Climate Change Vulnerability Study and Resilience Plan Update

Public Service Law (PSL) § 66(29) – PSC Case 22-E-022

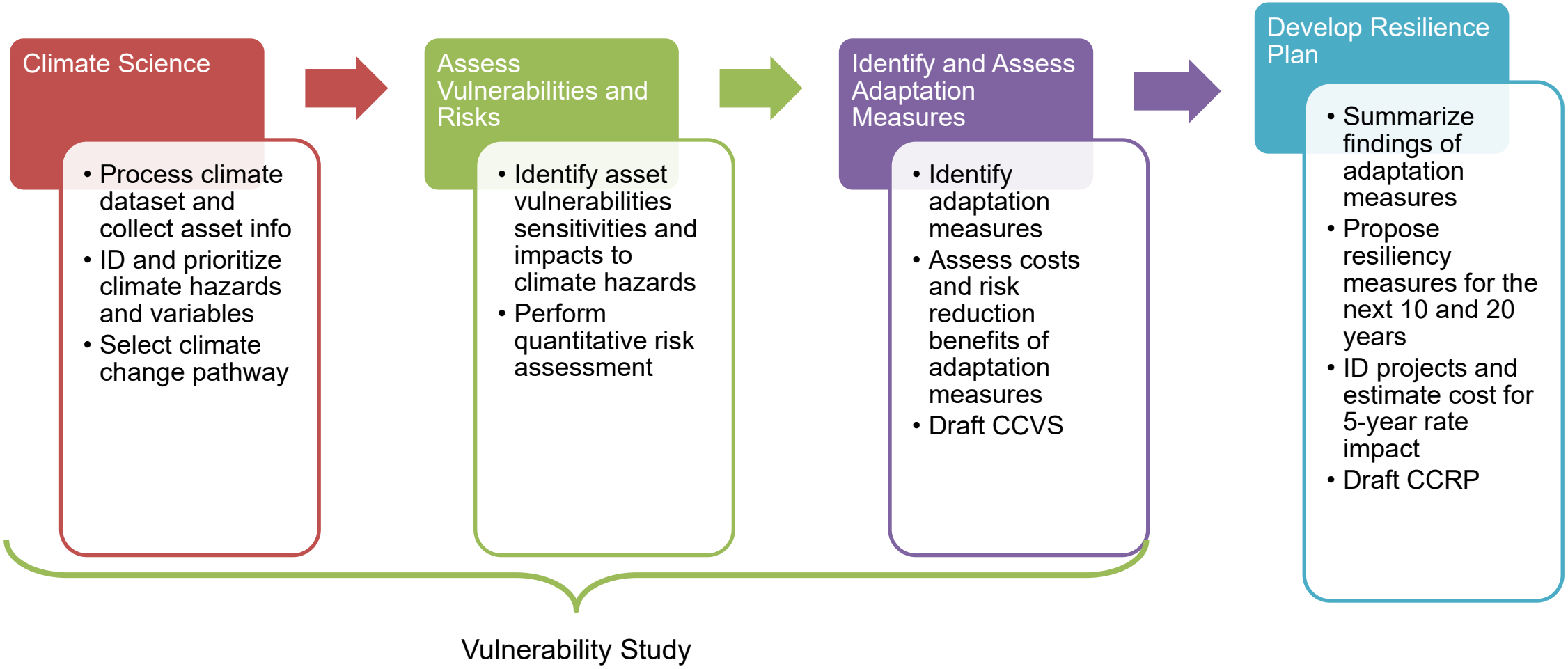
O&R Climate Resilience Working Group
March 29, 2023

DRAFT for working group discussion purposes only

AGENDA

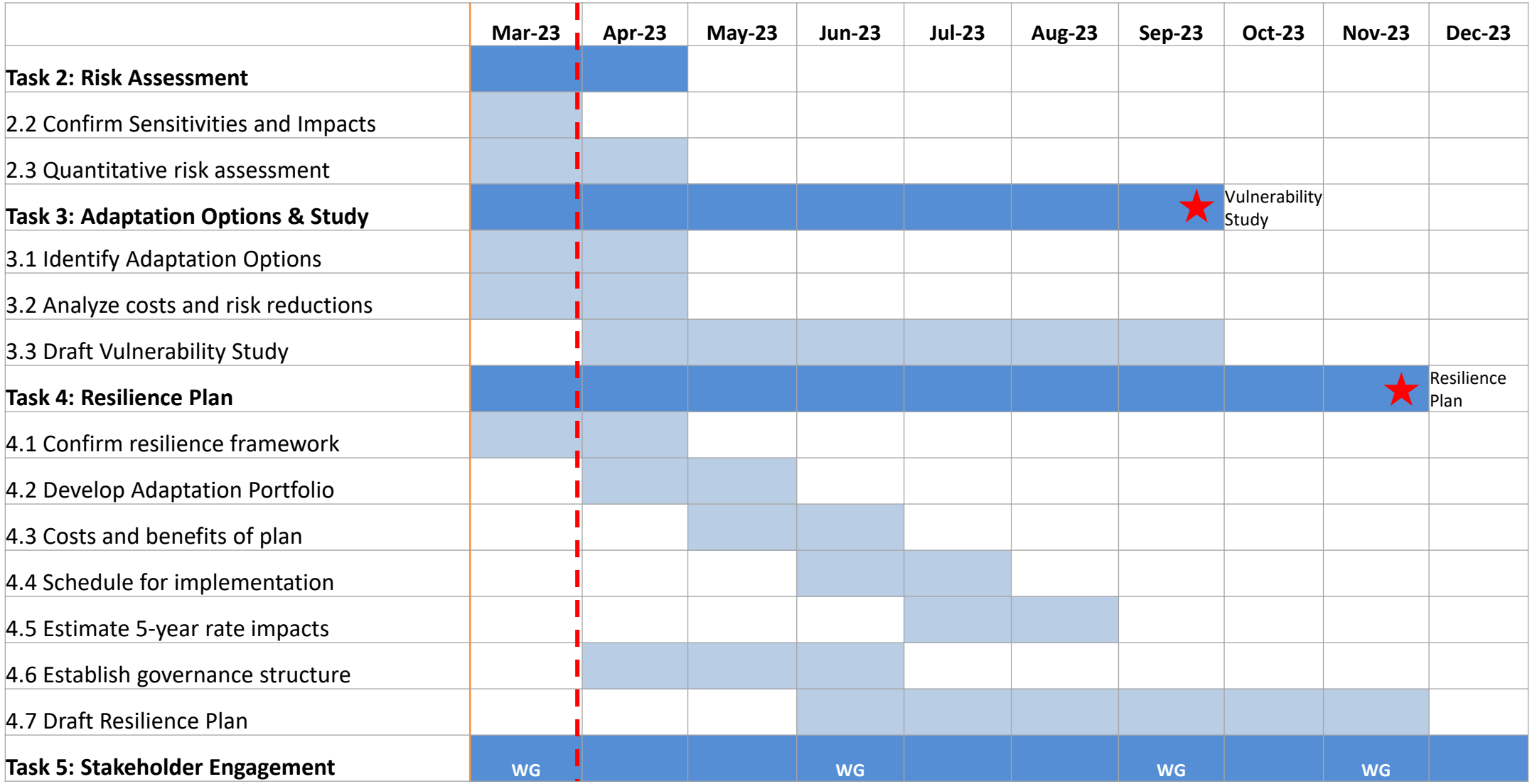
- Climate Change Vulnerability Study (“CCVS”) Update
- Climate Pathway Selection
- Vulnerability Assessment
- Climate Hazard Qualitative Findings
- Next Steps

Orange & Rockland CCVS & CCRP Process Flow



DRAFT for working group discussion purposes only

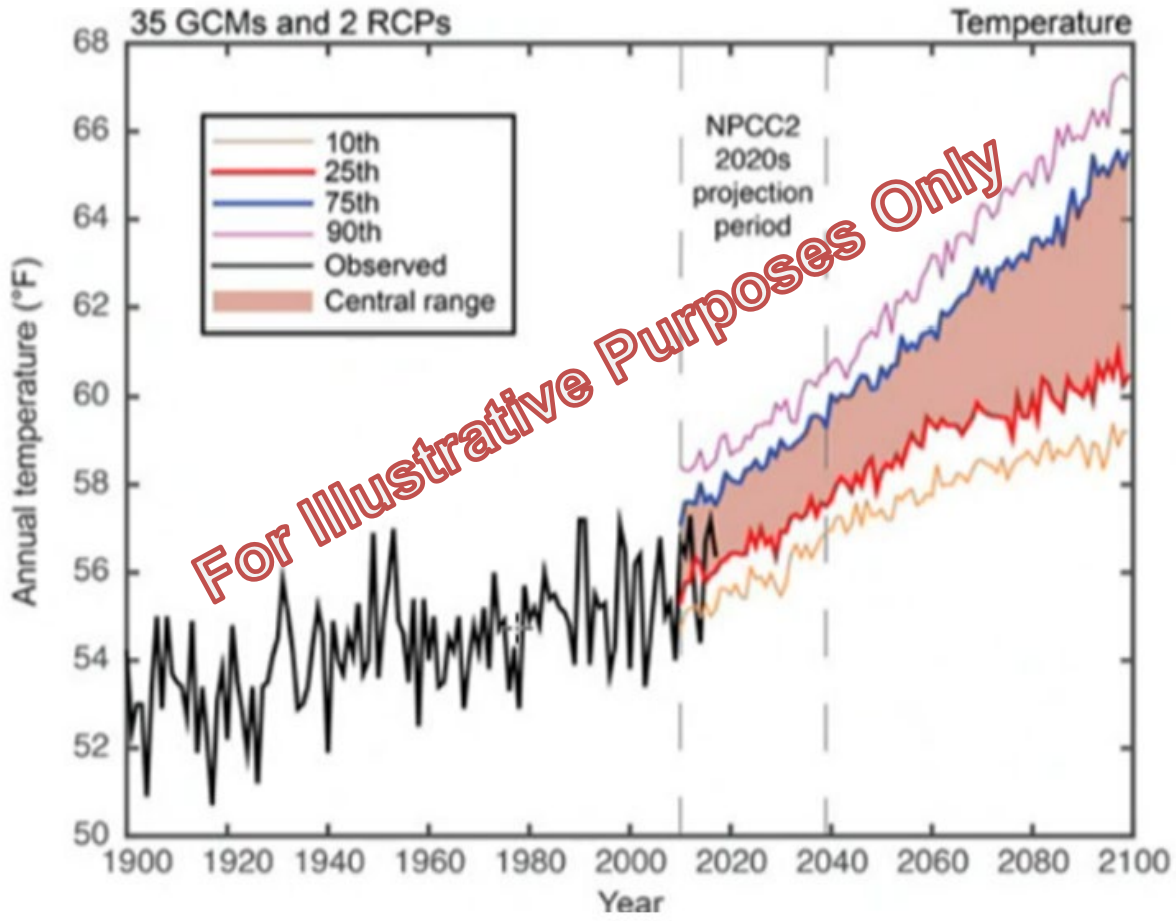
Timeline of Execution



DRAFT for working group discussion purposes only

Climate Change Pathways

- Climate change pathways provide guidance on the level of potential climate change in the service area and benchmark values for design parameters to plan to and make O&R's system more resilient to potential climate change risks.



Comparison of Sample Climate Change Projections to Historical Baseline

Mohonk Weather Station Data

Climate Variables	Current 30-year historical average	2050 Projection*	2080 Projection*
Days per year over 95°F	1	13	43.5
Heat waves per year (3-days max temp over 90°F)	0	0.2	1.8
Days over 2 inches precipitation	3.1	4.5	5.5

*Projection figures are based on SSP5-8.5 75th Percentile Climate Change Pathway

- Are there any climate variables of interest to you?

Climate Change Pathway Recommendation

- Are you comfortable with the selection of the 75th percentile pathway?
- Does this pathway align with other organizations you have interacted with?

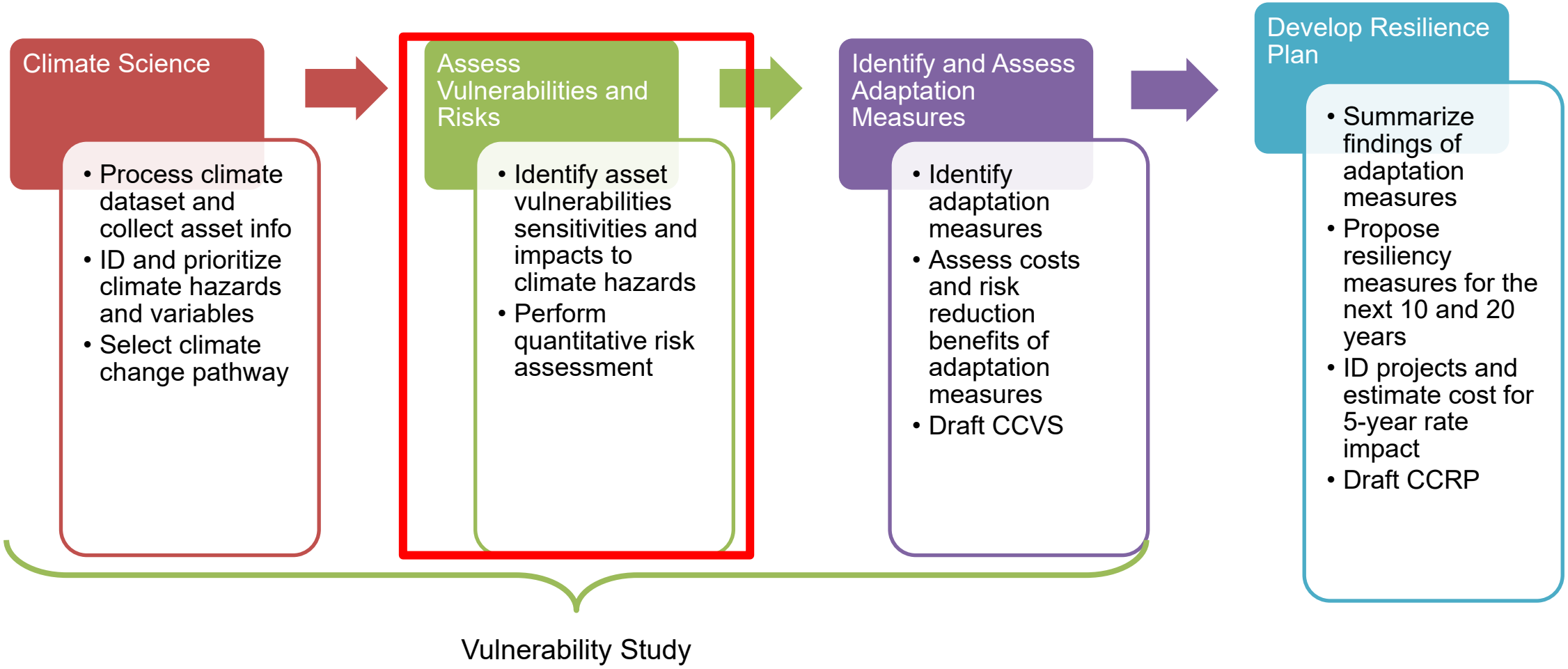
O&R Proposed Pathway Recommendation

- 75th percentile of SSP 5-8.5 projections for temperature, precipitation, and related variables.
- 50th percentile of combined SSP2-4.5 and SSP5-8.5 projections for sea level rise (may impact Hudson River assets).

Factors in Climate Change Pathway Recommendation

- The 50th and 75th percentiles of SSP5-8.5 remain in a narrow range through end of the century and do not show significant increases over baseline until after mid-century for the O&R service territory
- Peer utilities overall plan to use the “high-impact” than “low-impact” future climate outcome to de-risk assets and operations
- Proactively harden the system to increases in the frequency and intensity of extreme weather events and climate change

Orange & Rockland CCVS & CCRP Process Flow



DRAFT for working group discussion purposes only

Assess Vulnerabilities and Risks

Vulnerability Assessment
(Identified Assets at Risk)

Quantitative risk assessment for CCVS

Compile GIS Shapefiles (i.e., primaries, poles, transformers) and physical location data (i.e., substations, battery storage sites, office locations)

Creation of flood depth using updated digital elevation data and overlay can be imported into mapping software and used to overlay with O&R assets

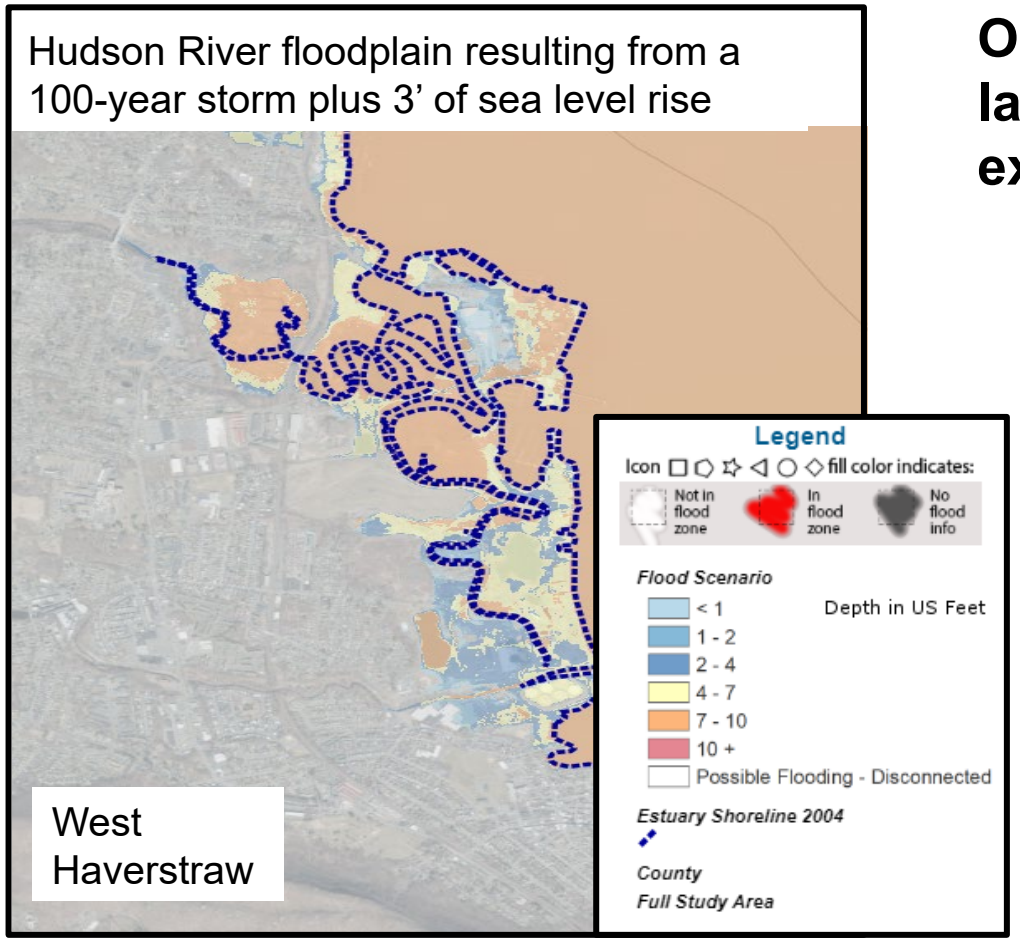
Screen for assets inundated and depth sampling of these assets for the 100-year storm (inland flooding)

Screen for assets inundated along the Hudson as a product of sea level rise and coastal storms, and depth sampling of these assets for the 100-year storm (coastal flooding)

DRAFT for working group discussion purposes only

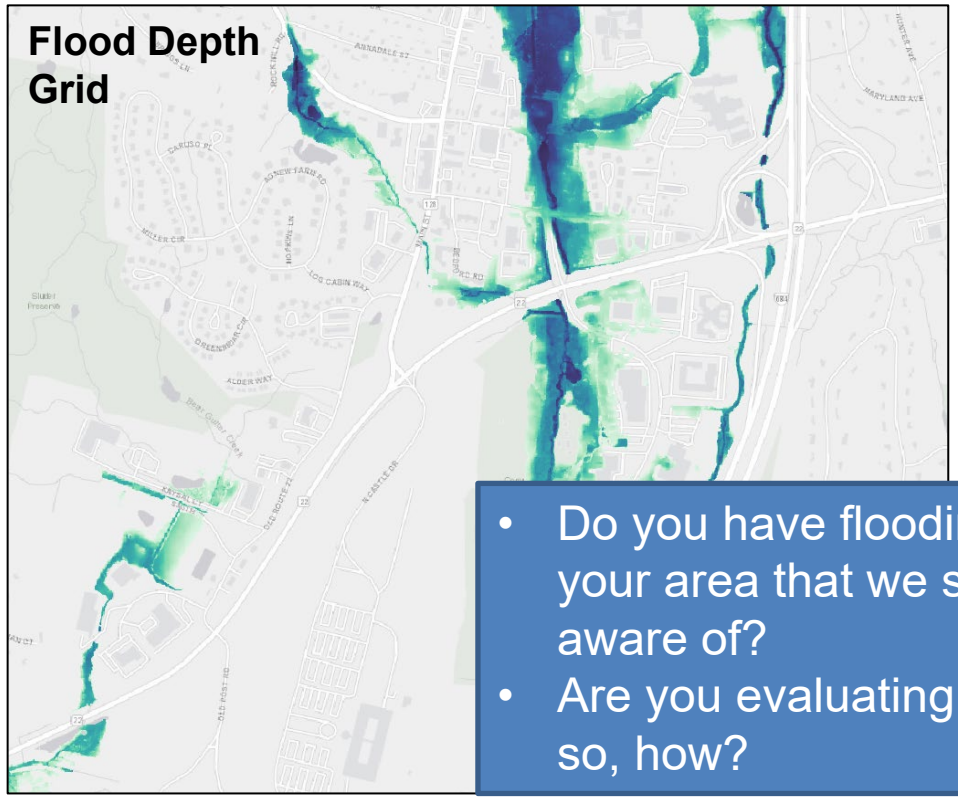
Flood Exposure Assessment

Hudson River floodplain resulting from a 100-year storm plus 3' of sea level rise



[Hudson River Flood Impact Decision Support System Version 2 (columbia.edu)]

O&R will use GIS-enabled flood depth and extent layers in combination with asset data to evaluate utility exposure to sea level rise and Hudson River flooding.



- Do you have flooding concerns in your area that we should be aware of?
- Are you evaluating flood risk? If so, how?

Climate Hazards

Heat		Temperature and humidity*	Flooding		Wind		Ice
Gradual	Extreme	Gradual	Gradual	Extreme	Gradual	Extreme	Extreme
Increasing maximum summer temperatures	Increasing frequency of 3-day heatwaves	Increasing maximum summer electric load	Projected sea level rise	Expansion of coastal and inland floodplains (100-year)	Increasing average wind speeds	Increasing likelihood of hurricane with CAT 2 wind speeds	Increasing accumulation from major winter storm events
Increasing number of high heat days		Increasing number of days per summer with high electric load	Increasing number of days per year with >2 in. of precipitation				
Increasing average summer temperatures							

- Are there any other hazards that are of interest to you?

*Temperature and humidity are evaluated in terms of their combined effect on Temperature Variable (TV), which is an engineering variable that is an indicator of load demand for cooling in the summer.

Qualitative Analysis of Hazards

Climate Hazard	Frequency	Intensity	Summary of Findings from Literature Review
Hurricanes and Tropical Cyclones	Unchanged	Increase	• Warmer air and ocean surface temperatures could result in increased frequency of stronger hurricanes further north • Future hurricanes projected to have higher maximum sustained winds and larger radius of hurricane force wind speeds
Lightning and Tornadoes	Potentially Increase	Potentially Increase	• Atmospheric conditions that facilitate thunderstorms could increase in frequency and intensity • Anticipated increases in temperature and atmospheric water vapor may increase precipitation rates during thunderstorms
Snow and Ice*	Decrease	Increase	• Shorter snow season could result in reduced snow cover and depth and fewer snow events in the future, however the largest snowfall events could produce higher snowfall totals • Warming temperatures could lead to increased freezing rain frequency and accumulation rather than snowfall

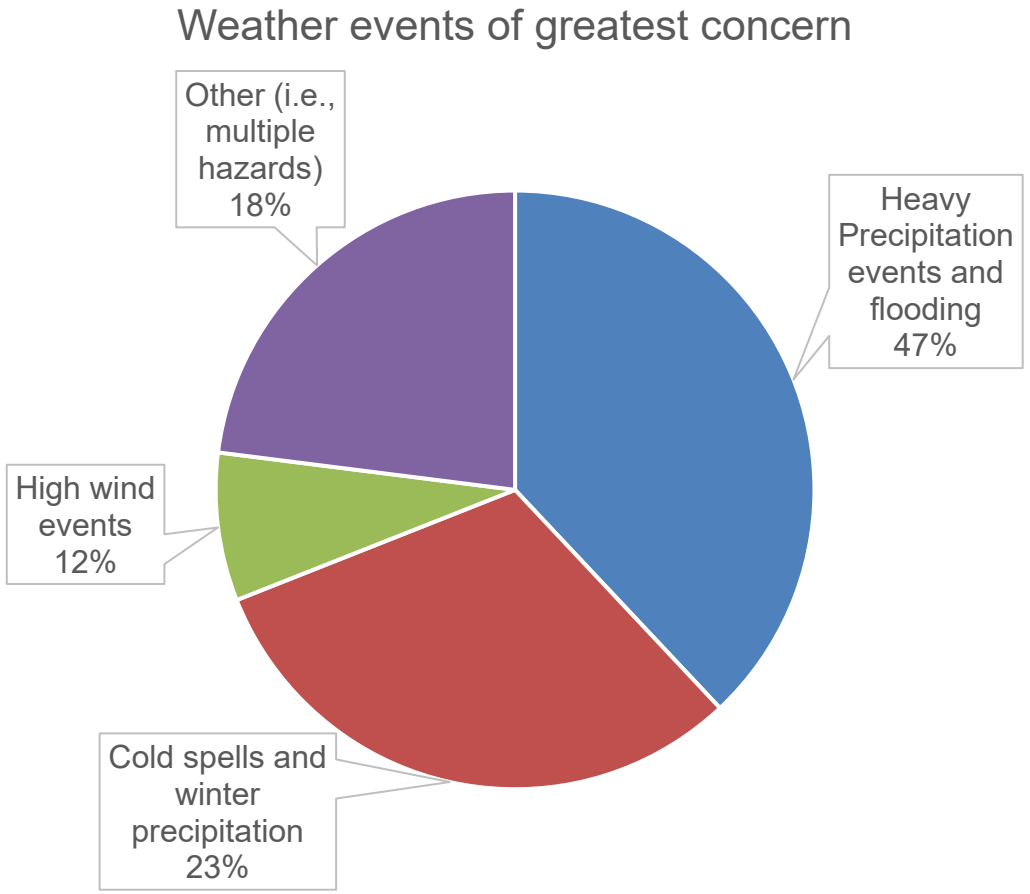
*Review of MIT dataset for potential additional quantitative findings on frozen precipitation variables.

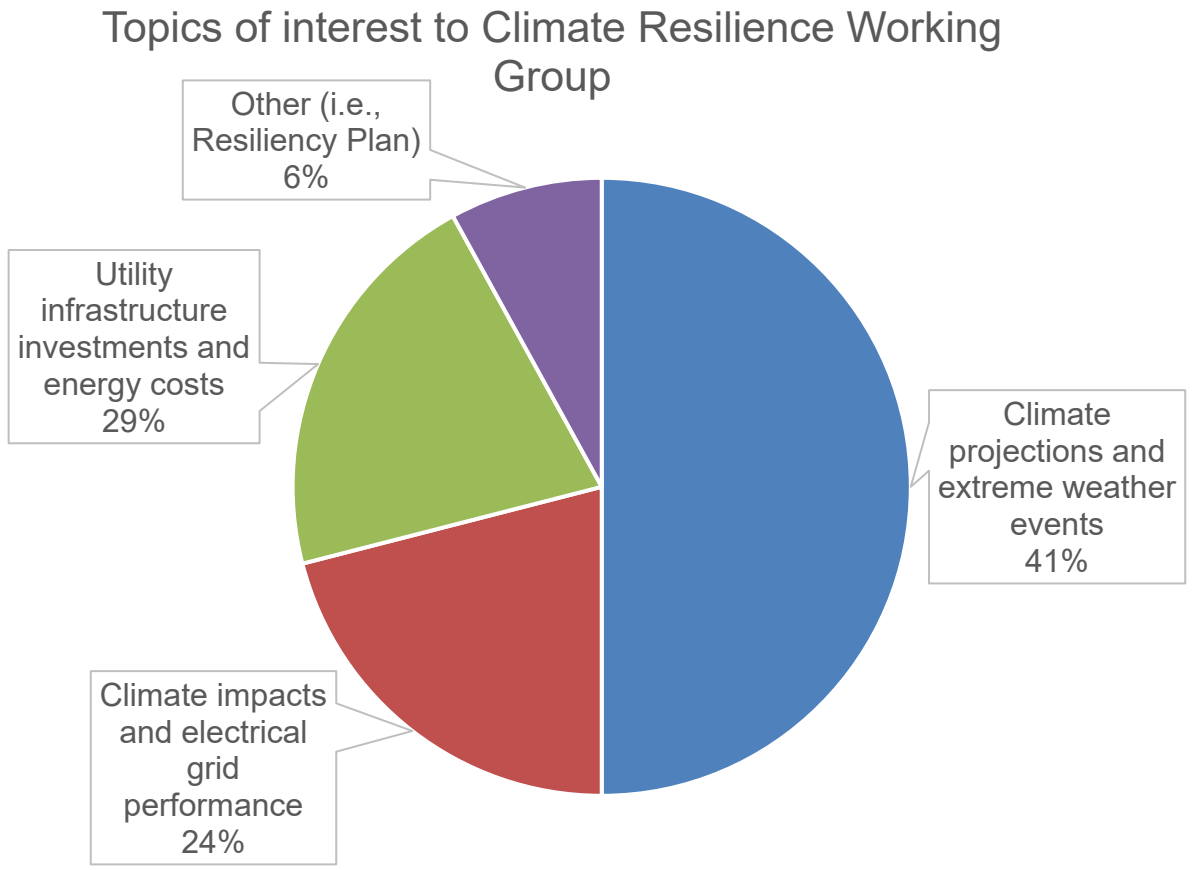
Qualitative Analysis of Hazards

Climate Hazard	Frequency	Intensity	Summary of Findings from Literature Review
Cold Snaps and Polar Vortex	Decrease	Potentially Increase	• While winter temperatures are projected to warm, complex processes amplified by climate change, such as Arctic amplification, could worsen some cold snaps and polar vortex events
Drought	Increase	Increase	• Warmer temperatures are projected to produce overall drier conditions, resulting in increased frequency and intensity of major droughts • While drought intensity and frequency are projected to increase in the region, drying in New York is likely lower in magnitude than more arid regions of the Country
Wildfire	Increase	Increase	• Warmer temperatures, decreases in fuel moisture, and increases in occurrence of lightning strikes could increase wildfires • Like drought, less impact from wildfires than more arid regions of the Country

Survey Feedback*

- Are you planning for climate adaptation?
- What actions have you taken to address climate hazards?





*Based on 20 responses. Link to survey: https://qfreeaccountssjc1.az1.qualtrics.com/jfe/form/SV_3WuBMqI5ueWt70y

Next Steps

- We are working with ICF to identify insights available within the MIT data
- Continued engagement with engineering on risk assessment of asset classes to climate hazards
- Next O&R Climate Resilience Working Group Meeting expected in June 2023
  - Review identified asset/climate hazard risk combinations
  - Share initial list of potential adaptation options
  - Discuss CCVS and Resilience Plan outlines

Orange & Rockland

Link to Website: Our Climate Change Resiliency Plan | Orange & Rockland (oru.com)

Questions or comments may be sent to: ResilientGrid@oru.com