Adapt Waikīkī 2050
Charrette 2 Summary
August 14, 2024, 8:30 AM – 11:30 AM
St. Andrews Cathedral

Attendees:

Project Team:

- ✓ Noelle Cole, DPP Project Manager
- ✓ Dina Wong, DPP Planning Division Chief
- ✓ Imelda Fernandez, DPP Planning Division
- ✓ Min Bu, DPP Planning Division
- ✓ Kitty Courtney, Tetra Tech, Lead Consultant Project Manager
- ✓ Wendy Meguro, Workshop Green, Architect
- ✓ Melissa May, SSFM, Project Manager & Senior Planner
- ✓ Ollie Lau, SSFM, Planner
- ✓ Erin Emerson, SSFM, Marketing and Communications Coordinator

Attendee List:

Name	Organization
Alex Beatty	Department of Planning and Permitting (DPP)
Alex Yee	City and County of Honolulu Office of Climate Change, Sustainability, and Resiliency (OCCSR)
Anna Mikkelsen	University of Hawai'i
Barry Usagawa	Board of Water Supply
Chip Fletcher	University of Hawai'i
Chloe Obara	University of Hawai'i
Dave Kajihiro	Luxury Collection
Dominic Dias	Board of Water Supply
Matt Gonser	OCCSR
Noelani Schilling-Wheeler	O'ahu Visitors Bureau
Rachel Beasley	Office of Planning and Sustainable Development
Rick Egged	Waikīkī Beach Special Improvement District Association
Saani Fong	Department of Facilities and Maintenance
Scott Brady	Department of Transportation Services (DTS)
Kaily Pascua	DPP
Lenny Fabro	Department of Enterprise Services
Mario Siu Li	DPP
Chase McDaniel	OCCSR

Meeting Objectives

- Introduce the project and consultant team.
- Present Climate Change impacts facing public infrastructure and private development in Waikīkī through five scenarios.
- Identify and discuss the feasibility and relevance of potential adaptation solutions to mitigate flood risk.

Meeting Summary Notes

Plenary Presentation:

- AW2050 Plan aims to create recommendations to be implemented over the next 25 years to:
    - Protect public safety from rainfall-driven flood events.
    - Improve the environment of Waikīkī through better stormwater management.
    - Extend the useful life of subsurface infrastructure exposed to shallow groundwater.
- Create adaptation recommendations informed by level of service determinations in the long term.
- The project is in early stages and will be collecting input from stakeholders including City/State agencies, landowners, businesses, residents, and community organizations. This is the second of three charrettes and is focused on exploring potential adaptation strategies facing public infrastructure private development for five climate risk scenarios.
- Climate Risk Scenarios (described and accompanied by projected hazard and risk maps):
    - Scenario 1: Heat Extremes
        - Objective: Mitigate temporary and widespread extreme heat events.
    - Scenario 2: Rainfall-Driven Compound Flooding (1 ft Sea Level Rise (SLR), ~2040)
        - Objective: Mitigate temporary and widespread flooding from extreme rainfall events compounded by high tides and storm surge.
    - Scenario 3: SLR-Driven Shallow Groundwater Exposure (1 ft SLR, ~2040)
        - Objective: Extend the useful life of subsurface infrastructure exposed to permanent and widespread shallow (<5 ft below land surface) groundwater.
    - Scenario 4: SLR-Driven Groundwater Inundation (4 ft SLR, ~2080)
        - Objective: Address permanent and localized flooding from groundwater above land surface.
    - Scenario 5: SLR-Driven Groundwater Inundation (6 ft SLR, ~2100)
        - Objective: Address permanent and widespread flooding from groundwater above land surface.
- During the meeting, polling was conducted to obtain feedback from attendees through the online platform Mentimeter. Results from polling can be found on the following pages.
- Activity Overview
    - Attendees were split into four groups.

- Each group stayed at the same table and rotated through scenarios 2 to 5. Each scenario discussion began with a polling question and then attendees were encouraged to vote for their preferred scenario using stickers. Each attendee was given four stickers per scenario and could place multiple stickers on a single scenario if desired. The outcomes of the sticker voting are discussed in the following pages. After polling and voting, attendees discussed the scenario's impacts, related concerns, and feasibility/limitations of pre-identified adaptation strategies. A facilitator and note-taker from the project team were present at each table.
- Groups discussed each scenario for 20 minutes before moving to the next scenario until each group had discussed all scenarios.

Plenary Polling Results

During the plenary presentation, live polling was conducted via Mentimeter to gather feedback from attendees. A high-level summary is provided below, and the results of all of the polling questions can be found in the appendix at the end of this summary.

During the plenary, participants were asked about the impacts they had experienced in Waikīkī for each scenario, and then what actions they had taken on their properties to mitigate the impacts from each scenario. This was focused on present day impacts for each scenario.

For extreme heat, the most common impacts were increased energy usage/higher utility bills, and loss of vegetation or landscaping. Most respondents indicated that they had taken no action to mitigate extreme heat impacts at this time.

For rainfall driven flooding, a proxy of the 2021 and 2024 Kona Low Storm events was used to solicit feedback. Respondents indicated that most experienced flooded roads that impeded transportation around Waikīkī. To mitigate flood impacts, respondents indicated that all options were explored, although the most used mitigative action was to protect building openings e.g. with sandbags.

For subsurface groundwater impacts, respondents noted that they had experienced all impacts including damaged subsurface structures, corroding subsurface infrastructure, roadbed damage, and water accumulation during construction or infrastructure repair. Mitigative actions included pumping water out of construction sites and repairing or replacing corroded subsurface infrastructure.

For groundwater impacts, respondents also noted that they had experienced all impacts. The most noted impacts were beach/shoreline erosion and structures/walkways impacted by wave energy. Mitigative actions included pumping water from flooded areas and protecting building openings.

Scenario 1: Extreme Heat

During the plenary session, participants were asked to vote via Mentimeter on a scale of 1-5 whether the potential strategies listed to combat extreme heat were relevant (1) or not relevant (5) for implementation in Waikīkī. Respondents noted that the use of high solar reflectance building materials and facilitating cooling solutions were the most relevant strategies.

Extreme heat was not discussed as a table topic during this charrette.

Scenario 2: Rainfall-Driven Compound Flooding (1 ft SLR, ~2040)

Participants were asked to vote via Mentimeter on the most appropriate strategies to mitigate rainfall driven compound flooding in Waikīkī. To do this, participants were asked to vote on a scale of 1-5 whether potential strategies were relevant (1) or not relevant (5). The top three strategies voted by participants were:

1. Prepare a stormwater management plan with public and private sector solutions.
2. Implement a system for stormwater storage, reuse, and delayed discharge.
3. Elevate/floodproof facility utility connections and critical equipment.

The least relevant strategy was the use of permeable pavers and trench drains.

This voting pattern was mirrored in the sticker exercise where the top three strategies in the Mentimeter poll were also voted as the top three strategies in the sticker exercise as shown in Table 1.

Table 1: Scenario 2 Sticker Exercise Results

SCENARIO 2	
Strategy	**Total Votes**
Prepare stormwater management plan with public and private sector solutions for storage, reuse, & delayed discharge	17
Implement a system for stormwater storage, reuse, & delayed discharge (eg, pumps, cisterns, green/blue roofs, floodable open spaces)	14
Elevate/floodproof facility utility connections & critical equipment	13
Develop emergency response routes & procure high-water emergency vehicles	4
Install tidal backflow preventor	5
Use permeable pavers and trench drains	2
Dry floodproof at-grade buildings	4
Install passive flood barriers	5

Scenario 3: SLR-Driven Shallow Groundwater Exposure (1 ft SLR, ~2040)

Participants were asked to vote via Mentimeter on the most appropriate strategies to mitigate shallow groundwater exposure in Waikīkī. To do this, participants were asked to vote on a scale of 1-5 whether potential strategies were relevant (1) or not relevant (5). The top three strategies voted by participants were:

1. Conduct an integrated road/subsurface infrastructure adaptation/engineering/economic study.
2. Line public storm and sanitary sewer pipes and private laterals.
3. Establish standards for subsurface building structure inspections.

The least relevant strategy was to improve roadway strength and durability.

This voting pattern was mirrored in the sticker exercise for the top two strategies from the menitmeter poll, however, the third most voted on adaptation measure was “Repurpose or fill

below-grade spaces/increase building height/density". The results from the sticker voting exercise are shown in Table 2.

Table 2: Scenario 3 Sticker Exercise Results

SCENARIO 3	
Strategy	**Total Votes**
Conduct an integrated road/subsurface infrastructure adaptation/engineering/ economic study	20
Line public storm and sanitary sewer pipes & private laterals	13
Improve roadway strength and durability	4
Establish standards for subsurface building structure inspections	7
Assess potential revisions to standards for dry floodproofing buildings' below-grade areas	7
Repurpose or fill below-grade spaces/increase building height/density	10
Use materials resistant to corrosion	3

Scenario 4: SLR-Driven Groundwater Inundation (4 ft SLR, ~2080)

Participants were asked to vote via Mentimeter on the most appropriate strategies to mitigate groundwater inundation in Waikīkī. To do this, participants were asked to vote on a scale of 1-5 whether potential strategies were relevant (1) or not relevant (5). The top three strategies voted by participants were:

1. Conduct an infrastructure services phasing study.
2. Prepare plan to potentially elevate roads and associated utilities for a localized area with early flood risk.
3. Revise WSD Design guidelines/Develop overlay district to promote WSD-wide and localized flood resilience.

The least relevant strategy was conduct a level of service infrastructure phase out study for long-term adaptation.

This voting pattern was not mirrored in the sticker exercise. Revise WSD guidelines was the top vote getter, followed by elevate roads and associated utilities, and conduct incremental retreat studies on easements, TDR and public lands. The results from the sticker voting exercise are shown in Table 3.

Table 3: Scenario 4 Sticker Exercise Results

SCENARIO 4	
Strategy	**Total Votes**
Conduct infrastructure services phasing study	6
Revise WSD design guidelines/Develop overlay district to promote WSD-wide & localized flood resilience	16
Elevate roads and associated utilities for a localized area with early flood risk	13
Require Right-of-Way Harmonization Agreements at elevated roads	5
Prepare standards for transition zones at elevated roads	6
Repurpose or fill below-grade spaces/increase building height/density	0
Elevate buildings on open foundation/fill to new Design Flood Elevation	2
Conduct incremental retreat study: easements, TDR, public lands	11
Setback Buildings and Move sidewalks into private property	3

Scenario 5: SLR-Driven Groundwater Inundation (6 ft SLR, ~2100)

For the final scenario, participants were asked to vote via Mentimeter on two questions. The first question asked participants to rank factors that they were most concerned about regarding a future SLR impact of 6ft. on the most appropriate strategies to mitigate rainfall driven compound flooding in Waikīkī. The top three concerns ranked by participants were:

1. Feasibility of continued infrastructure
2. Loss of recreational beaches
- Increased flooding from the Ala Wai Canal/major storm events.

This voting pattern was mirrored in the sticker exercise where the top three strategies in the Mentimeter poll were also voted as the top three strategies in the sticker exercise as shown in

Table 4.

Table 4: Scenario 5a Sticker Exercise Results

SCENARIO 5	
Ranking	**Total Votes**
Feasibility of continued infrastructure	20
Cost to private landowners to adapt in place	5
Loss of useable land area/shoreline erosion	10
Loss of recreational beaches	13
Increased flooding from the Ala Wai Canal / Major storm events	13
Property Insurance costs and availability	1

The second question asked participants to vote on a scale of 1-5 whether potential strategies were highly favored (1) or not favored(5). The top three strategies voted by participants were:

1. Hybrid Approach
2. Adapt-in-Place
3. Managed Shoreline

The least favored strategy was managed retreat.

This voting pattern was mirrored in the sticker exercise where the top three strategies in the Mentimeter poll were also voted as the top three strategies in the sticker exercise as shown in Table 5.

Table 5: Scenario 5b Sticker Exercise Results

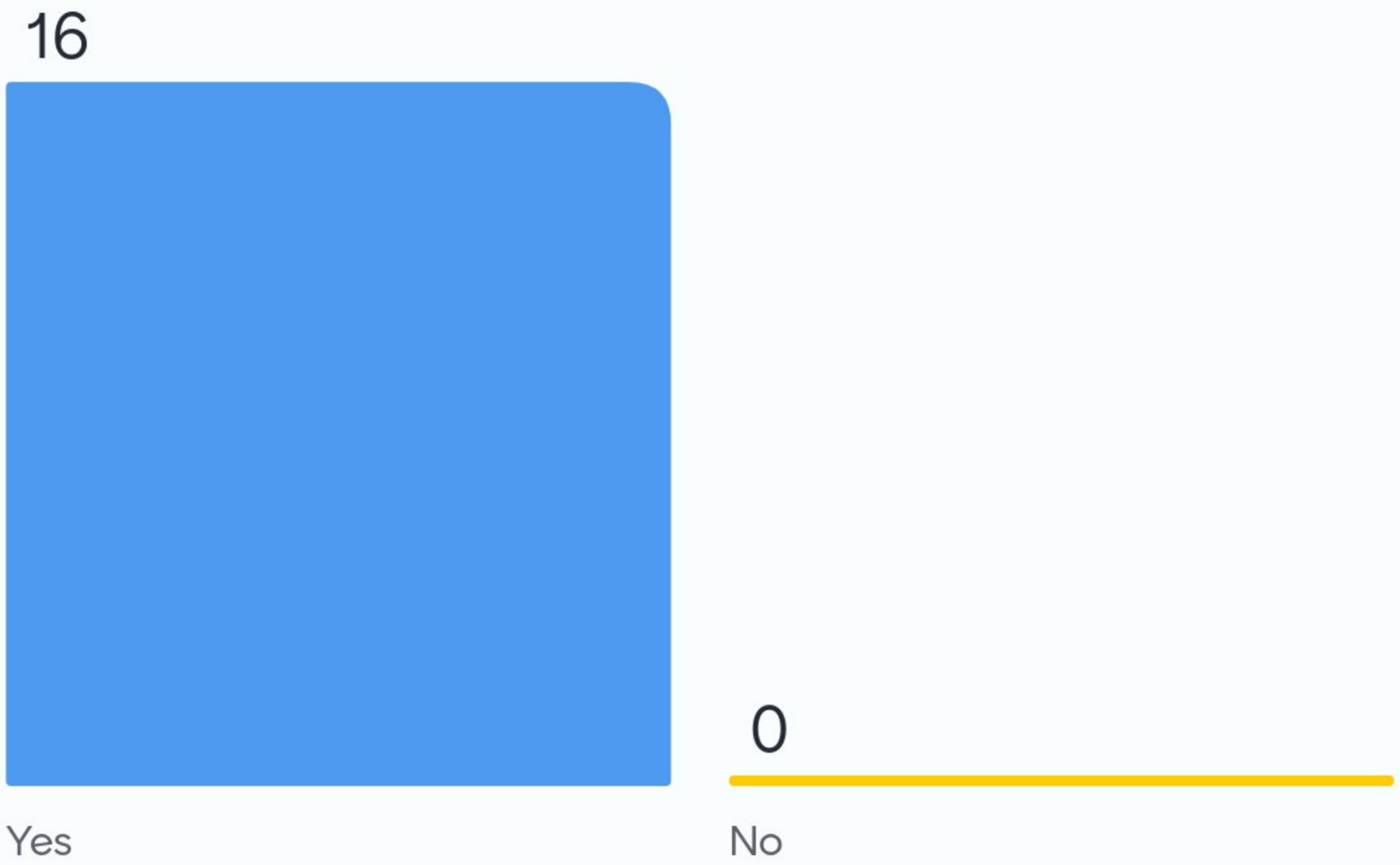
SCENARIO 5	
Strategy	**Total Votes**
Managed Shoreline	10
Adapt in Place	10
Managed Retreat	9
Managed Elevation	9
Hybrid Approach	19

APPENDIX 1:

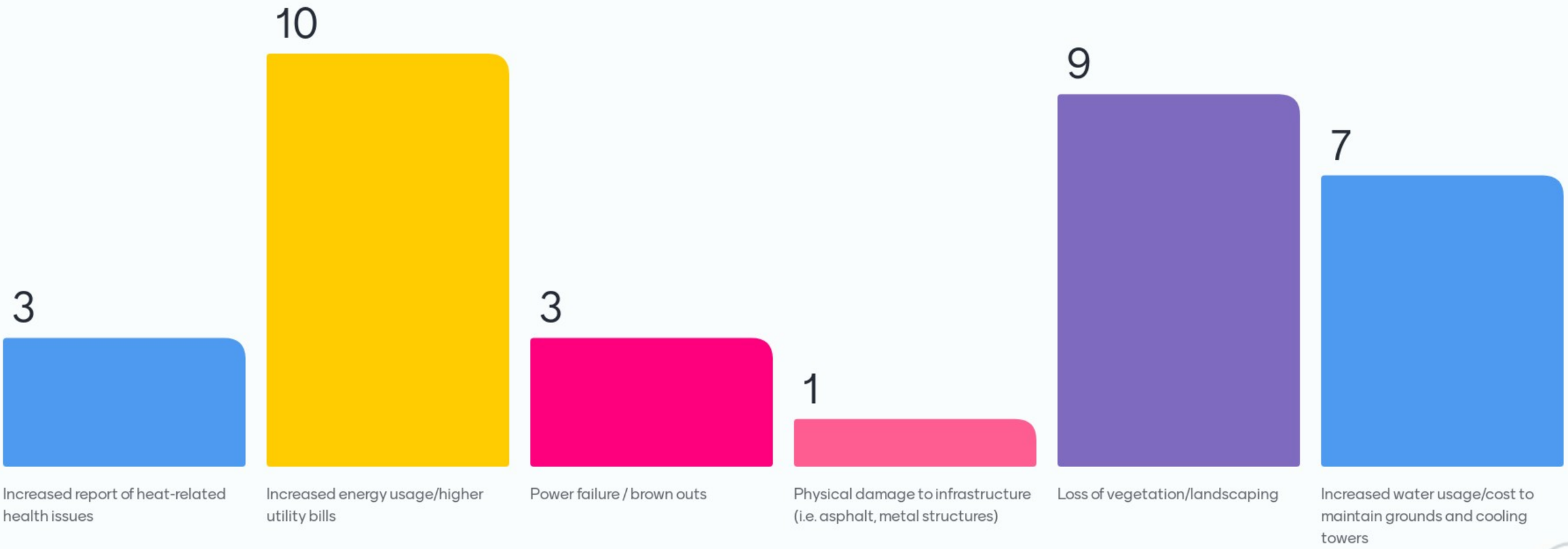
Mentimeter Polling Results

ARE YOU READY?

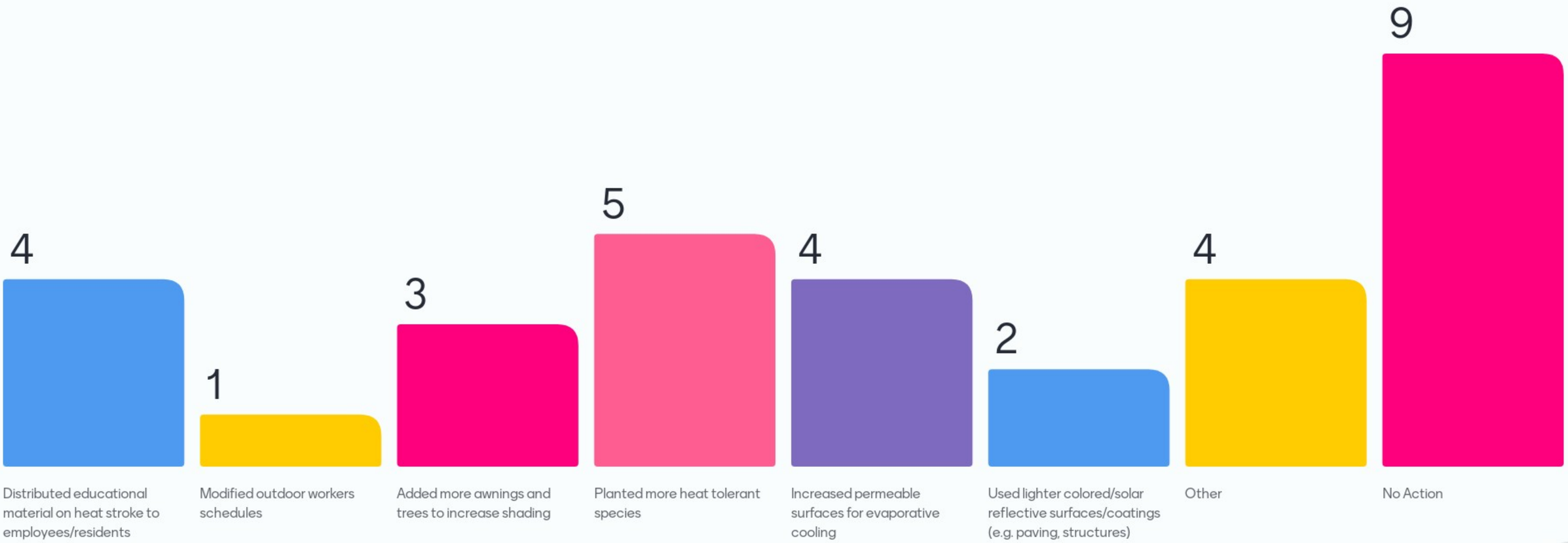
Are You Ready?



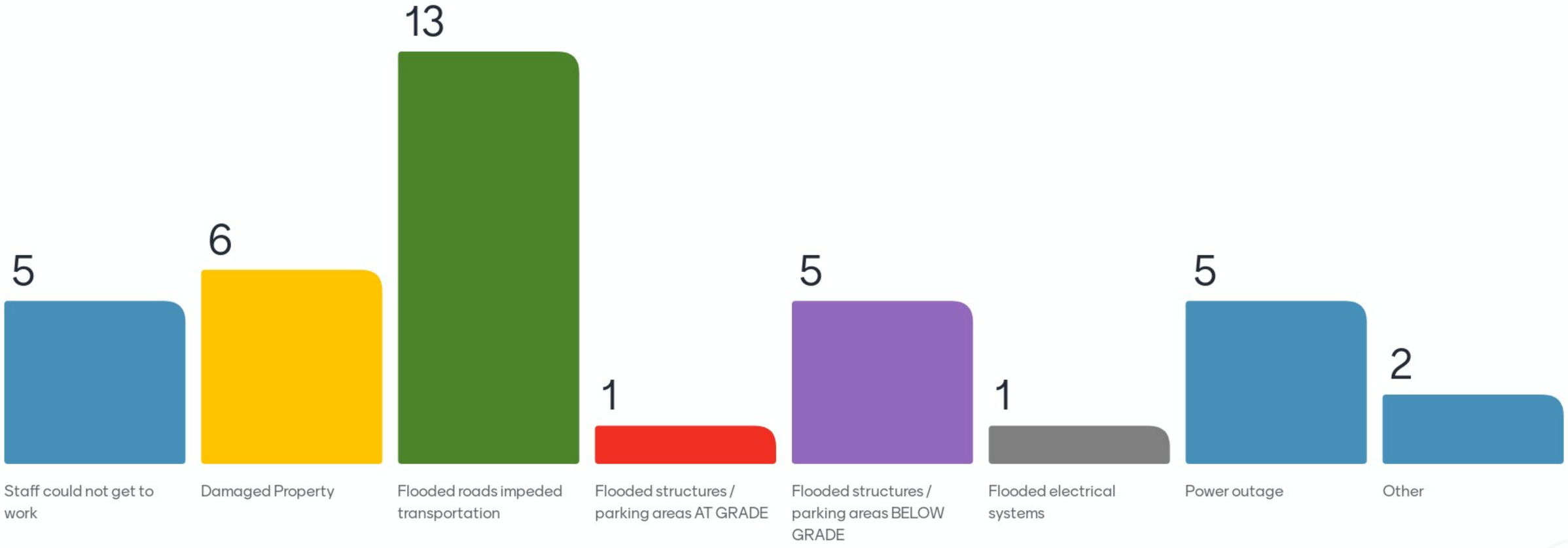
What impacts from heat events have you experienced?



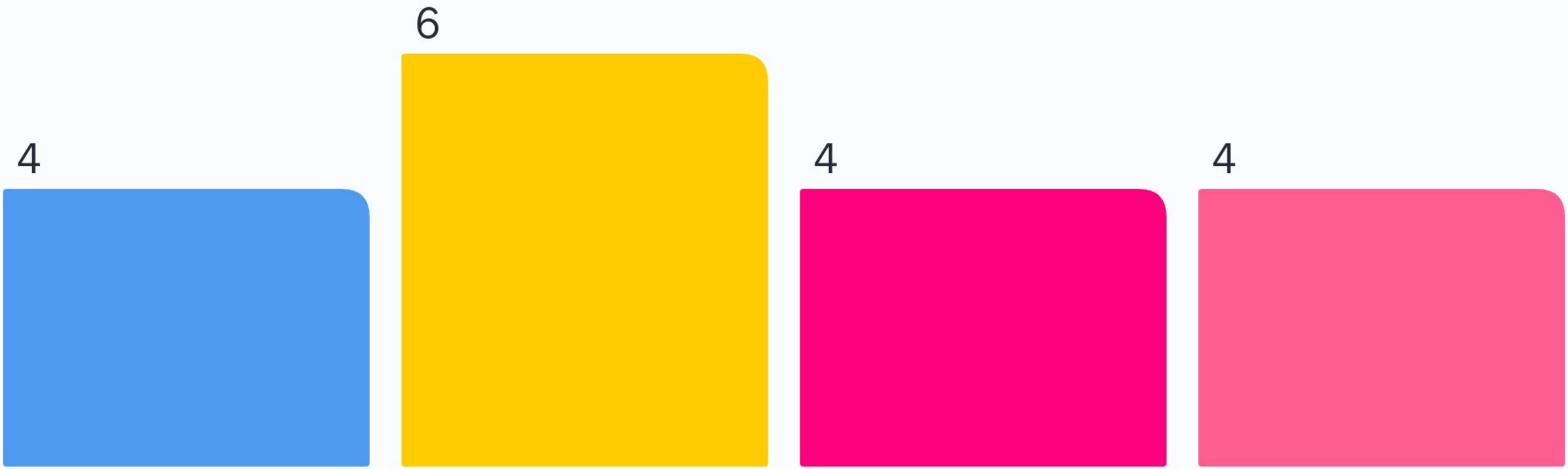
What actions have you taken to mitigate heat impacts, if any?



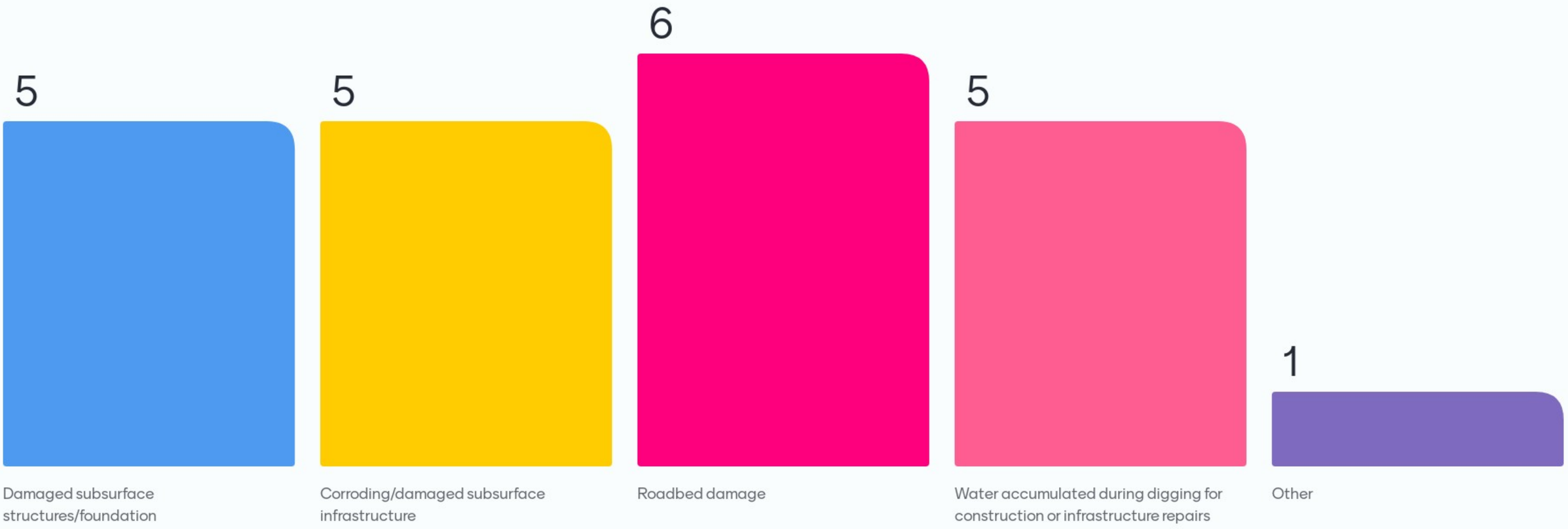
What flood impacts did you experience during the 2021 and 2024 Kona Low Events?



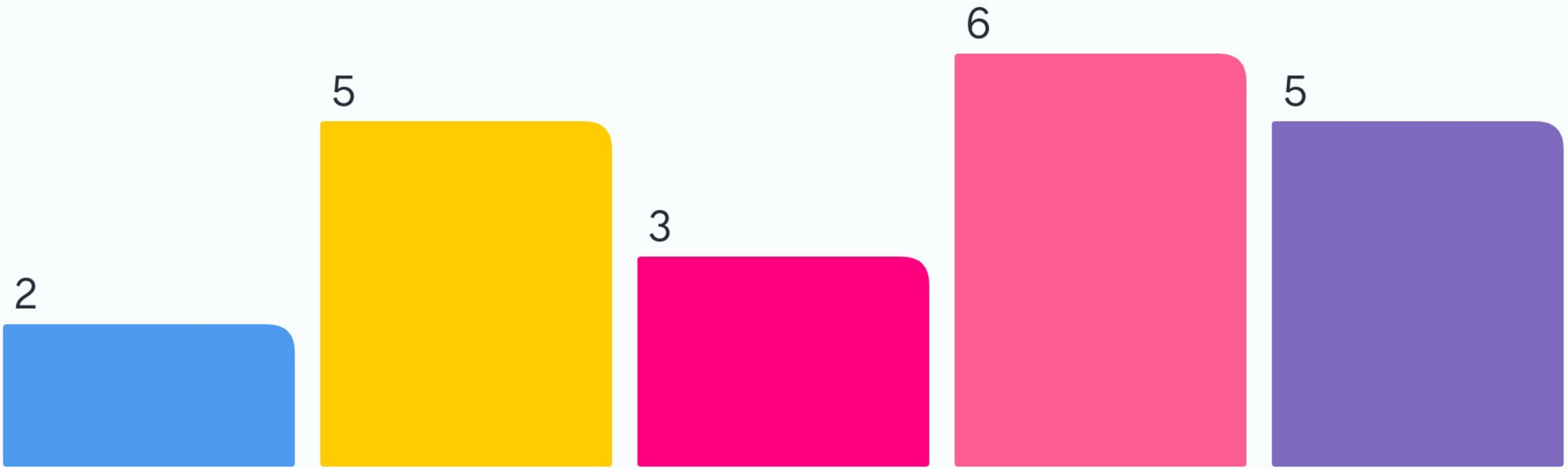
What actions did you take to mitigate flood impacts, if any?



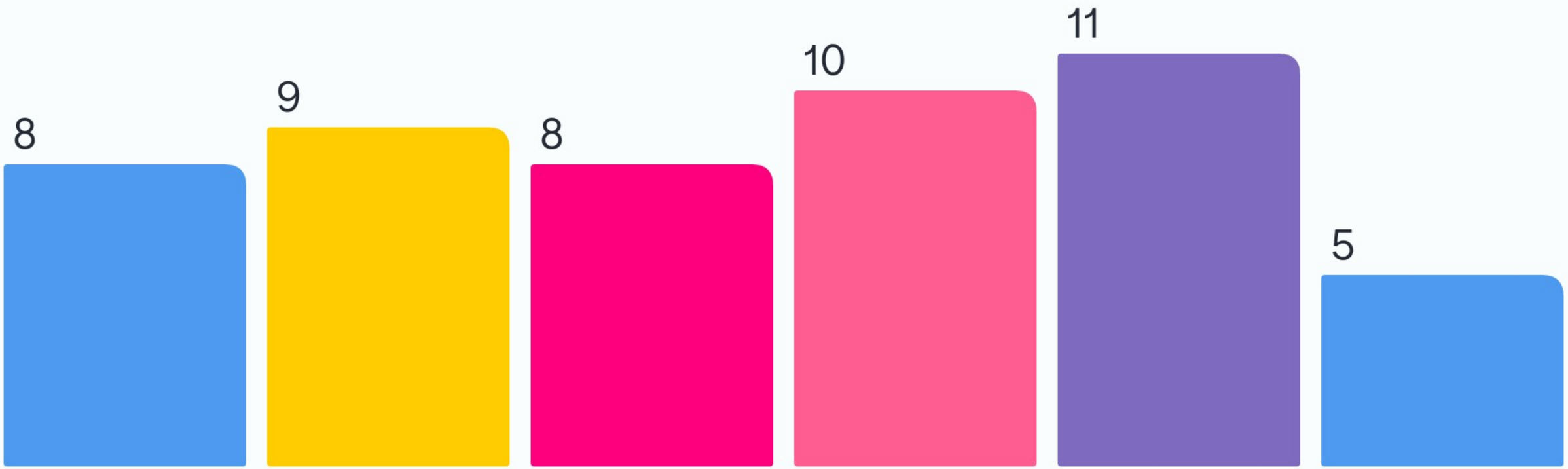
What impacts have you experienced from shallow groundwater?



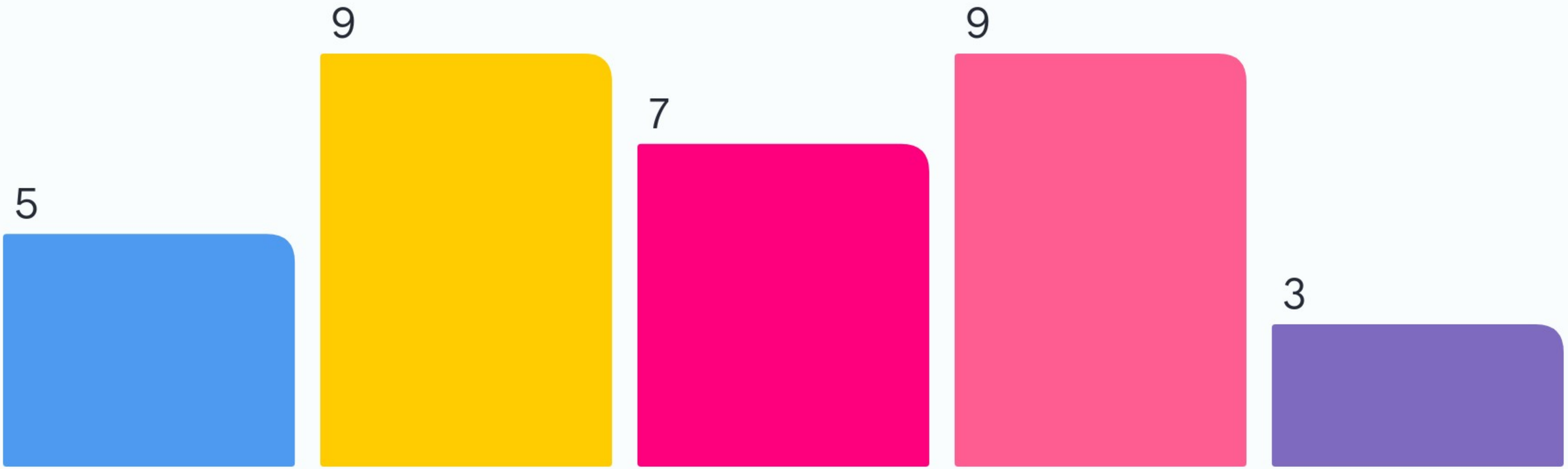
What actions have been taken to mitigate shallow groundwater impacts?



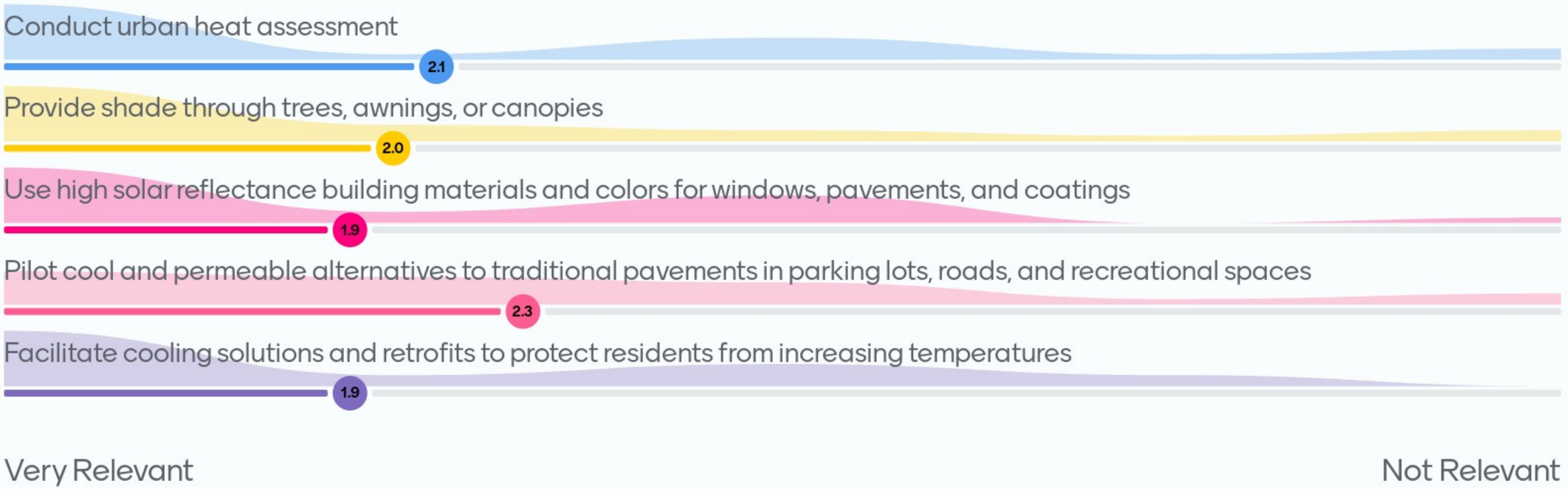
What impacts have you experienced for Groundwater inundation



What actions have been taken to mitigate groundwater inundation?



Heat Extremes: To what extent is the strategy relevant/appropriate as an adaptation for Waikīkī?



Scenario 2: To what extent is the strategy relevant/appropriate as an adaptation for Waikīkī?

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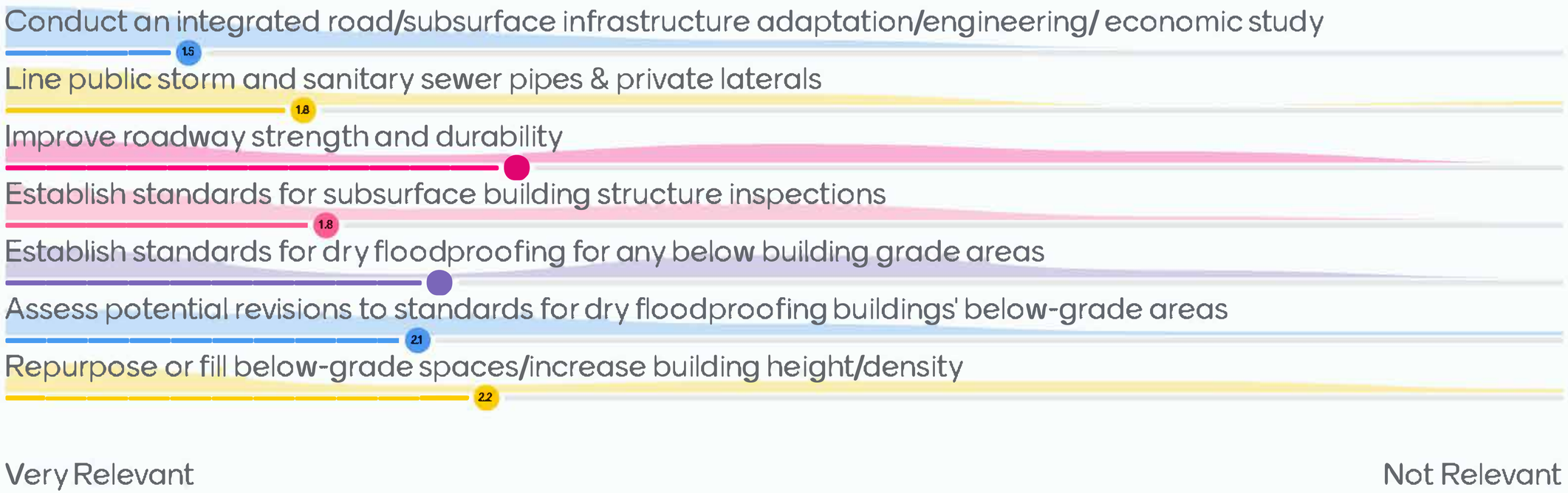
Scenario 3: To what extent is the strategy relevant/appropriate as an adaptation for Waikīkī?



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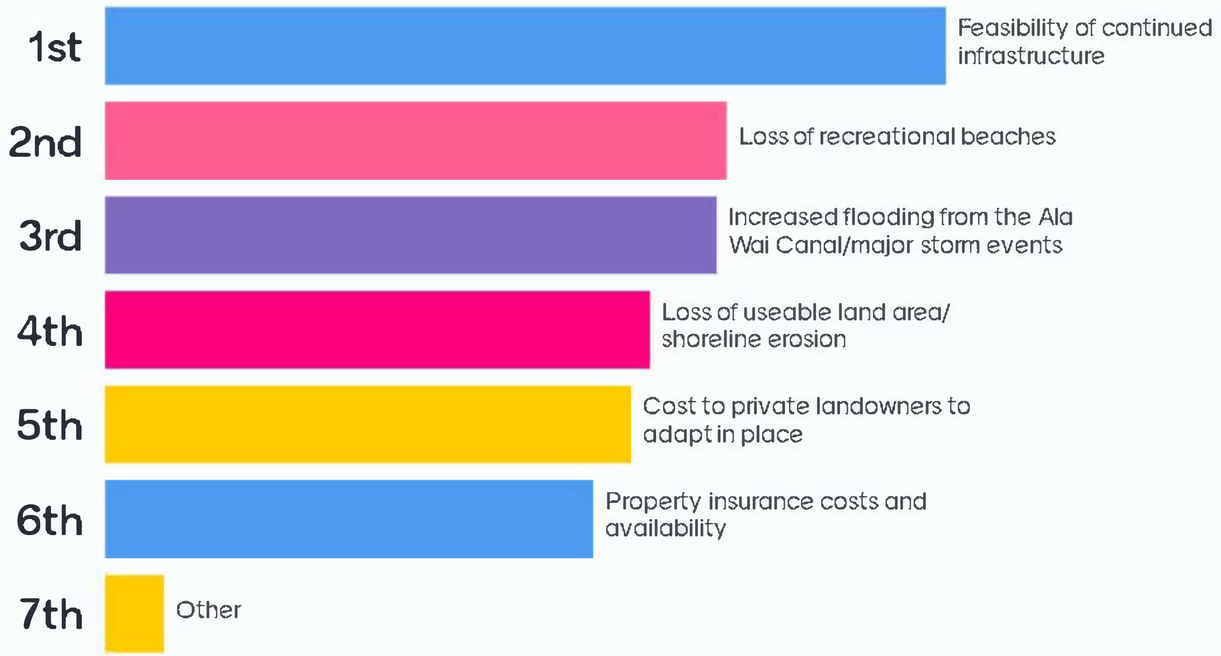
Scenario 4: To what extent is the strategy relevant/appropriate as an adaptation for Waikīkī?

Scenario 5: Given the impacts with 6 feet of sea level rise, please rank the factors you are most concerned about..



Scenario 5: Given the impacts with 6 feet of sea level rise, how much do you favor each adaptation strategy?