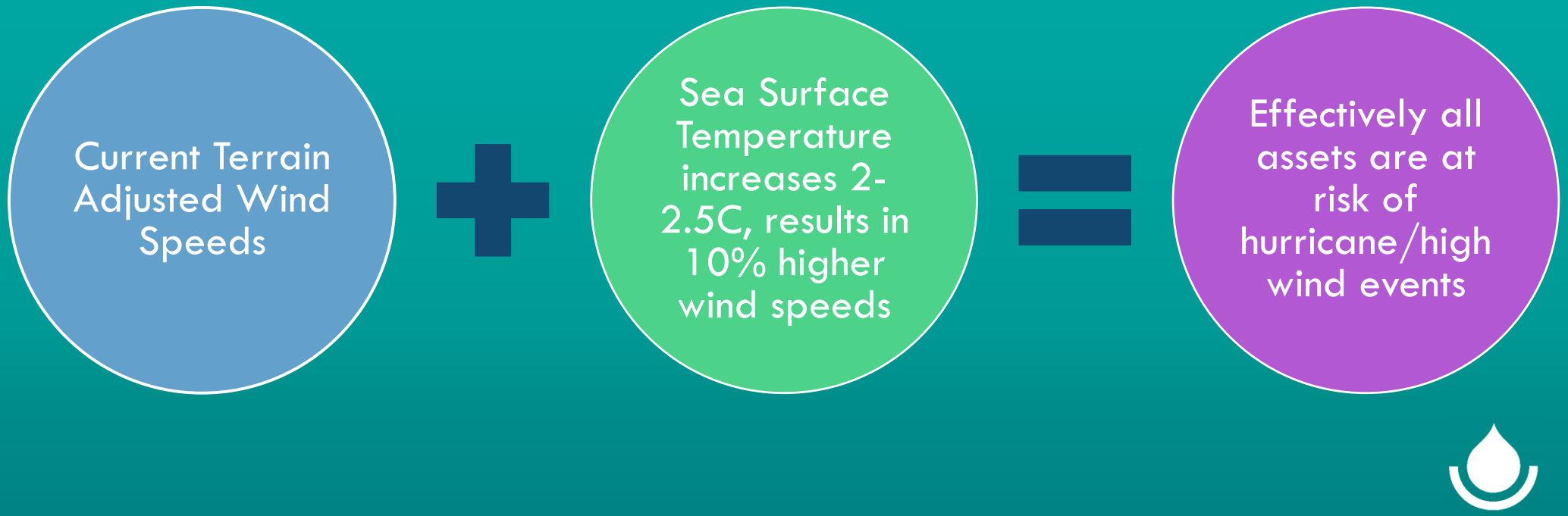
NATURAL HAZARDS AND FUTURE CONDITIONS



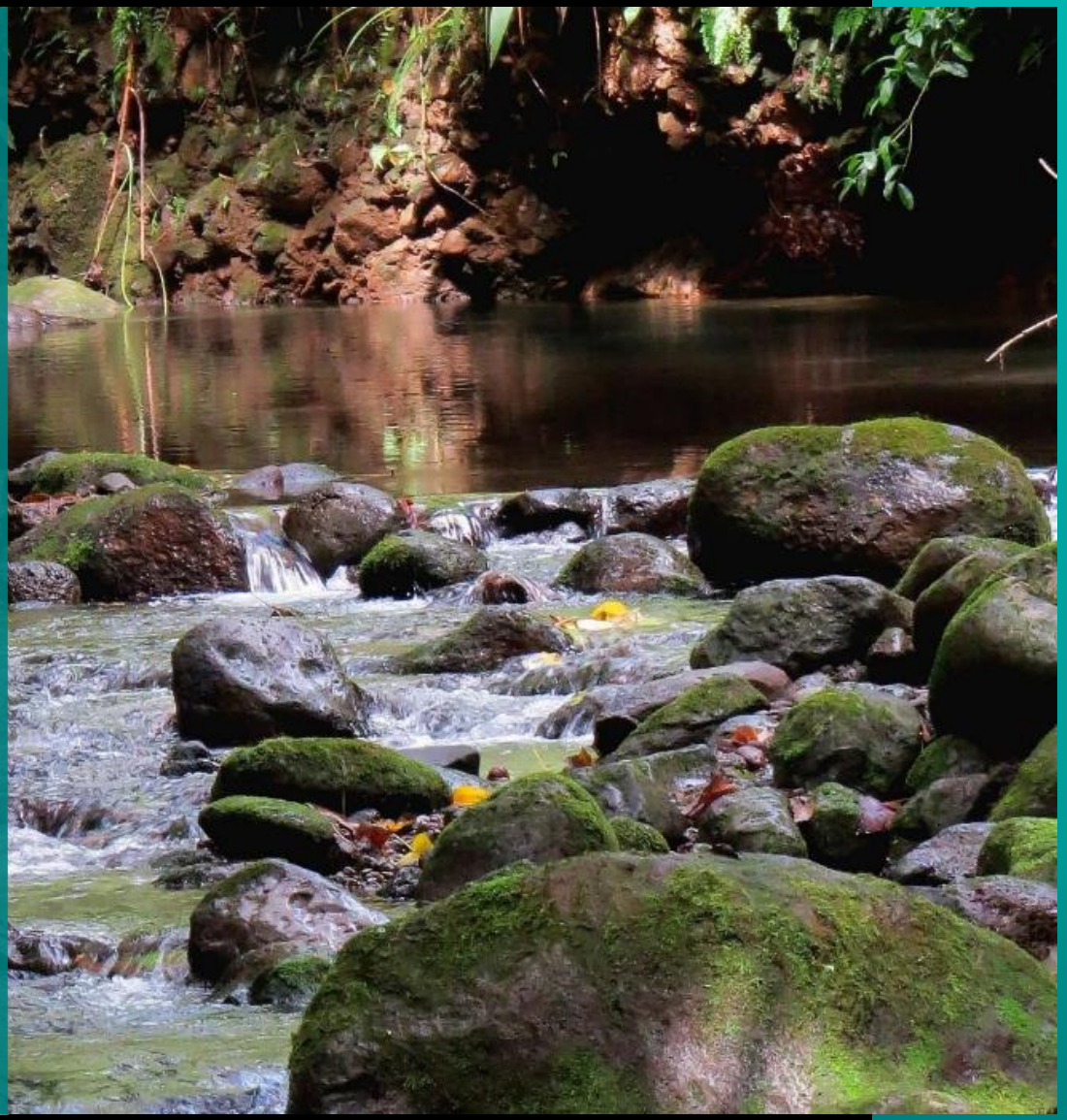
FUTURE HURRICANE EXPOSURE



FUTURE HURRICANE EXPOSURE WILL BE HIGHER DUE TO HIGHER SEA SURFACE TEMPERATURES



FUTURE FLOOD EXPOSURE

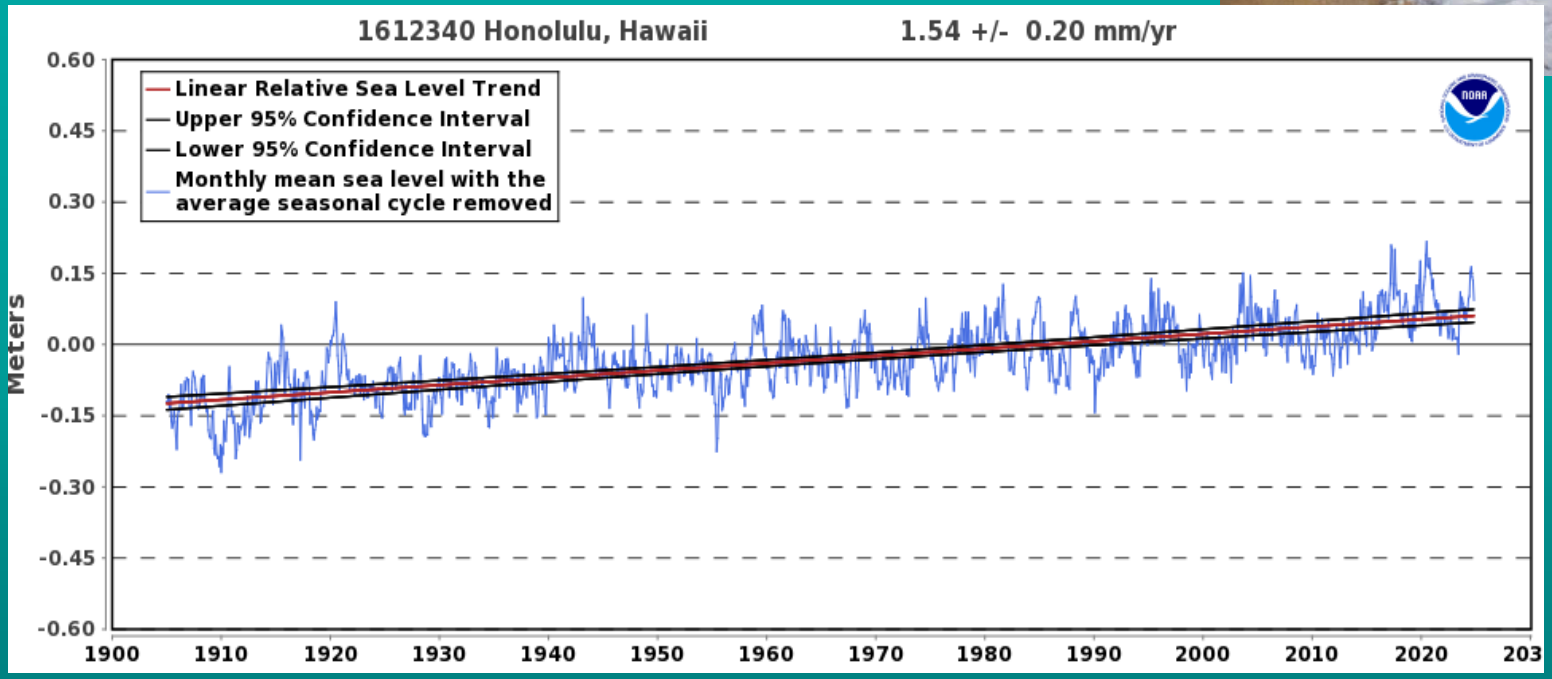


COASTAL FLOODING

2024 King Tide Flooding Māpunapuna Area

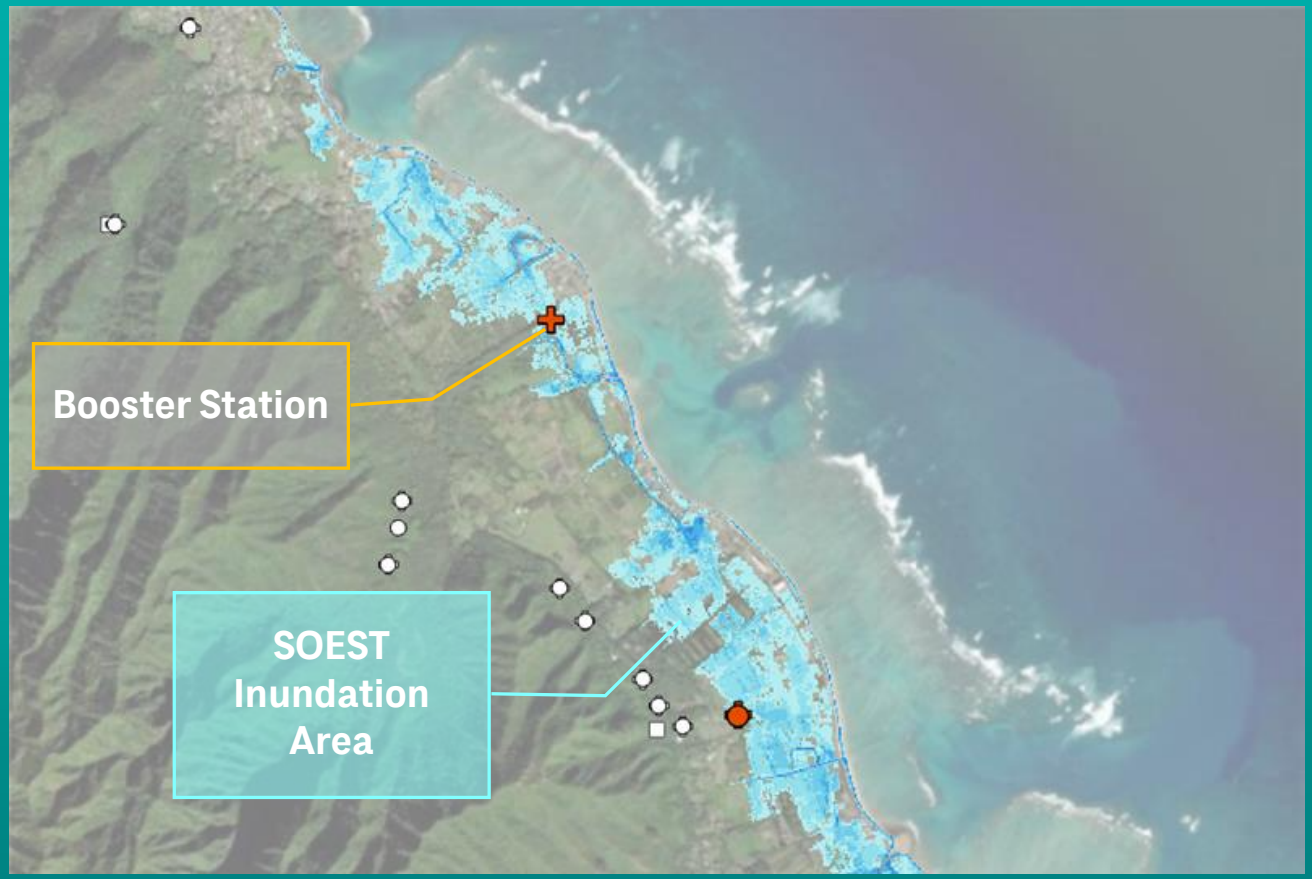
COASTAL & SEA LEVEL RISE DATA

- FEMA Flood Maps and SOEST SLR Viewer
- NOAA Tides and Storm Surge Data



COASTAL FLOODING GEOSPATIAL ANALYSIS

- UH's SOEST future inundation area overlaid with BWS Assets
- Scoring based on how soon flooding occurs



STREAM FLOODING

2025 Kuli‘ou‘ou area

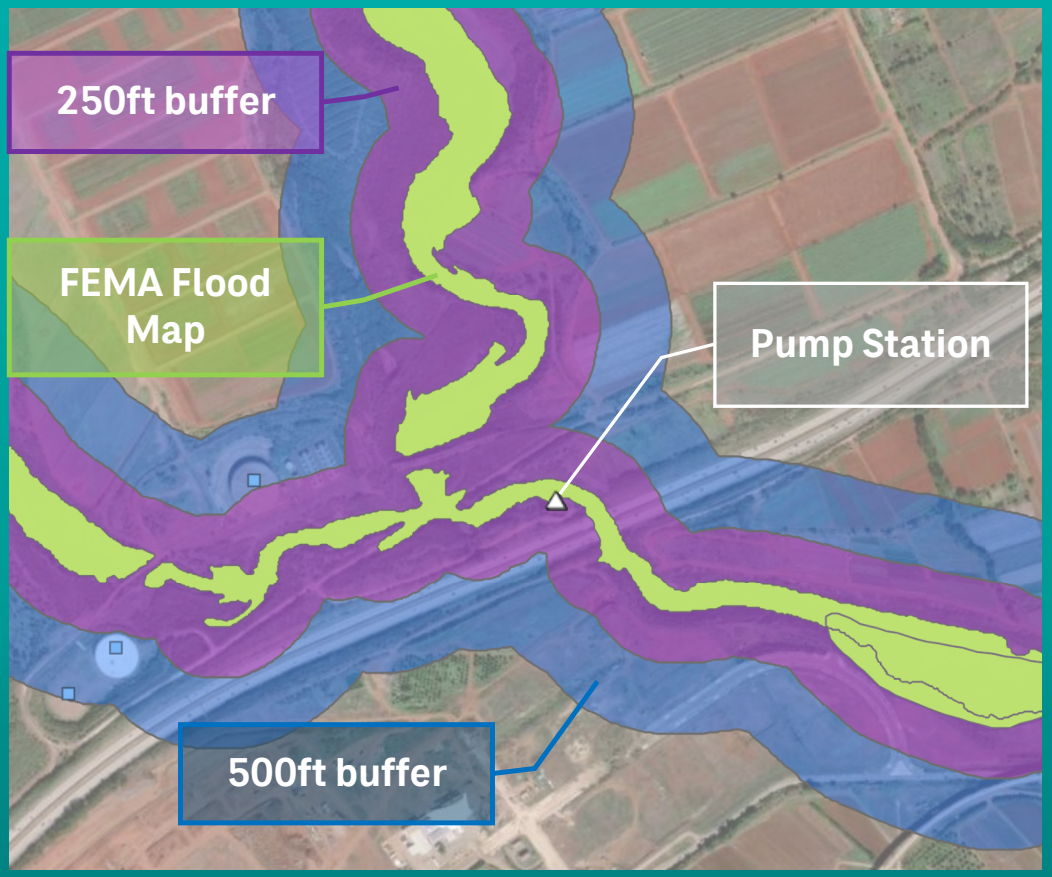
https://www.kitv.com/news/heavy-downpour-brings-massive-flooding-to-kuliouou-on-east-oahu/article_5d060866-df94-11ef-9fbf-6fa4f9bf169c.html

2021 Pearl City Area

https://www.staradvertiser.com/2021/03/09/photo-gallery/heavy-rain-causes-flooding-on-windward-oahu/

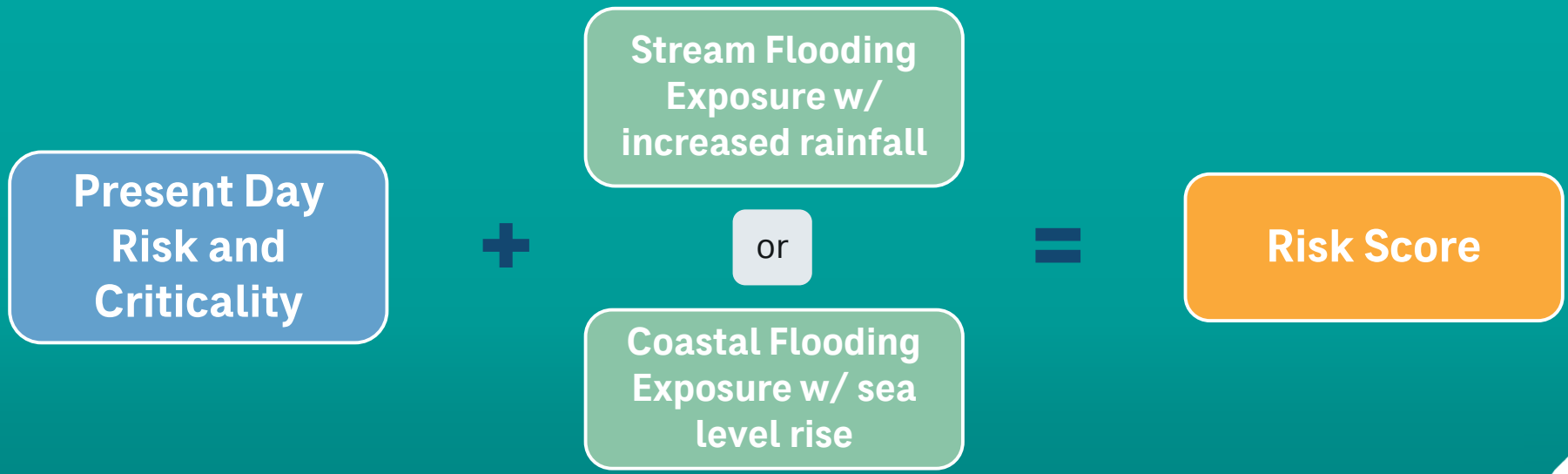
STREAM FLOODING GEOSPATIAL ANALYSIS

- FEMA Flood Map
- Horizontal buffer to identify future vulnerabilities
- Scoring based on buffer zone



CURRENT & FUTURE FLOOD RISK SCORING

- Risk scoring approach aligns with FEMA Guidance
- Weighted Scale 1 – 4 (low to high)



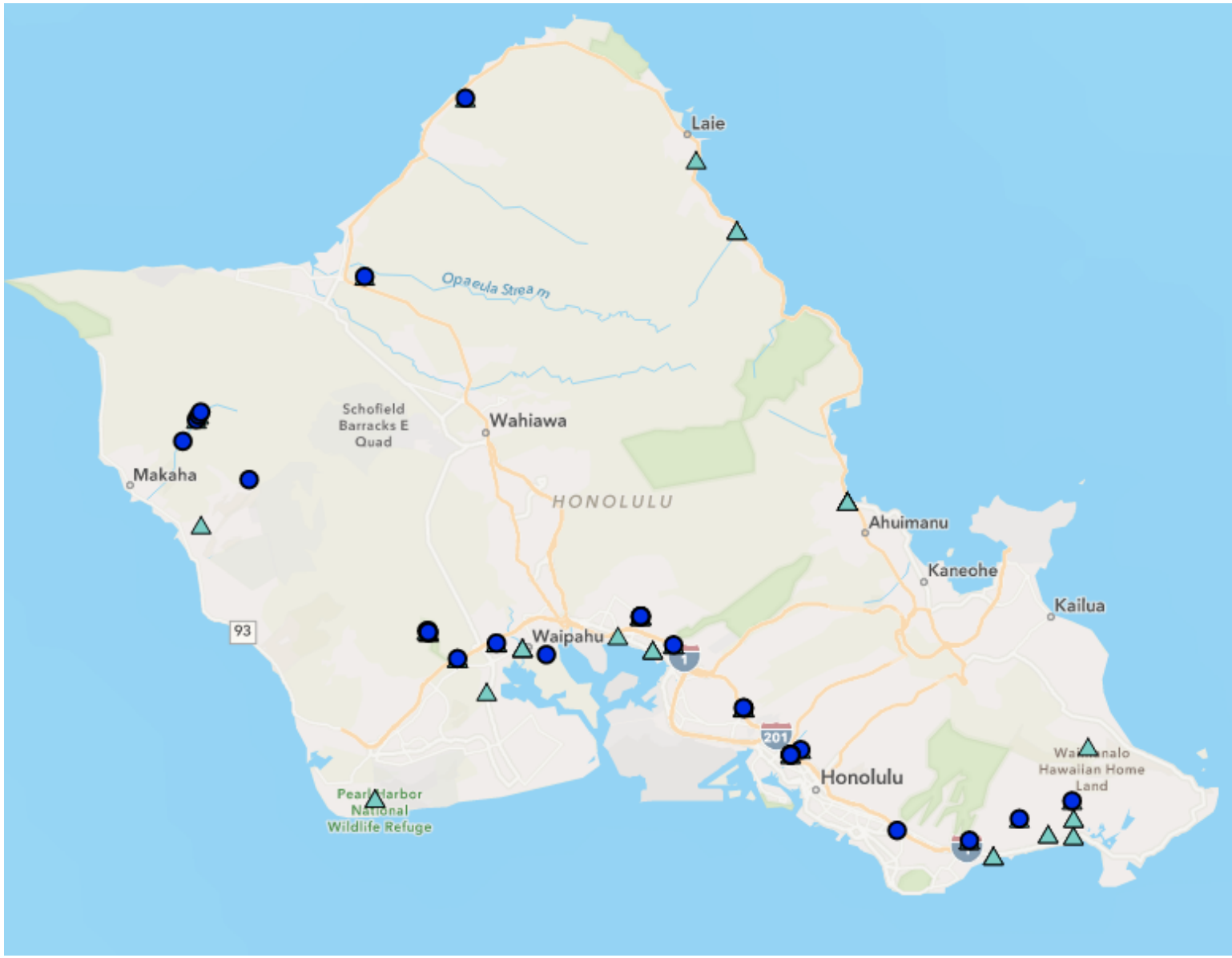
FLOOD RISK SCREENING RESULTS

Wells - Flood Ranking

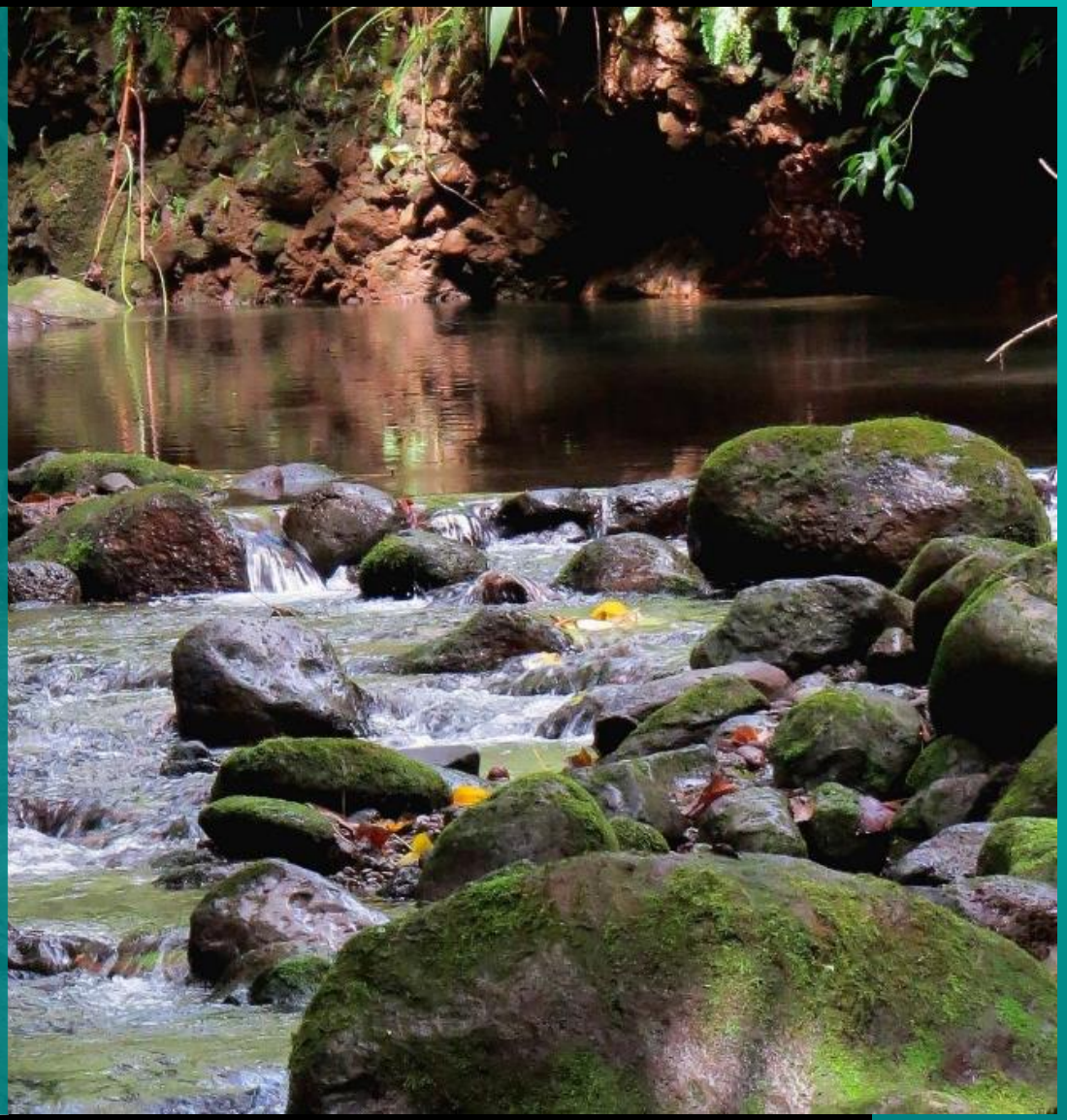
● ≥ 2.5 **(25)**

Pumps - Flood Ranking

▲ ≥ 2.5 **(30)**

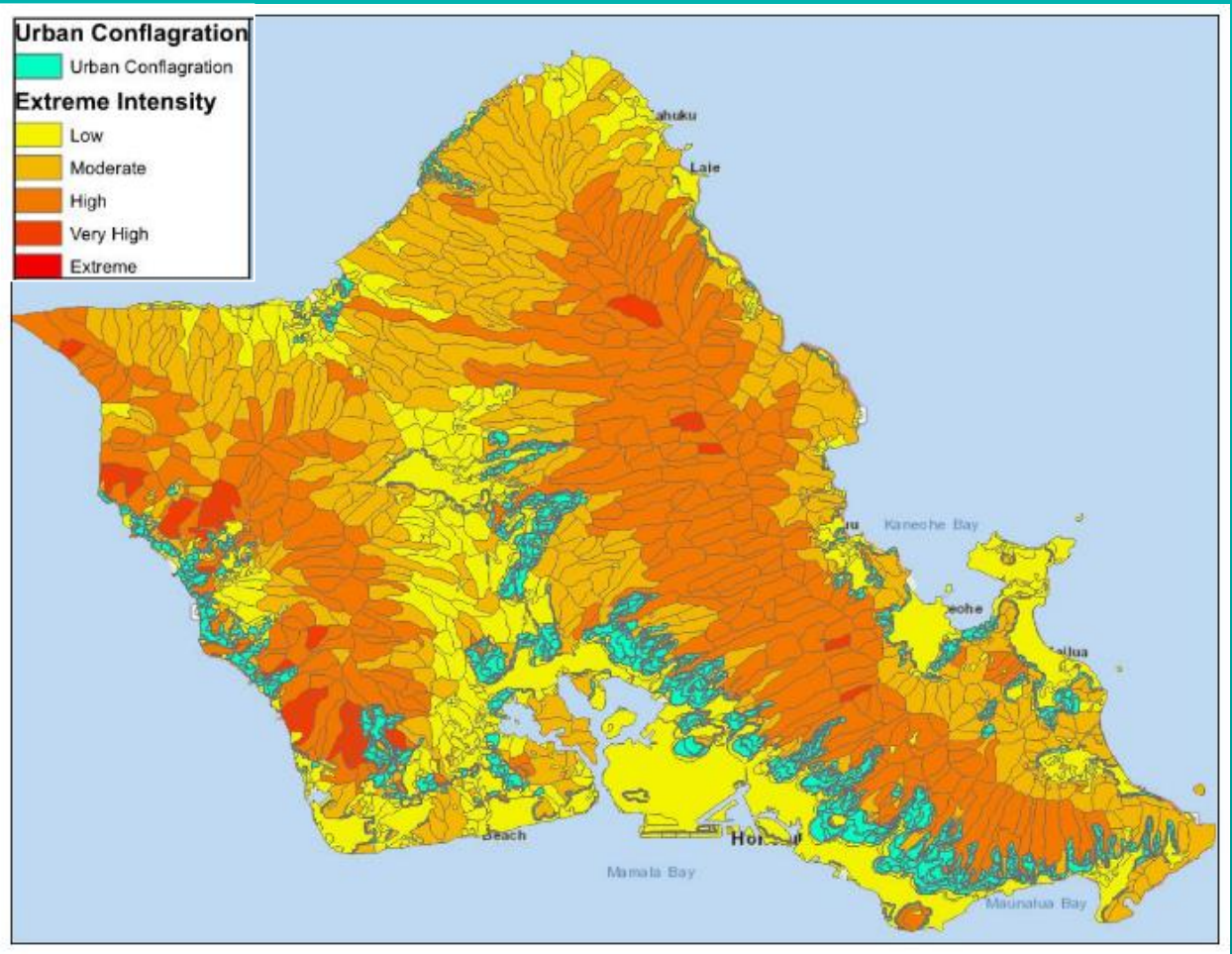


FUTURE WILDFIRE EXPOSURE



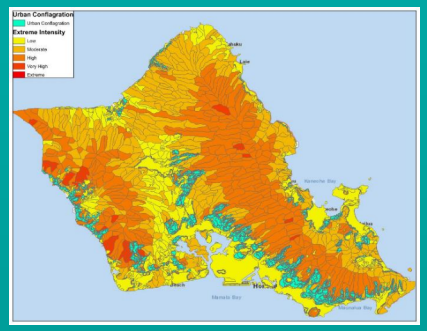
WILDFIRE DATA

- **Present Day Conditions**
  - Existing wildfire risk model
  - Updated/calibrated after the Lahaina fires



"Precisely" Wildfire Model with Conflagration. Extreme Scenario: mapping fire sheds for the 99th percentile historic trends

CURRENT WILDFIRE RISK MODIFIED FOR FUTURE CLIMATE IMPACTS



Present Day Risk and Criticality

+

% Change Dry Season Precipitation

Change in Ease of Ignition and Flammability of Fuel

+

% Change Groundwater Recharge

Change in Soil (Duff) Moisture (Fuel Availability)

=

Risk Score

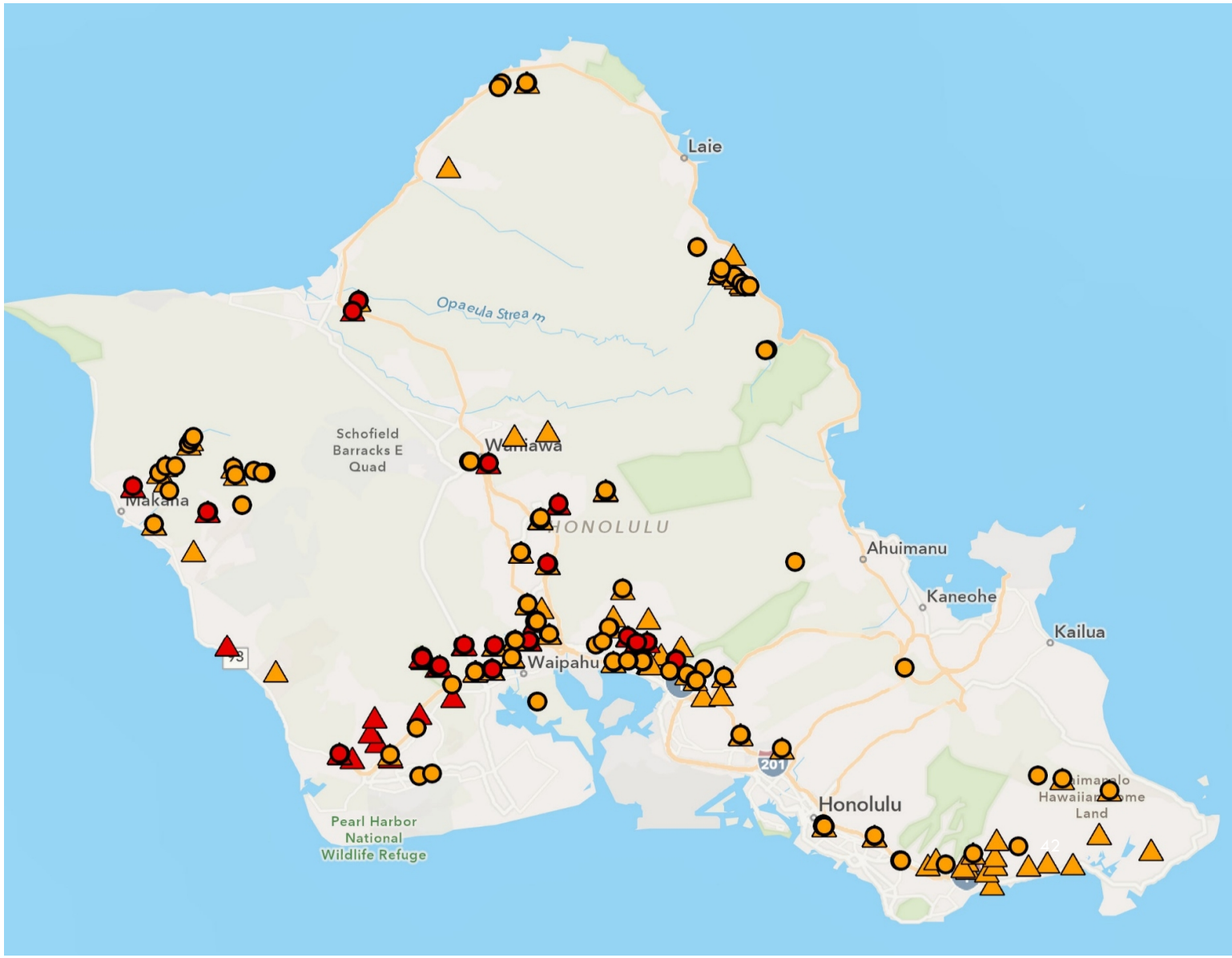
WILDFIRE INITIAL SCREENING RESULTS

Wells - Wildfire Ranking

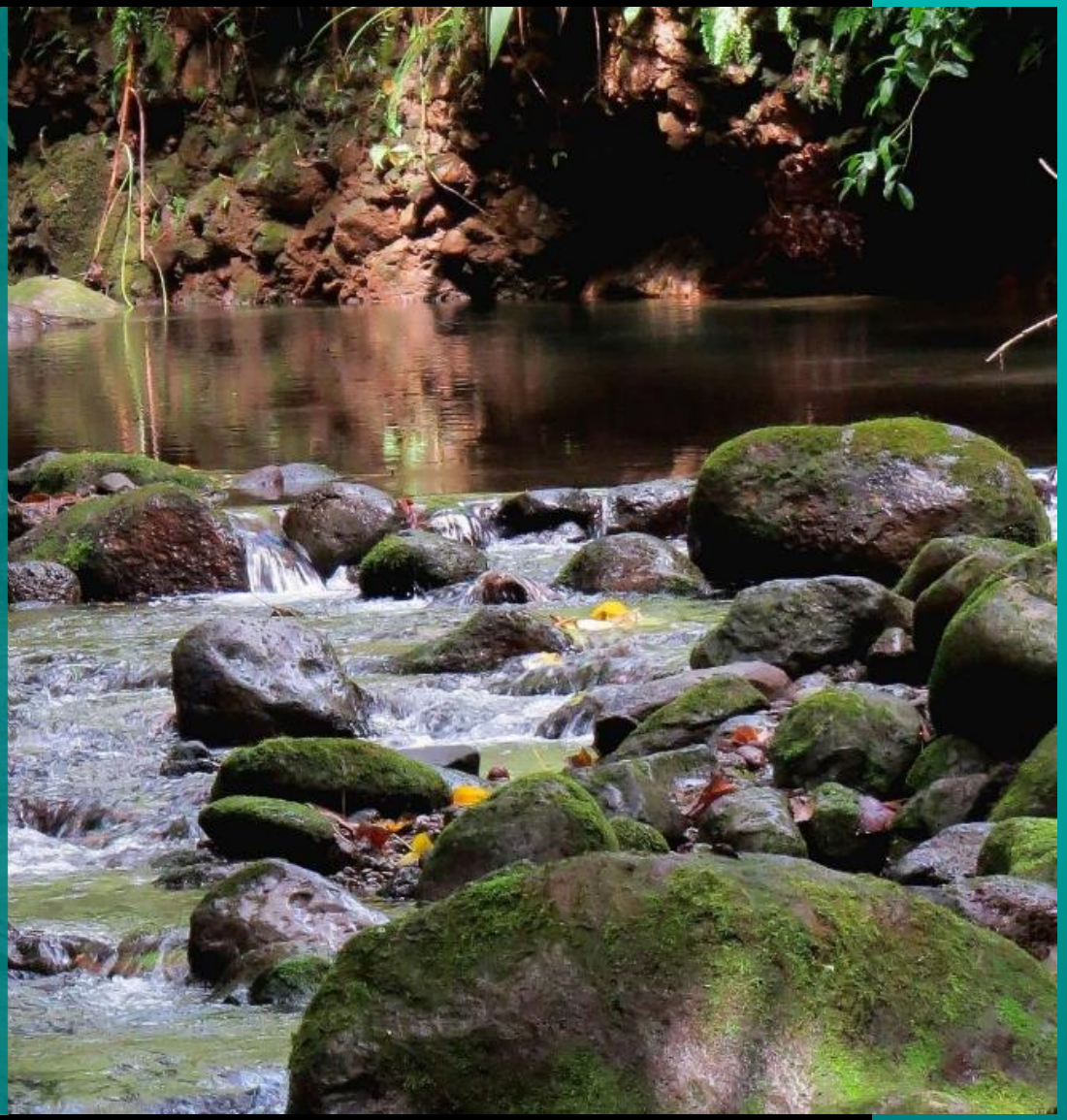
- ≥ 2.5 **(79)**
- ≥ 3 **(46)**

Pumps - Wildfire Ranking

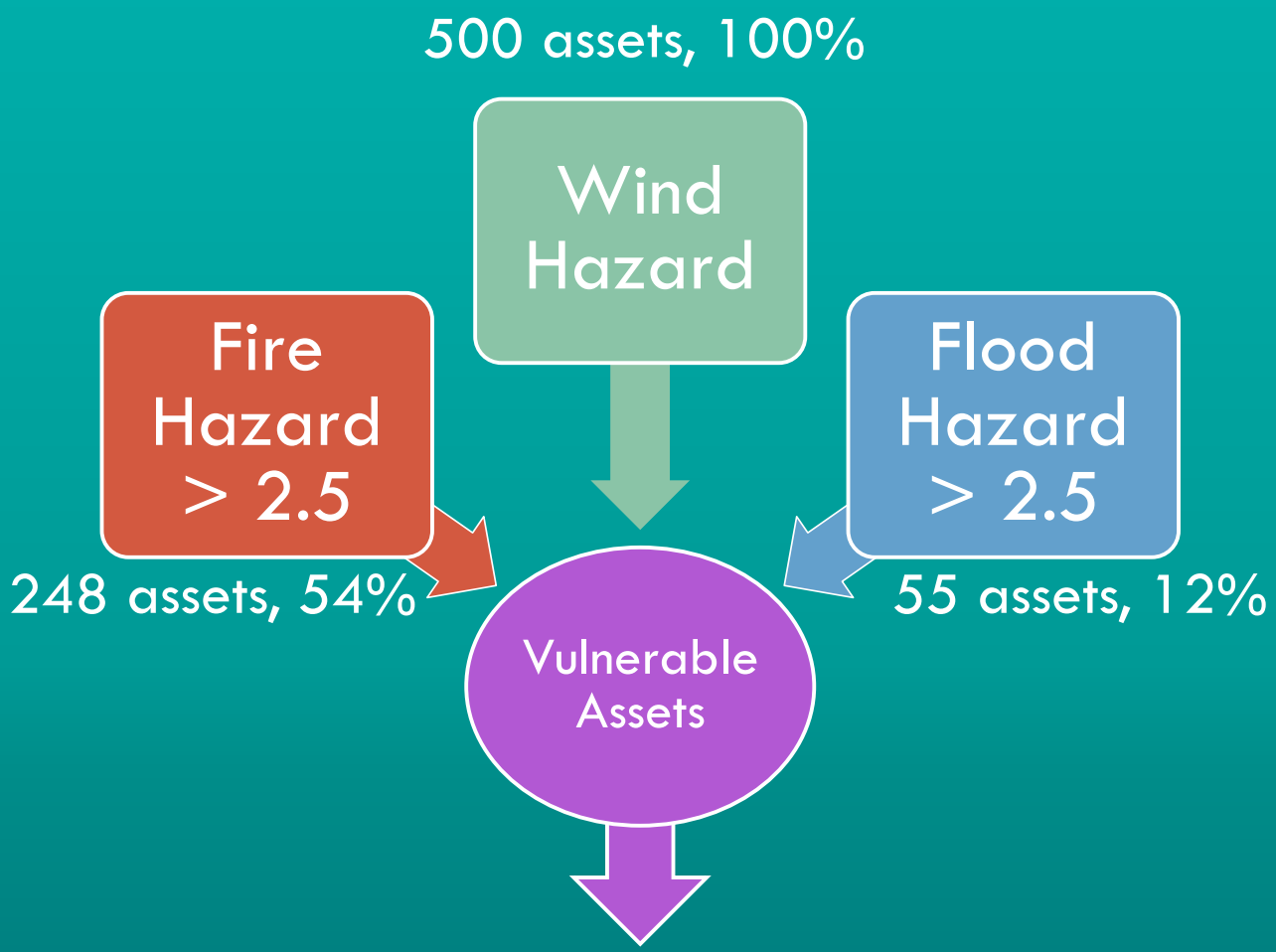
- ≥ 2.5 **(95)**
- ≥ 3 **(28)**



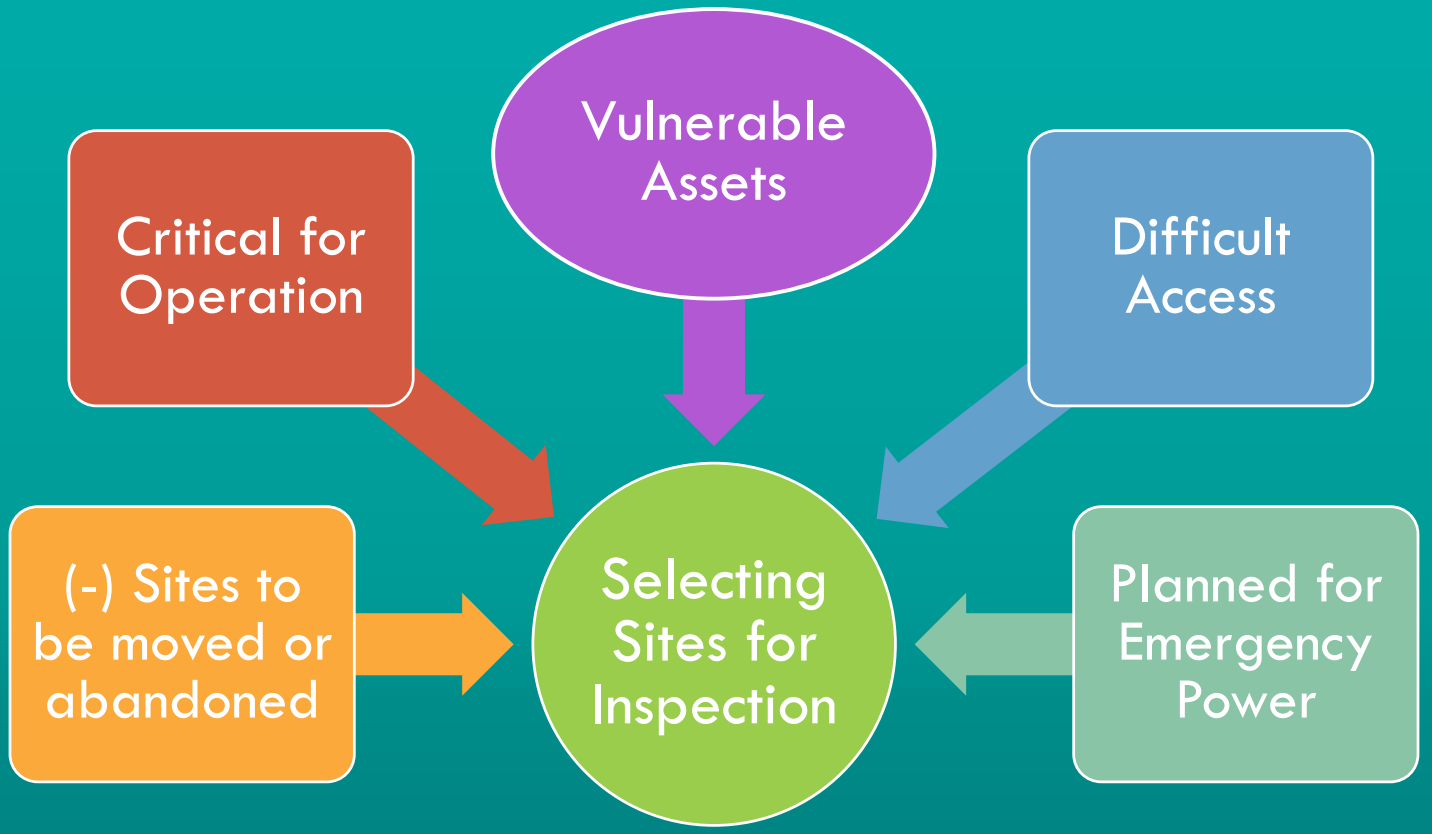
ASSET ASSESSMENT SELECTION



ASSET ASSESSMENT SELECTION– MOST VULNERABLE ASSETS

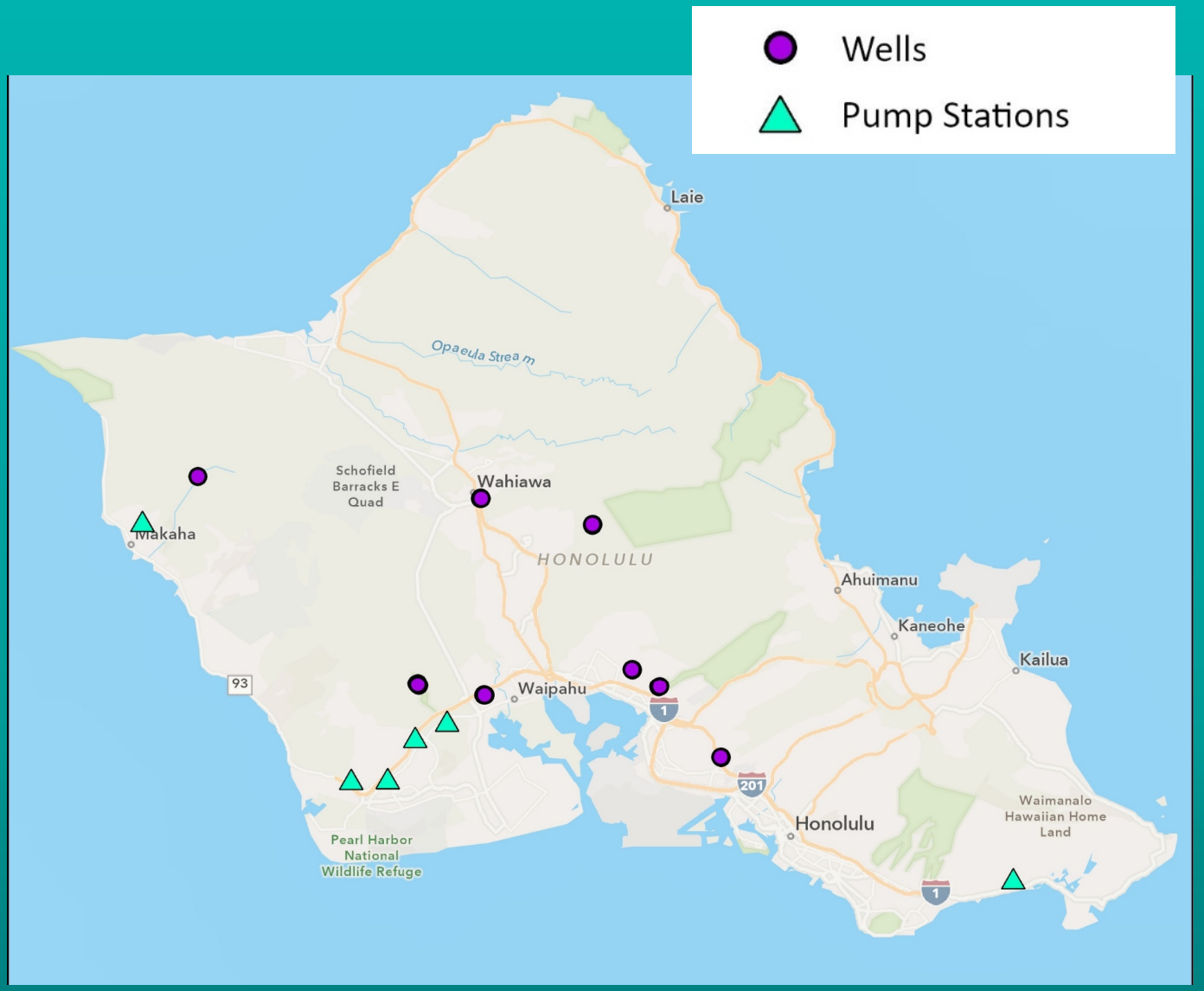


SELECTING SITES FOR INSPECTION

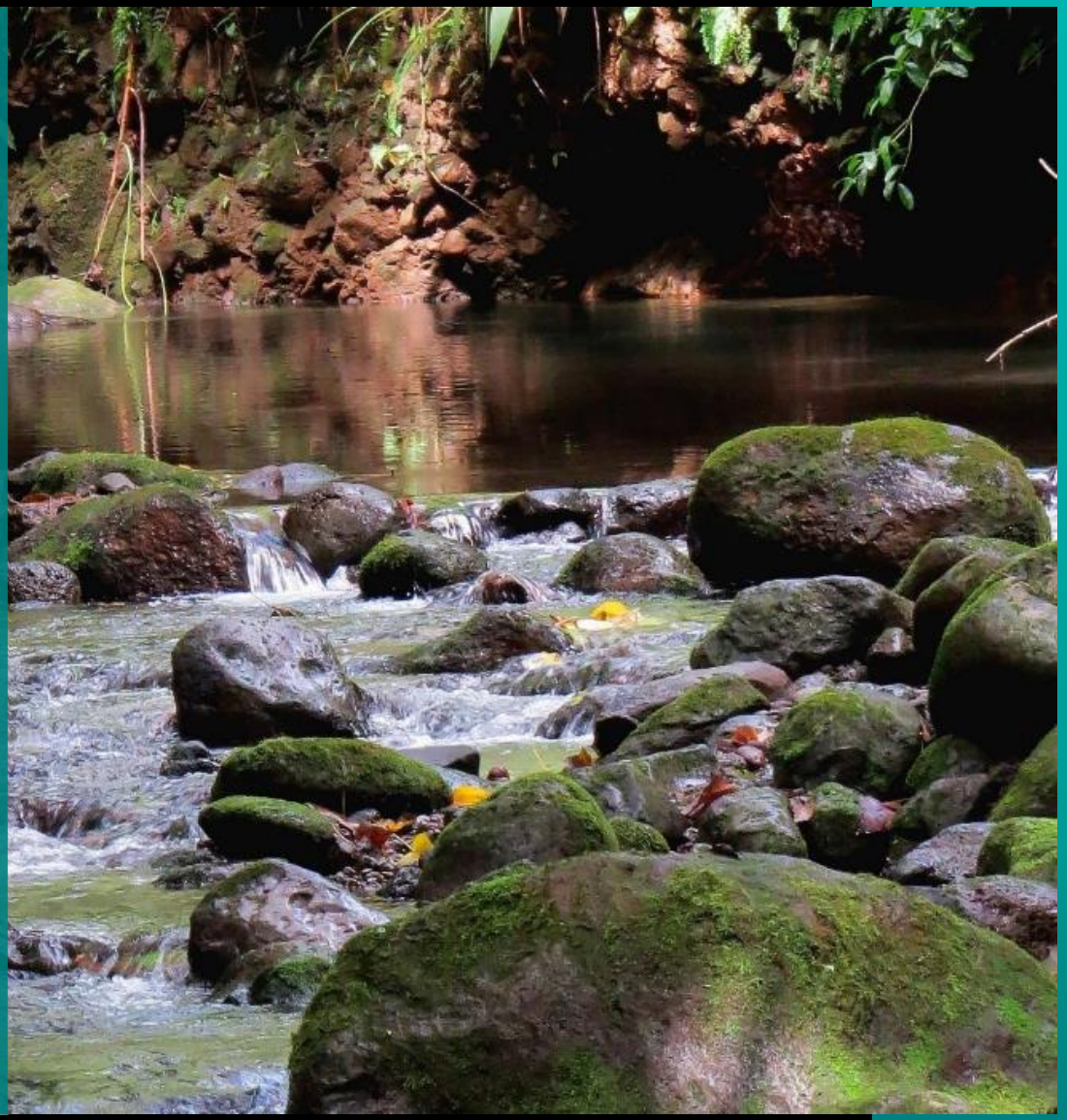


SITES SELECTED

- 15 site locations
  - 10 wildfire
  - 1 flood hazard
  - 4 sites with both hazards



SUMMARY & NEXT STEPS



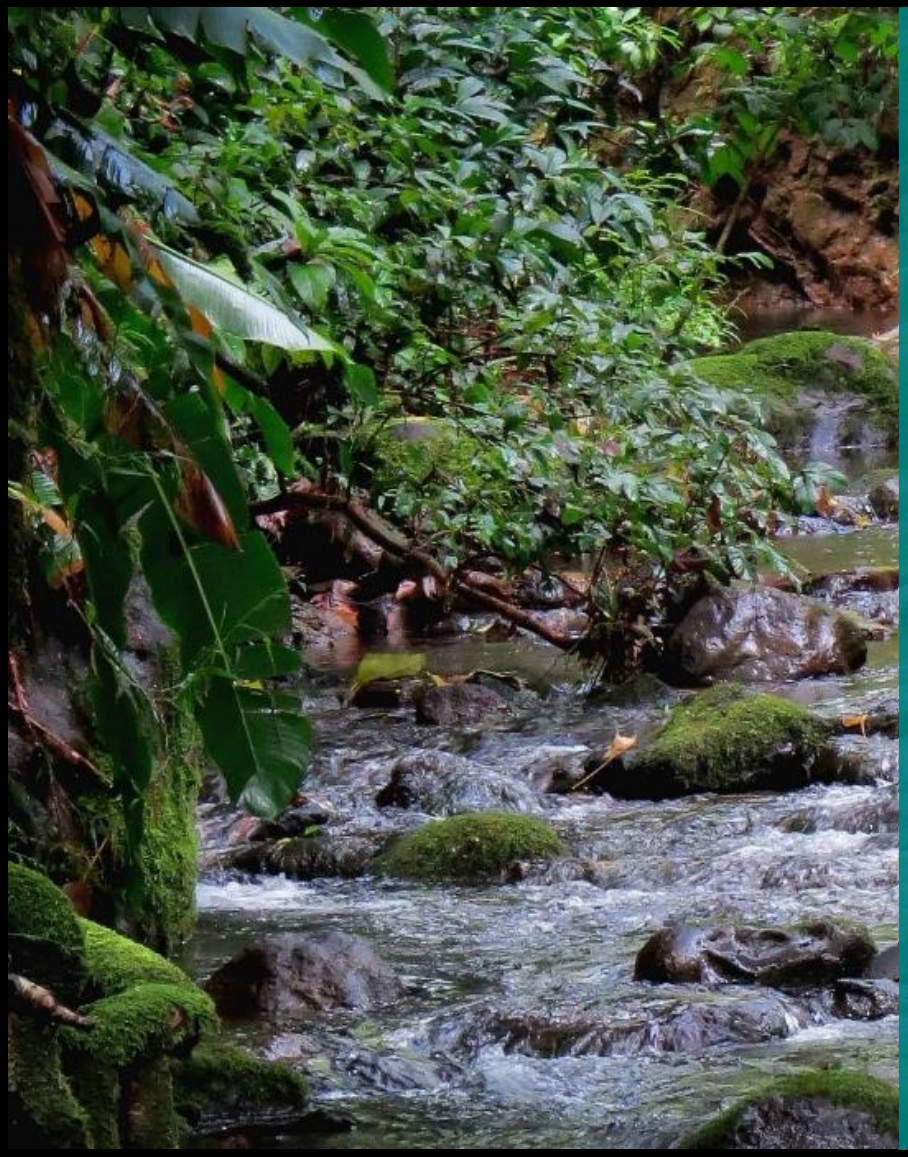
LEVERAGING NEW TECHNOLOGIES

SUMMARY & NEXT STEPS

- Summary:
  - Evaluated BWS Assets for criticality, flood, and wildfire hazards
  - Selected the most vulnerable and critical
- Next Steps
  - Coordinate with One Water efforts
  - Perform site inspections
  - Develop future design criteria

Will result in conceptual climate resiliency designs for 5 sites → template designs

Will inform Capital Improvement Plan → Cost effectively adapt to future risks



FUTURE WATER DEMAND PROJECTIONS

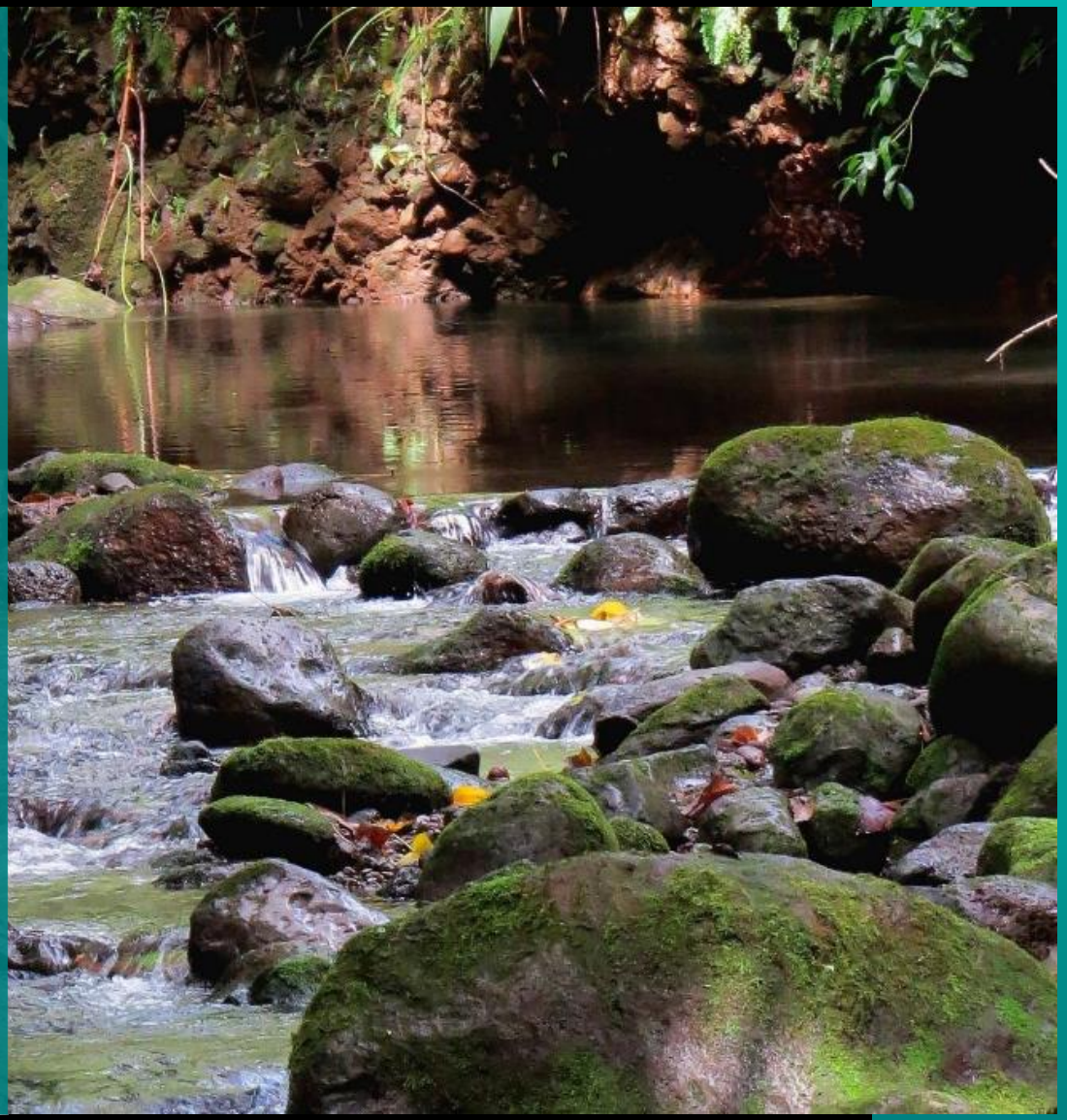
Erin Walsh, PE
CDM Smith
July 17, 2025

AGENDA

- Historical Water Demand
- Water Demand Model
- Next Steps

Join at slido.com
#3843378

HISTORICAL WATER DEMAND



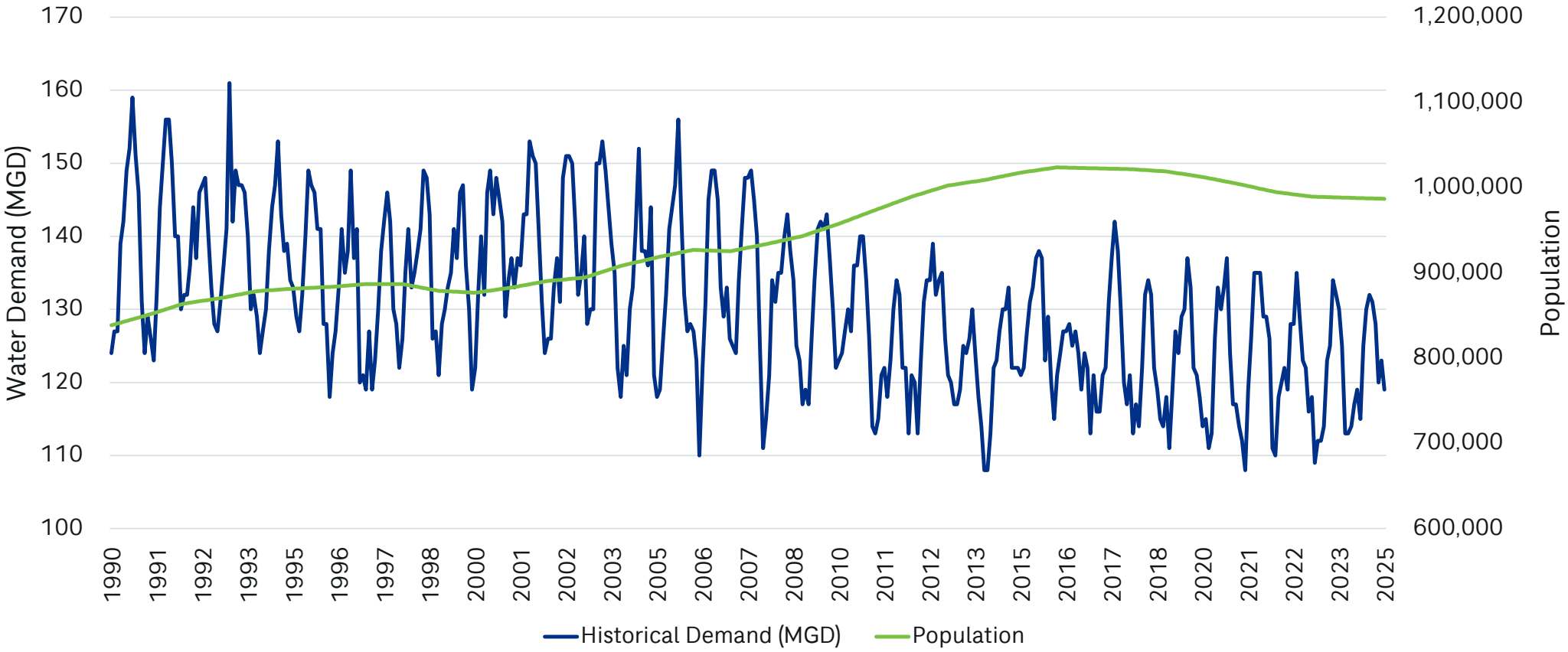
HISTORICAL PER PERSON WATER DEMAND

- BWS provides about 145 million gallons per day (mgd) to 1 million people

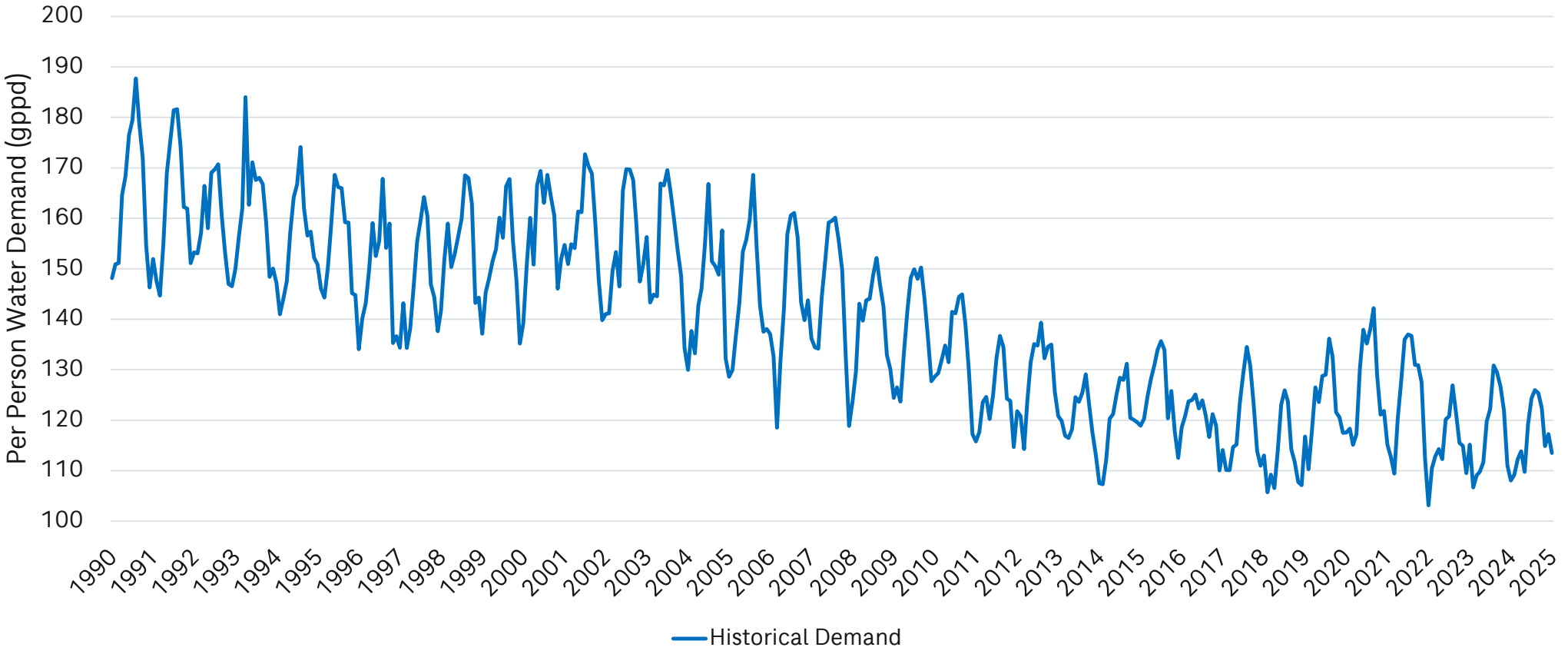
Per Person Water Demand	=	**Total BWS Water Production**	÷	**Oʻahu Population**
Gallons Per Person Per Day (gppd)		*Gallons*		*Number of People*

- Seasonal vs Long-Term impacts
  - Seasonal: patterns within a year
  - Long-Term: trends over years or decades

HISTORICAL WATER DEMAND (MGD) AND O‘AHU POPULATION



HISTORICAL PER PERSON WATER DEMAND



EXAMPLES OF DEMAND DRIVERS

Drought

Price of Water

Income

Conservation

Plumbing Efficiency

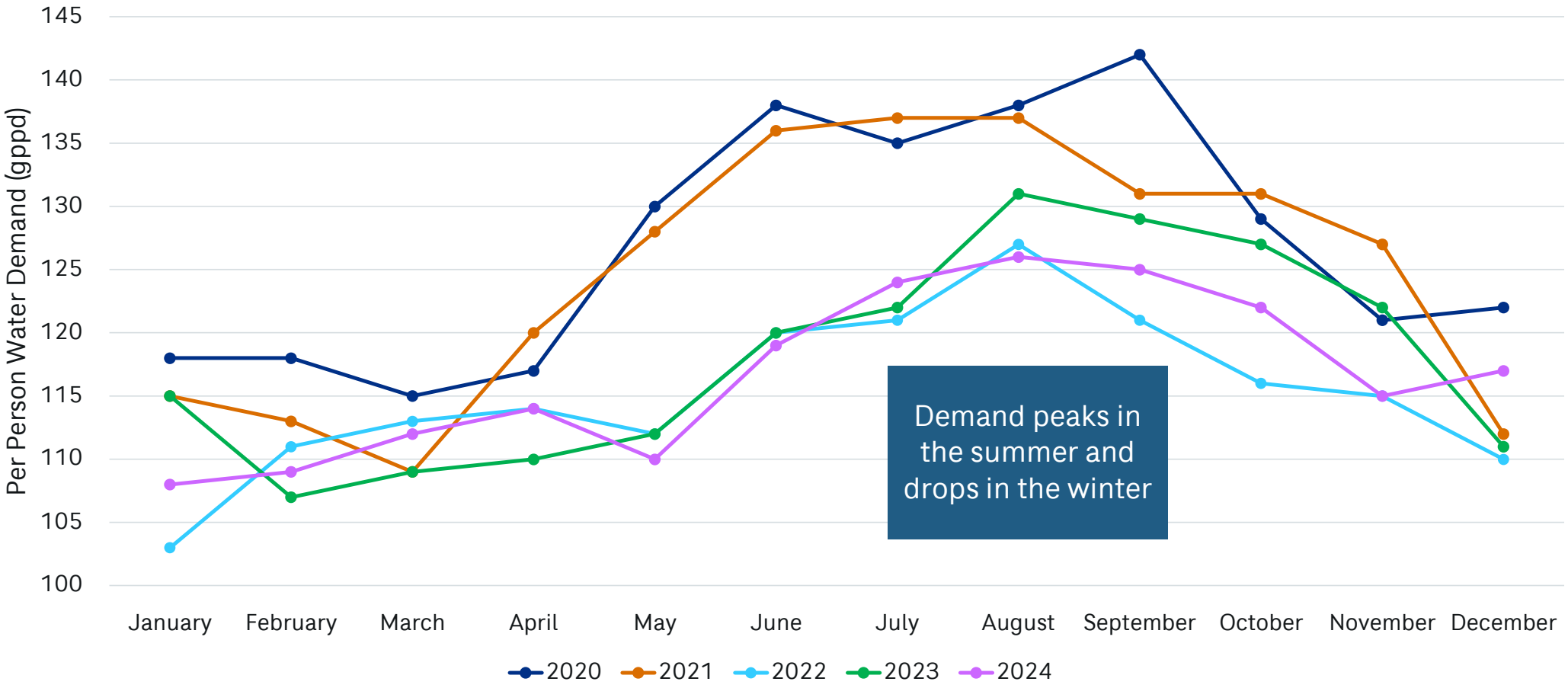
Tourism

Which of the following would you expect to INCREASE water demand the most?

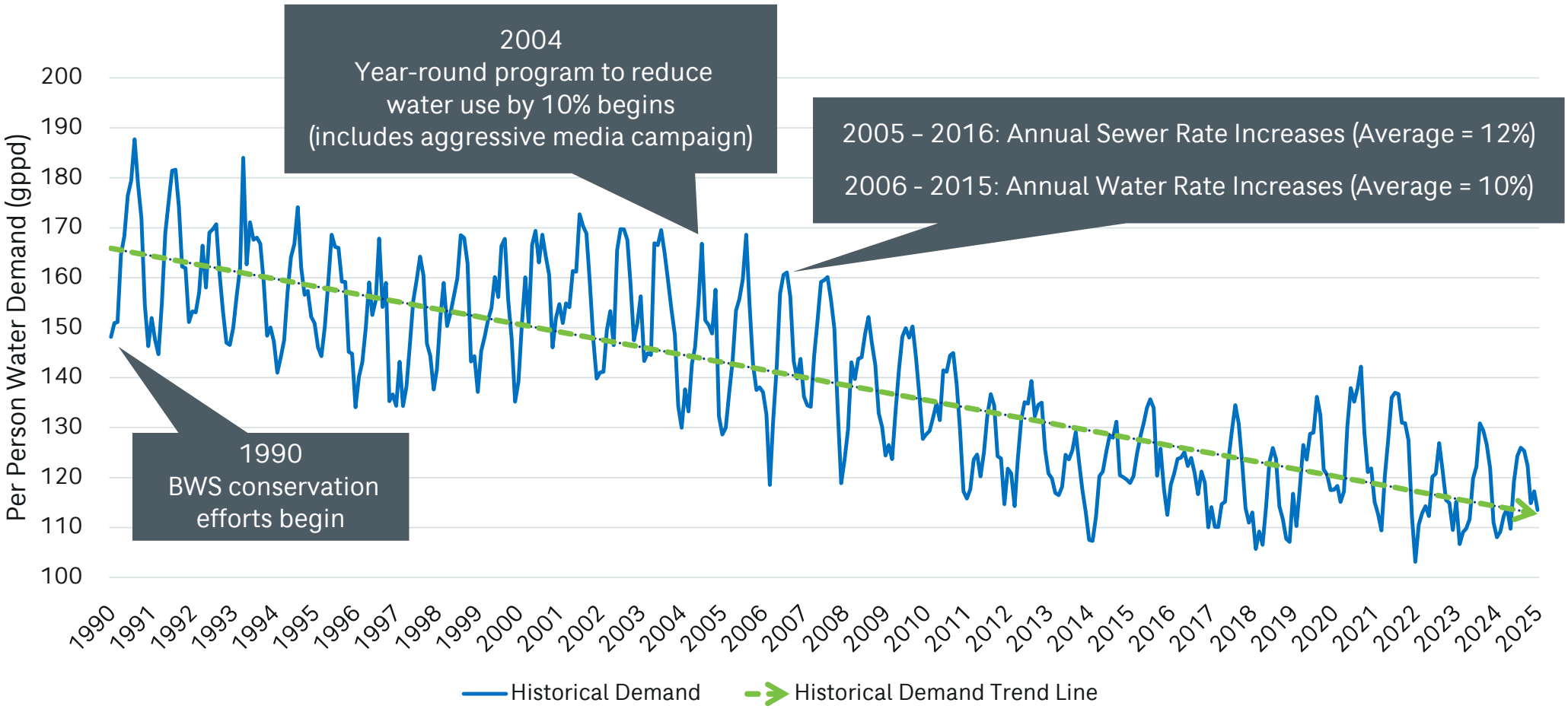
What things INCREASE your household water use?

What things DECREASE your household water use?

HISTORICAL PER PERSON WATER DEMAND – SEASONAL TRENDS (2020 – 2024)



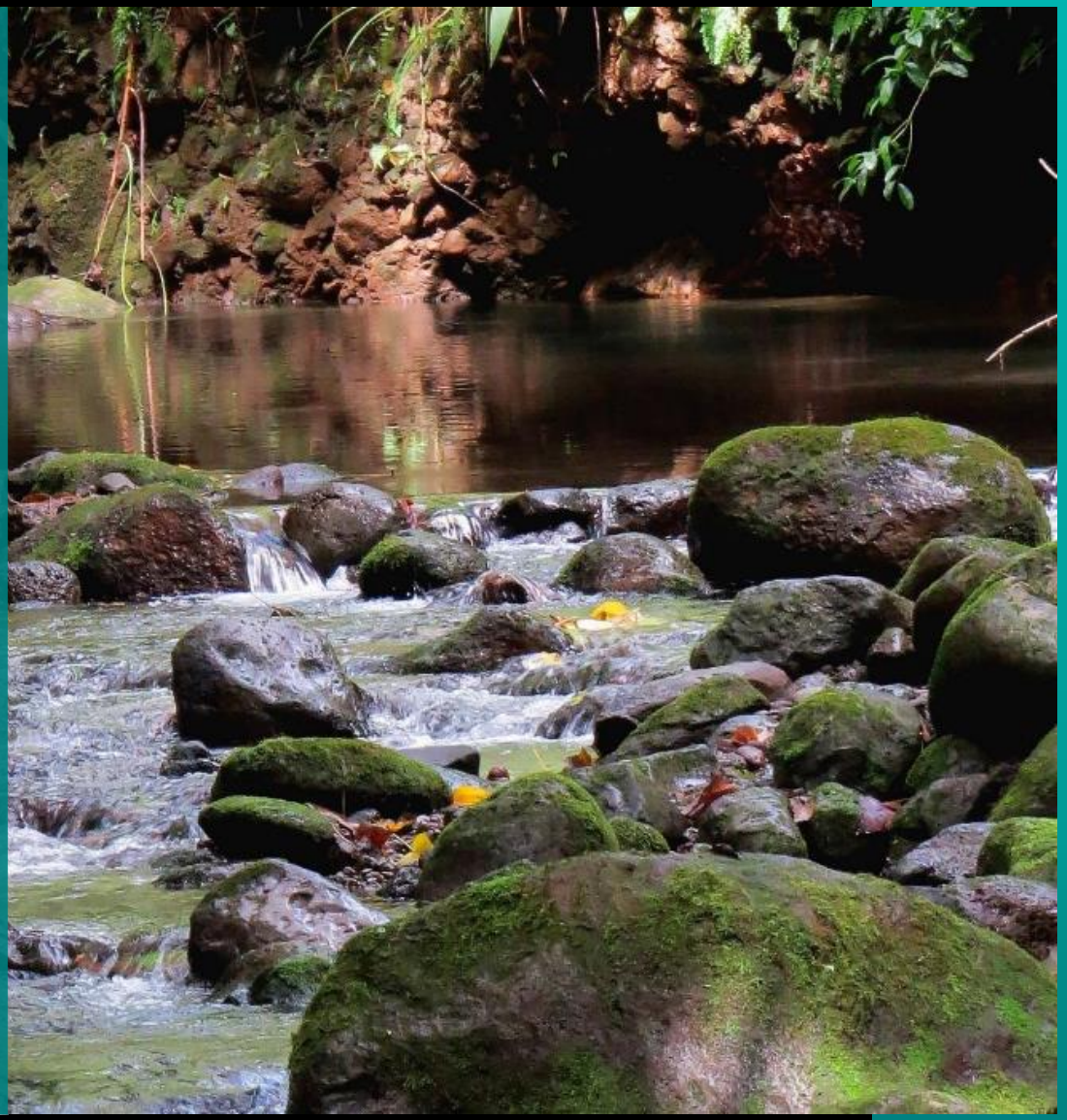
HISTORICAL PER PERSON WATER DEMAND - LONG-TERM TRENDS



KEY QUESTIONS

- How do we better understand how demand has changed over time?
- How do we understand the drivers for all of this variability?
- How can we estimate future demands, especially as the climate changes?
- How does this inform future policies and planning?

DEMAND MODEL – METHODOLOGY



DEMAND PROJECTIONS METHODOLOGY

- Econometric Demand Model
  - Statistical analysis that looks at how economics AND weather impact demand
  - ***Recognizes that:***
    - ***Water demand is based on combination of variables***
    - ***Water demand is not random and not set in stone***
- Examine combination of variables to find which one best "fits" historical demands
  - Determine how much each variable affects demand

OVERVIEW OF ECONOMETRIC DEMAND PROJECTION PROCESS

VARIABLES EXPLORED IN MODEL

- Max monthly temperature
- Number of days hotter than 90 degrees
- Monthly precipitation
- Previous month's precipitation
- Max consecutive days in month with zero precipitation
- Visitor arrivals
- Unemployment rate
- Economic recession indicator (unemployment > ~6%)
- Per capita income
- Price of water/13,000 gal
- BWS conservation
- Plumbing efficiency
- Non-revenue water

Most impactful variables in **blue**

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- **Max monthly temperature**
- Number of days hotter than 90 degrees
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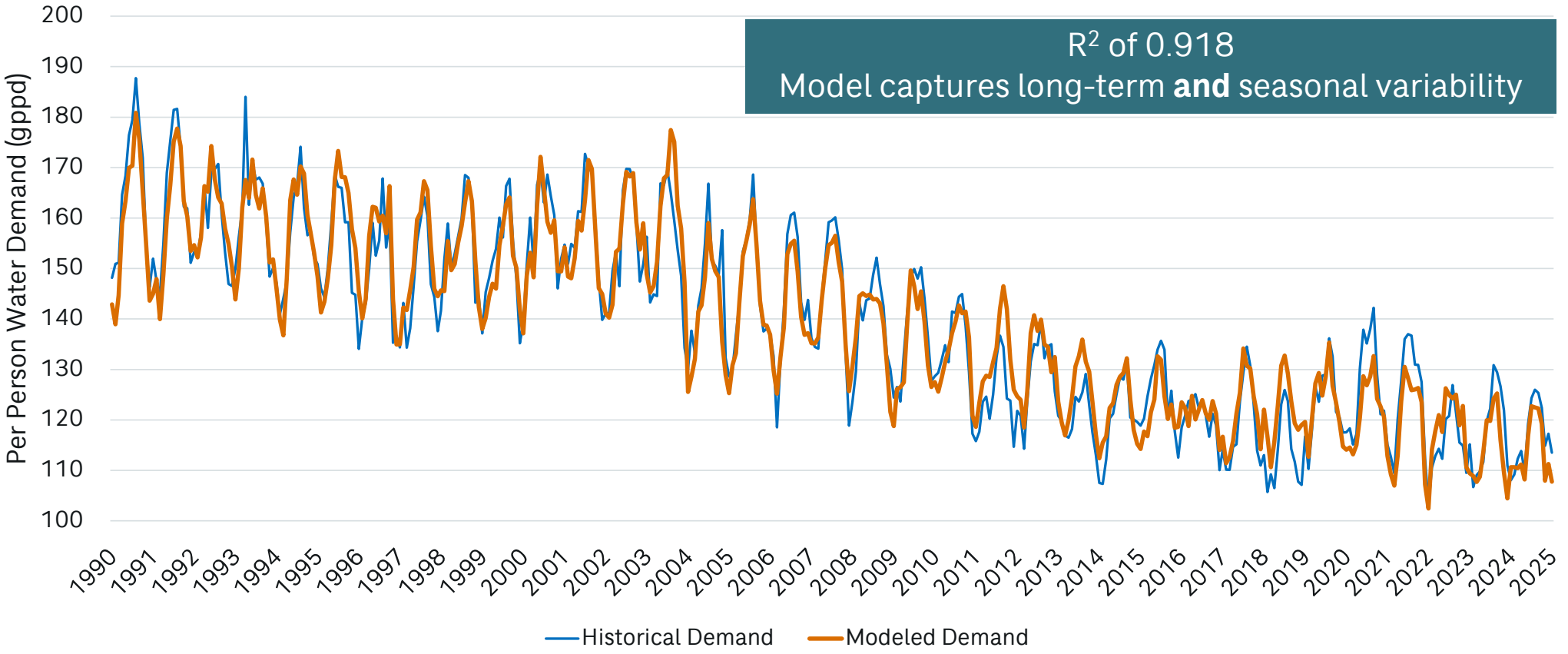
WATER DEMAND MODEL



HOW MUCH DOES EACH VARIABLE MATTER?

Variable	Coefficient
Monthly Average Daily Max Temperature	1.09
Total Monthly Precipitation	-0.02
Previous Month's Total Precipitation	-0.01
Per Capita Income	0.17
Increased BWS Active Conservation Binary	-0.10
Average Price of Water (per 13 kgal)	-0.29
Plumbing Efficiency Index	-0.39

- The coefficient tells us how much water demand would change if a variable was increased by 1%

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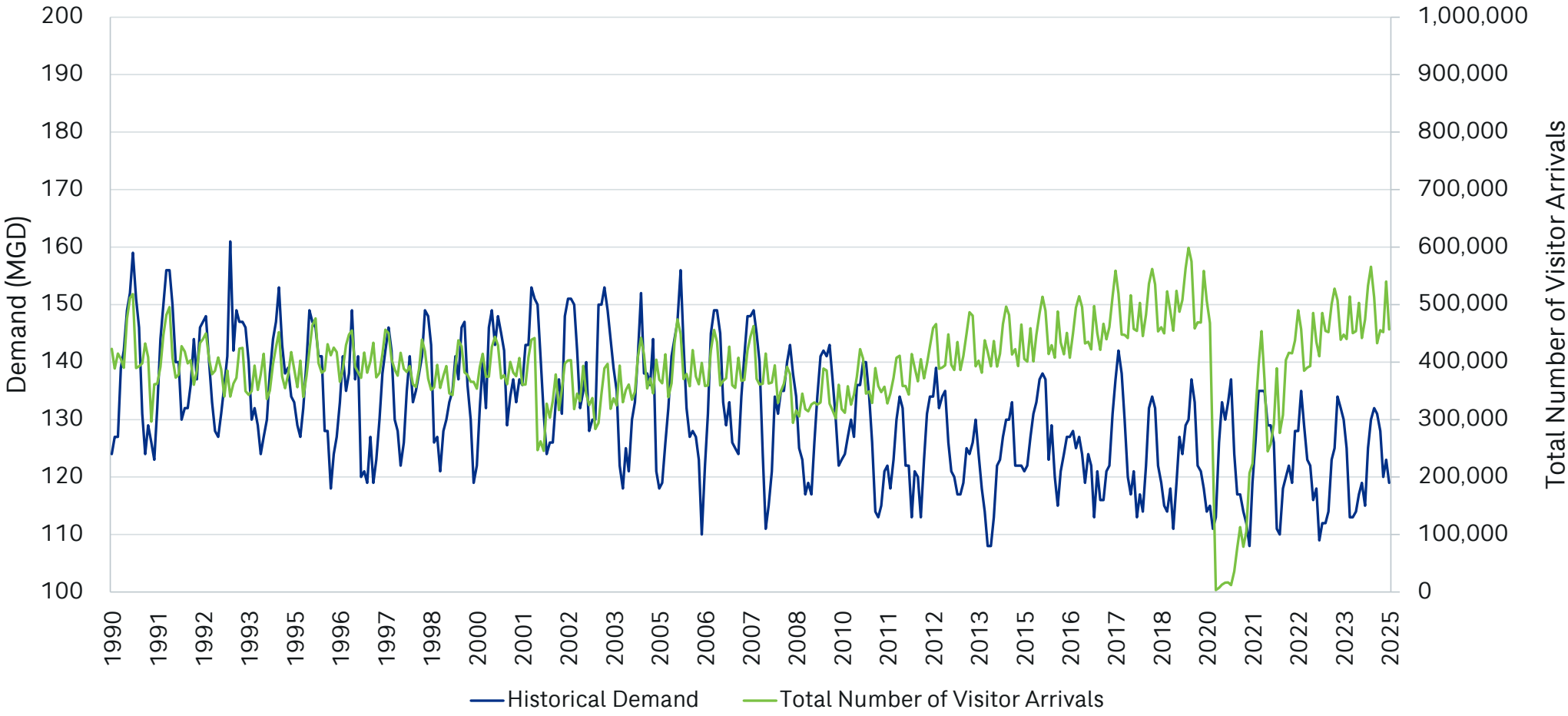
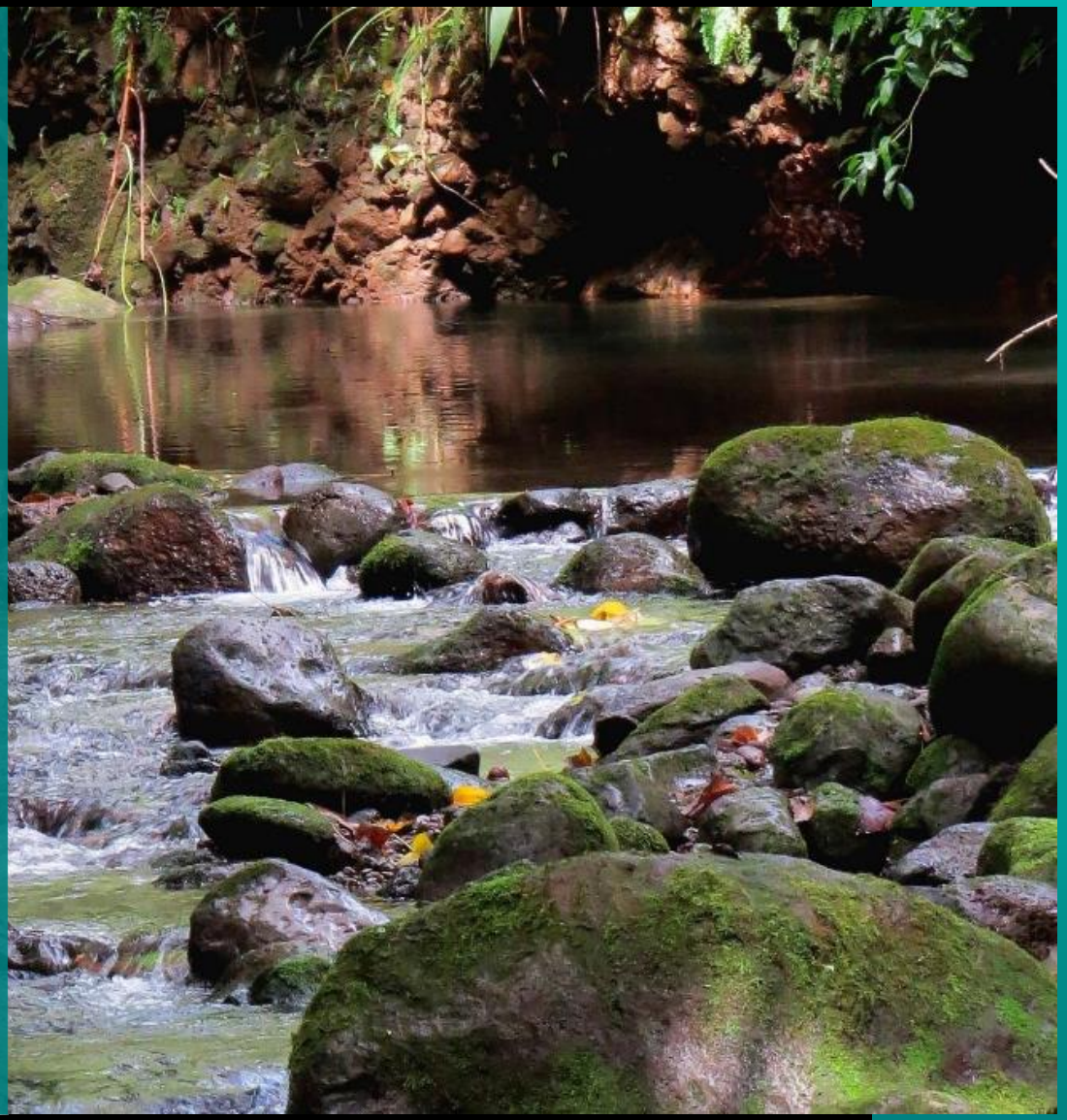
- Examples:
  - When the monthly average daily **max temperature** increases by 1%, the demand ***increases*** by 1.09%
  - When the **average price of water** increases by 1%, the demand ***decreases*** by 0.29%

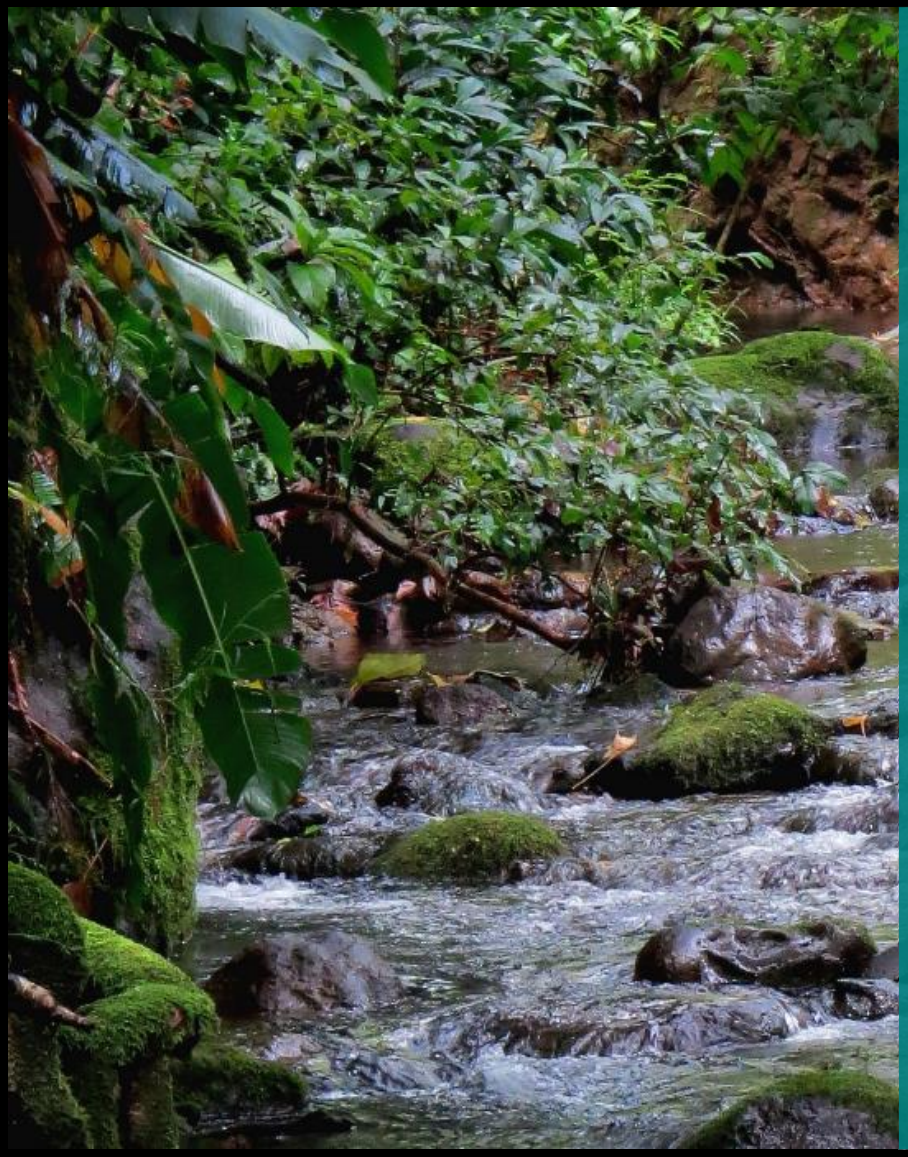
DO VISITOR ARRIVALS IMPACT WATER DEMAND?



NEXT STEPS



FUTURE PROJECTIONS



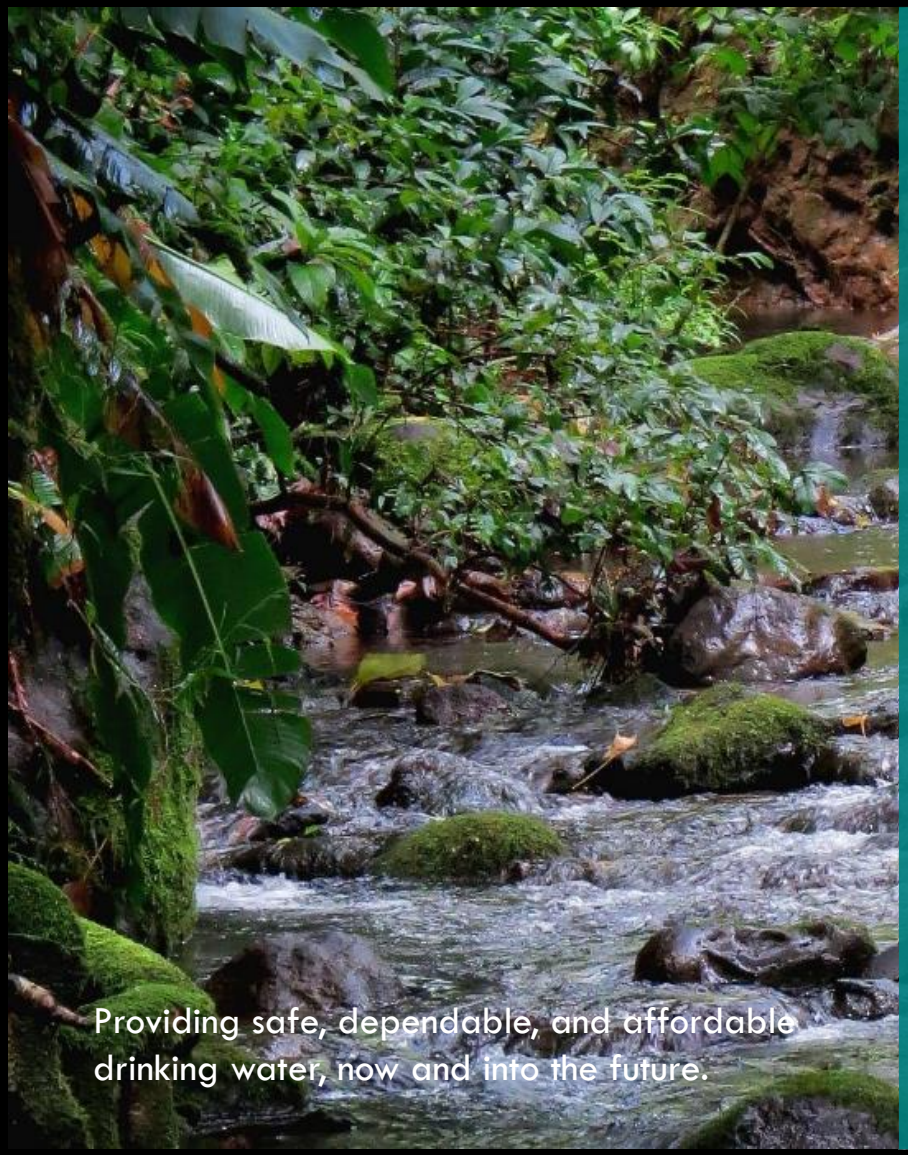
ACCEPT MEETING NOTES FROM MEETING 54

David Ebersold
Facilitator

July 17, 2025
www.boardofwatersupply.com

UPCOMING STAKEHOLDER ADVISORY GROUP MEETINGS

- REVISED DATE: Thursday, October 23, 2025



Providing safe, dependable, and affordable drinking water, now and into the future.

Mahalo!