



Briefing on Climate Change

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July 2020

# Agenda

- Contract Scope and Drivers
- Climate Analysis and Projections
- Facility Vulnerability Assessment and Adaptation Planning
- Greenhouse Gas Reduction Progress (Mitigation)
- Outline of FY'21 Tasks
- Questions



# Contract Scope and Drivers

# Climate Change Vulnerability Assessment, Adaptation and Mitigation Plan



- Determine local climate change effects

Task A



- Identify vulnerabilities and risks

Task B



- Assess impacts of climate change on local systems

Task C



- Identify resiliency and mitigation strategies

Task D

# Status

## Completed (years 1-5)

Task A - Determine local climate change effects

- Climate Projections
- Coastal and Riverine Modeling

For riverine and coastal treatment and pumping facilities

- Task B - Identify vulnerabilities and risks
- Task C - Assess impacts of climate change on local systems
- Task D - Identify resiliency and mitigation strategies

## Year Six (FY'21) Tasks

Tasks B, C and D for linear assets

Update GHG inventory and Action Plan

# Climate Analysis and Projections



# Climate Change Threats

## Rainfall, Extreme Storms, and Sea Level Rise



### Precipitation Driven

#### Stormwater/ Drainage

2- to 10-year  
storms



Localized flooding

#### Riverine

100-year  
storms



Regional flooding

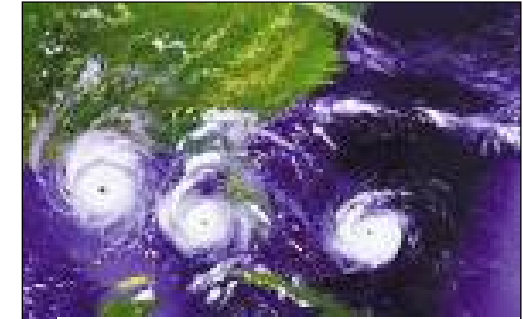


### Coastal

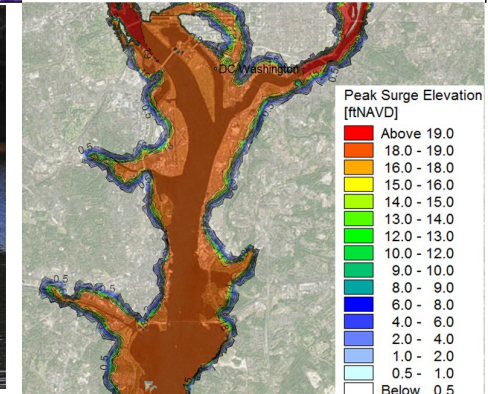
#### Sea Level Rise



#### Storm Surge



Flooding from  
increased tide levels

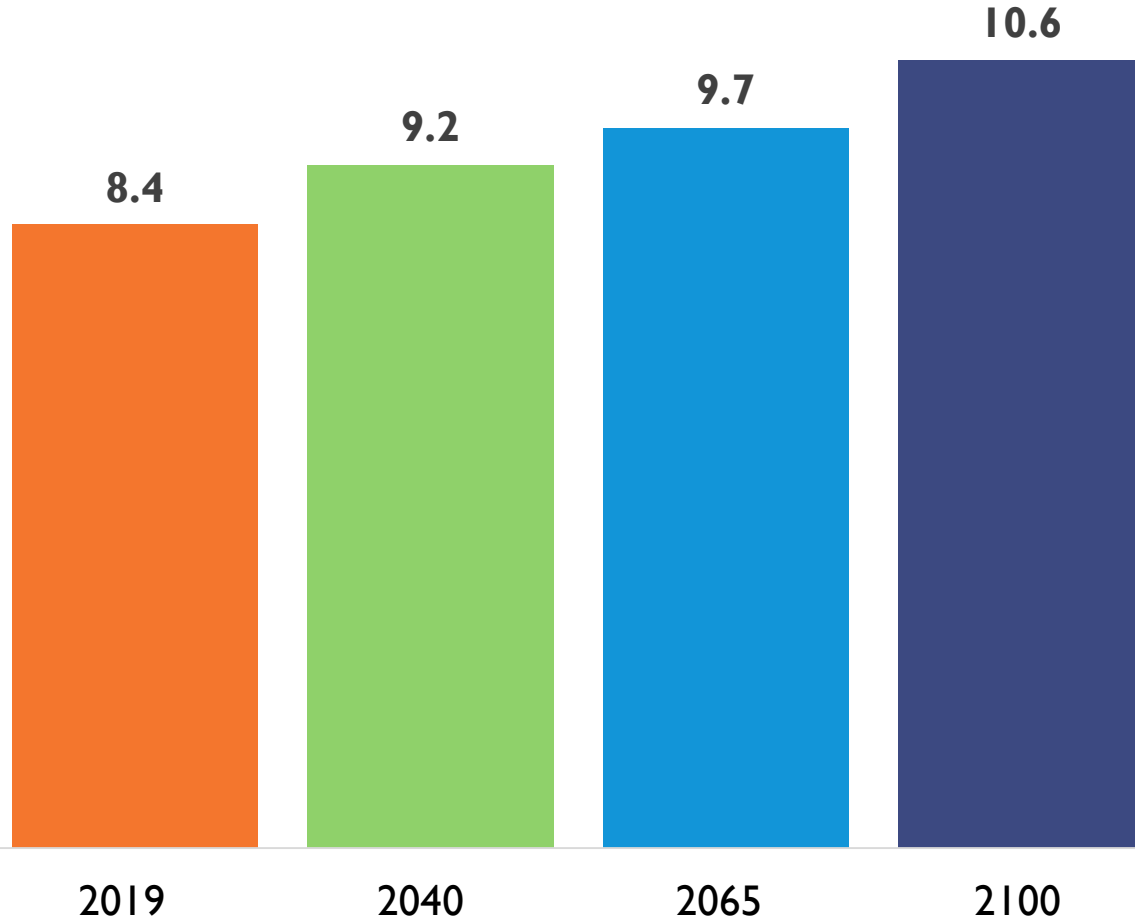


Coastal flooding

# Riverine Climate Projections for WSSC Water Service Area (100 yr. storm)

## *24-hour rainfall depth projected to increase 15% by 2065*

Rainfall depth (inches), 24-hr storm



100-year storm increases:

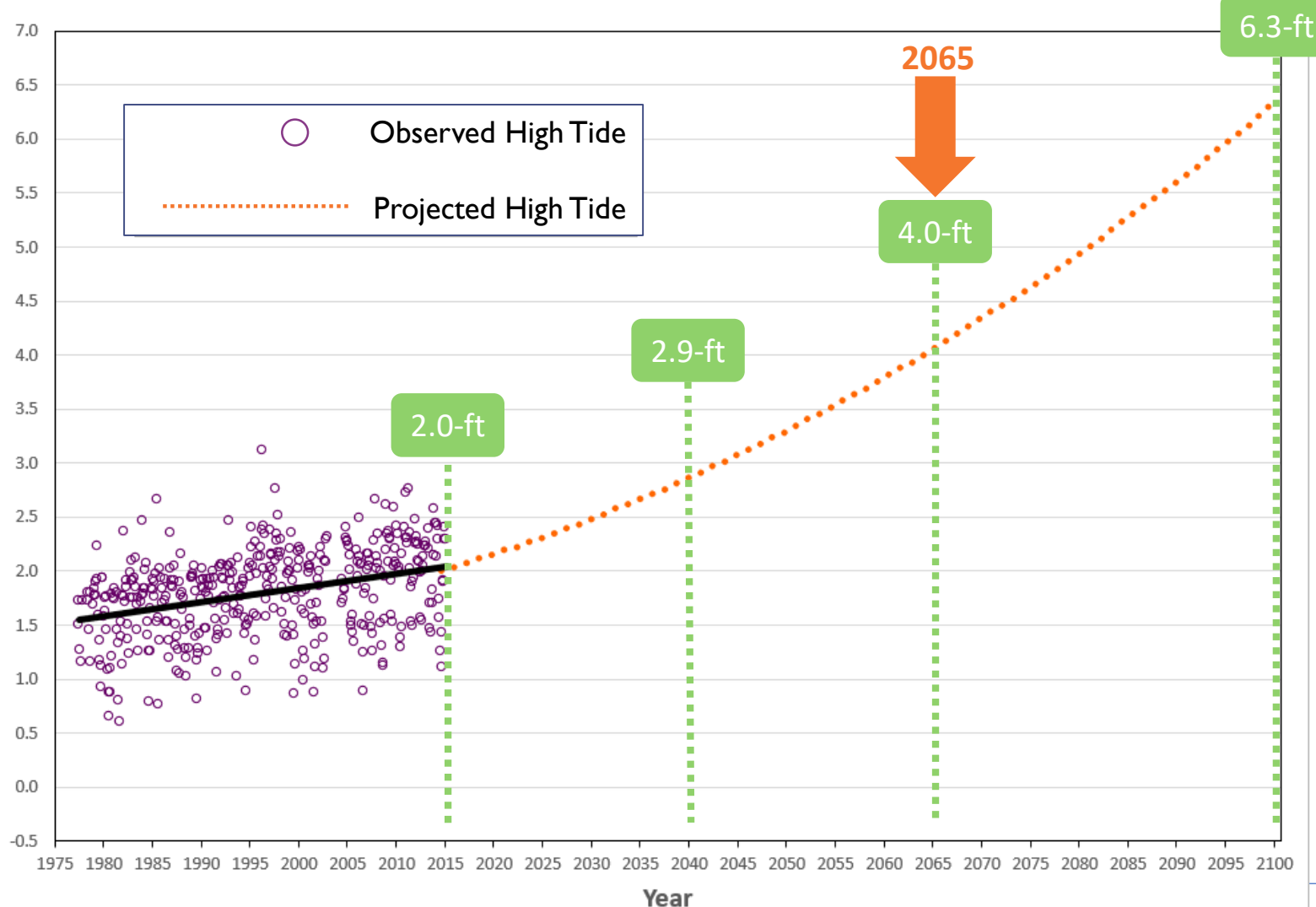
- 7 percent for 2040
- 15 percent for 2065
- 23 percent for 2100



# Coastal Climate Projections for WSSC Water Service Area

## *High tide projected to increase from 2.0 ft. to 4.0 ft. in 2065*

Projected High Tide (ft) for Washington, DC

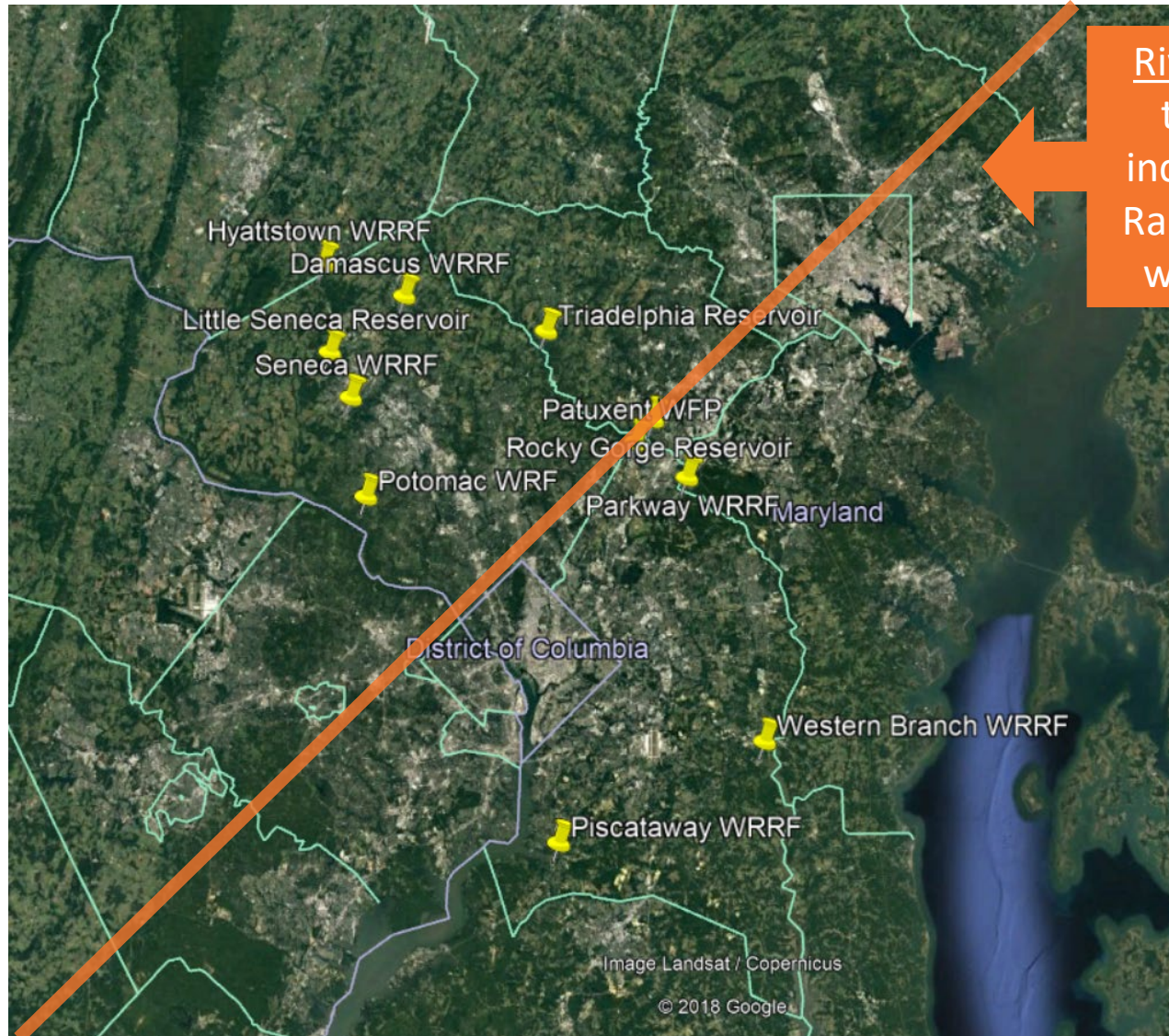


High tide projected to increase from 2.0 ft in 2015 to:

- 2.9 ft in 2040
- **4.0 ft in 2065**
- 6.3 ft in 2100

# **Facility Vulnerability Assessments and Adaptation Planning**

# Flood modeling completed for riverine and coastal facilities using climate projections



Riverine: Above the Fall Line, increased Flow / Rainfall Modeled with HEC-HMS

Coastal: Below the Fall Line, Storm Surge and Sea Level Rise Modeled with MIKE21

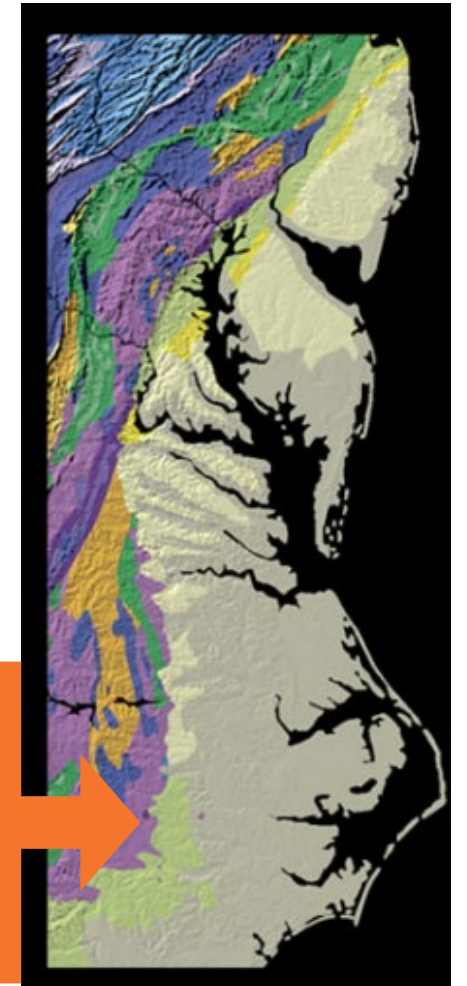


Photo credit: NationalAtlas.gov

# WSSC Water Facility Vulnerability Assessments

49 out of 200+ WSSC Water facilities are located in or near a floodplain



18 facilities prioritized for flood vulnerability assessments

All 18 have been completed through FY20.



# Vulnerability Assessments Completed to Date

*8 out of 18 found to be at risk from current or projected flooding*

## Coastal

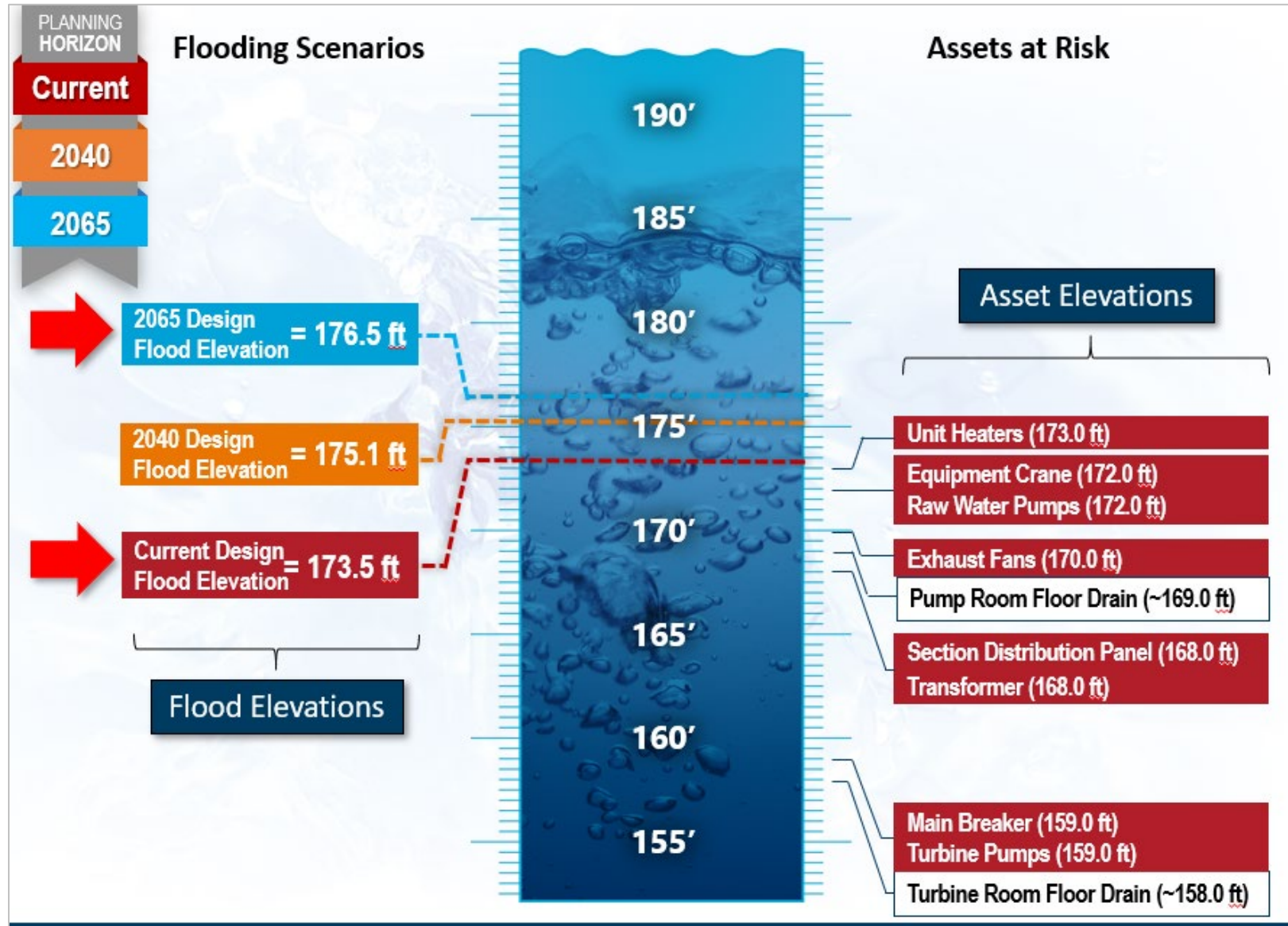
Broad Creek WWPS  
Western Branch WRRF  
Anacostia Complex  
Fort Foote WWPS  
Anacostia WWPS #1  
Anacostia WWPS #2  
Hyattsville WWPS  
Piscataway WRRF  
Colmar Manor WWPS  
Forest Heights WWPS

## Riverine

Rocky Gorge WPS  
Parkway WRRF  
Reddy Branch WWPS  
Hyattstown WRRF  
Air Park WPS  
Decatur Street WWPS  
Marlboro Meadows  
WWPS



# Sample Assessment: Rocky Gorge Water Pump Station





# Adaptation Strategies for Plants and Pump Stations

Strategy	Resiliency Level
No Action	No Protection
Sandbagging	Low
Temporary Barriers	Moderate
Seal Building/ Control Room	Moderate/ Medium
Construct Static Barrier	High
Flood-proof Equipment	High
Elevate Equipment	Very High



Temporary Movable Barriers



Source: [www.floodstopbarrier.com](http://www.floodstopbarrier.com)



Source: <http://usfloodcontrol.com/tiger-dam-products/>



Manual Flood Panels/Gates



Source: [www.floodbarriers.com](http://www.floodbarriers.com)



Source: [www.floodpanel.com](http://www.floodpanel.com)

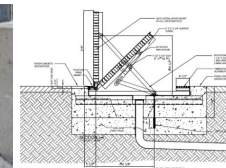


Source: [www.floodcontrolinternational.com](http://www.floodcontrolinternational.com)

Automated Flood Gates



Source: [www.floodcontrolinternational.com](http://www.floodcontrolinternational.com)



Source: [www.floodbreak.com](http://www.floodbreak.com)



# Vulnerability and Adaptation Results

(based on LOS 1 and LOS 2 assets at risk at 8 facilities found to be at risk of flooding)

Planning Horizon	LOS 1 and LOS 2 Assets at Risk*			
	Quantity	Cost of Replacement	Strategy Cost (Planning Level)	Benefit (Risk Avoided)
2065 100-year	71	\$12,720,000	\$1,104,000	\$3,931,700

\*Level of Service (LOS) 1 and (LOS) 2 include assets that maintain the safety and protection of site personnel, maintain plant hydraulic capacity, and perform primary treatment for liquid processes.

# Vulnerability and Adaptation Results

(based on all assets at risk at  
8 facilities found to be at risk of flooding)

Planning Horizon	All Assets at Risk			
	Quantity	Cost of Replacement	Strategy Cost (Planning Level)	Benefit (Risk Avoided)
2065 100-year	801	\$113,790,000	\$2,561,000	\$27,321,700

# Vulnerability and Adaptation Results Summary

- 8 out of 18 facilities were found to be at risk of flooding now or in the future (through 2065)
- Adaptation strategy costs at the 8 facilities estimated between \$1.1 and \$2.6 million to protect LOS 1 and LOS 2 assets or all assets, respectively
- Adaptation strategies would avoid between \$3.9 and \$27.9 million in direct damages for LOS 1 and LOS 2 assets or all assets, respectively
- Benefits are even higher if indirect customer impacts are considered

# Summary of Recommended Strategies, by Facility

Facility	Building/Area	All Assets at Risk				
		Quantity	Cost of Replacement	Strategy	Strategy Costs	Cumulative Risk Avoided
Anacostia Complex	B&G Building	37	\$470,000	Door Covers	\$26,000	\$80,000
Broad Creek WWPS	Generator Building	5	\$20,520,000	Seal Building	\$300,000	\$690,000
Broad Creek WWPS	Pump Station Building	26	\$22,300,000	Seal Building	\$300,000	\$2,160,000
Fort Foote WWPS	Pump Station Building	17	\$1,050,000	Door Covers	\$19,000	\$233,800
Hyattstown WWTP	Blower Building	2	\$20,000	elevate	\$200	\$1,000
Parkway WWTP	Influent Pump Station	20	\$4,960,000	Seal Building	\$250,000	\$1,370,000
Parkway WWTP	Denitrification Filter Building	58	\$8,220,000	Seal Building	\$225,000	\$2,040,000
Parkway WWTP	Denitrification Chemical Building	29	\$680,000	Seal Building	\$76,000	\$180,000
Parkway WWTP	Plant Water Pump Station	4	\$5,220,000	Seal Building	\$25,000	\$2,080,000
Parkway WWTP	Chemical Building	17	\$1,390,000	Seal Building	\$127,000	\$260,000
Parkway WWTP	RAS Pump Station	6	\$1,070,000	Seal Building	\$167,000	\$190,000
Parkway WWTP	RAS Metering Vault	2	\$170,000	Seal Building	\$65,000	\$120,000
Parkway WWTP	Backwash Metering Vault	3	\$170,000	Seal Building	\$65,000	\$110,000
Parkway WWTP	North Substation	14	\$2,730,000	Elevate	\$452,000	\$1,110,000
Parkway WWTP	Secondary Scum Pump Station	4	\$490,000	Seal Building	\$25,000	\$410,000
Reddy Branch WWTP	Pump Station Building	9	\$700,000	Temporary Door Covers	\$40,000	\$90,000
Rocky Gorge WPS	Turbine Room	49 <sup>a</sup>	\$19,180,000	Automatic valves on floor drains and more robust sump system	\$41,000	\$10,150,000
Rocky Gorge WPS	Pump Room	411	\$19,640,000	Automatic valves on floor drains and more robust sump system	\$70,000	\$4,530,000
Western Branch WWTP	Plant Water Building	18	\$2,210,000	Seal Building	\$118,000	\$150,000
Western Branch WWTP	Oil Building	19	\$420,000	Seal Building	\$52,000	\$100,000

# Summary of Recommended Strategies, by Facility: Broad Creek WWPS and Rocky Gorge RWPS

Facility	Building/Area	All Assets at Risk				
		Quantity	Cost of Replacement	Strategy	Strategy Costs	Cumulative Risk Avoided
Broad Creek WWPS	Generator Building	5	\$20,520,000	Seal Building	\$300,000	\$690,000
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Rocky Gorge WPS	Pump Room	411	\$19,640,000	Automatic valves on floor drains and more robust sump system	\$70,000	\$4,530,000



# Summary of Recommended Strategies, by Facility: Western Branch WWTP

Facility	Building/Area	All Assets at Risk				
		Quantity	Cost of Replacement	Strategy	Strategy Costs	Cumulative Risk Avoided
Western Branch WWTP	Plant Water Building	18	\$2,210,000	Seal Building	\$118,000	\$150,000
Western Branch WWTP	Oil Building	19	\$420,000	Seal Building	\$52,000	\$100,000

# Summary of Recommended Strategies, by Facility: Parkway WWTP

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Parkway WWTP	Influent Pump Station	20	\$4,960,000	Seal Building	\$250,000	\$1,370,000
Parkway WWTP	Denitrification Filter Building	58	\$8,220,000	Seal Building	\$225,000	\$2,040,000
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# Summary of Recommended Strategies, by Facility: Anacostia Complex, Fort Foote, Hyattstown, Reddy Branch

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Reddy Branch WWTP	Pump Station Building	9	\$700,000	Temporary Door Covers	\$40,000	\$90,000

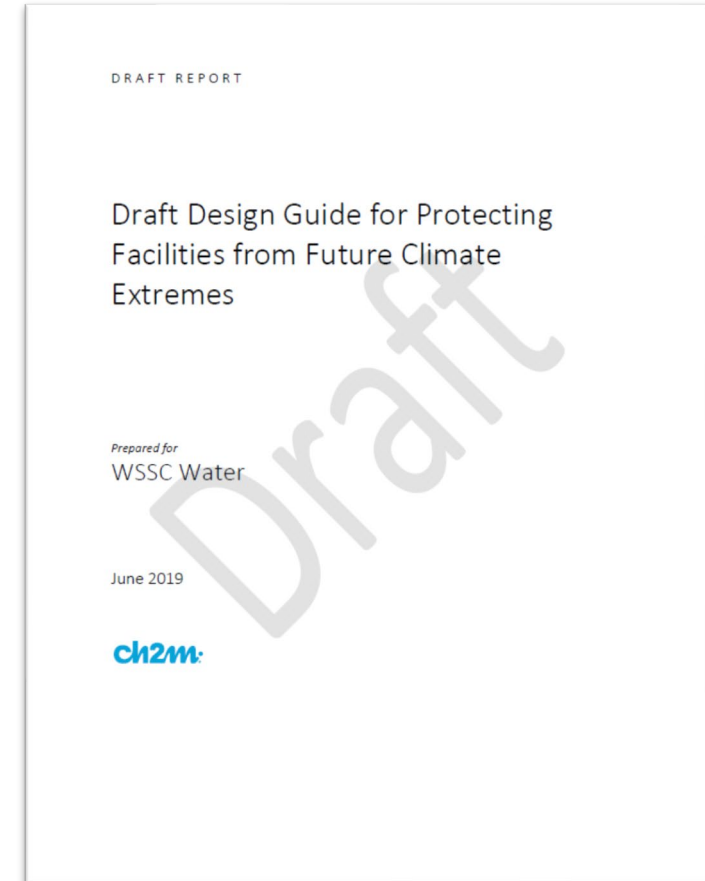
# Design Guide for Protecting Facilities from Future Climate Extremes

## Guidance for flood protection criteria

- Criteria for design of new facilities and protection of existing facilities
- Outfall tailwater design elevations for treatment process
- Site stormwater design guidance based on climate projections

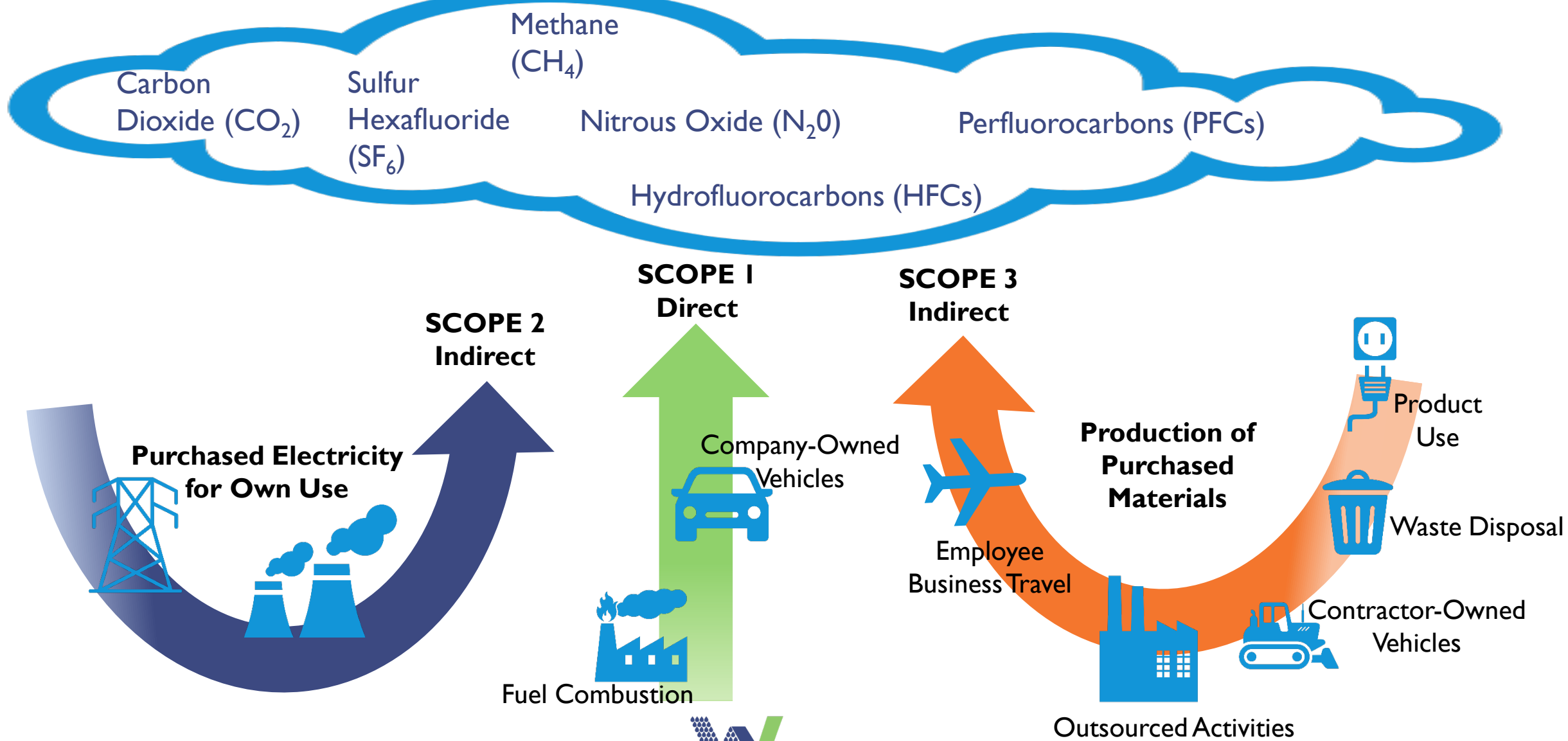
## Guidance for resiliency of electrical and Instrumentation & Controls systems

## Greenhouse gas emissions reporting guidance for new projects



# **Greenhouse Gas (GHG) Reduction Progress (Mitigation)**

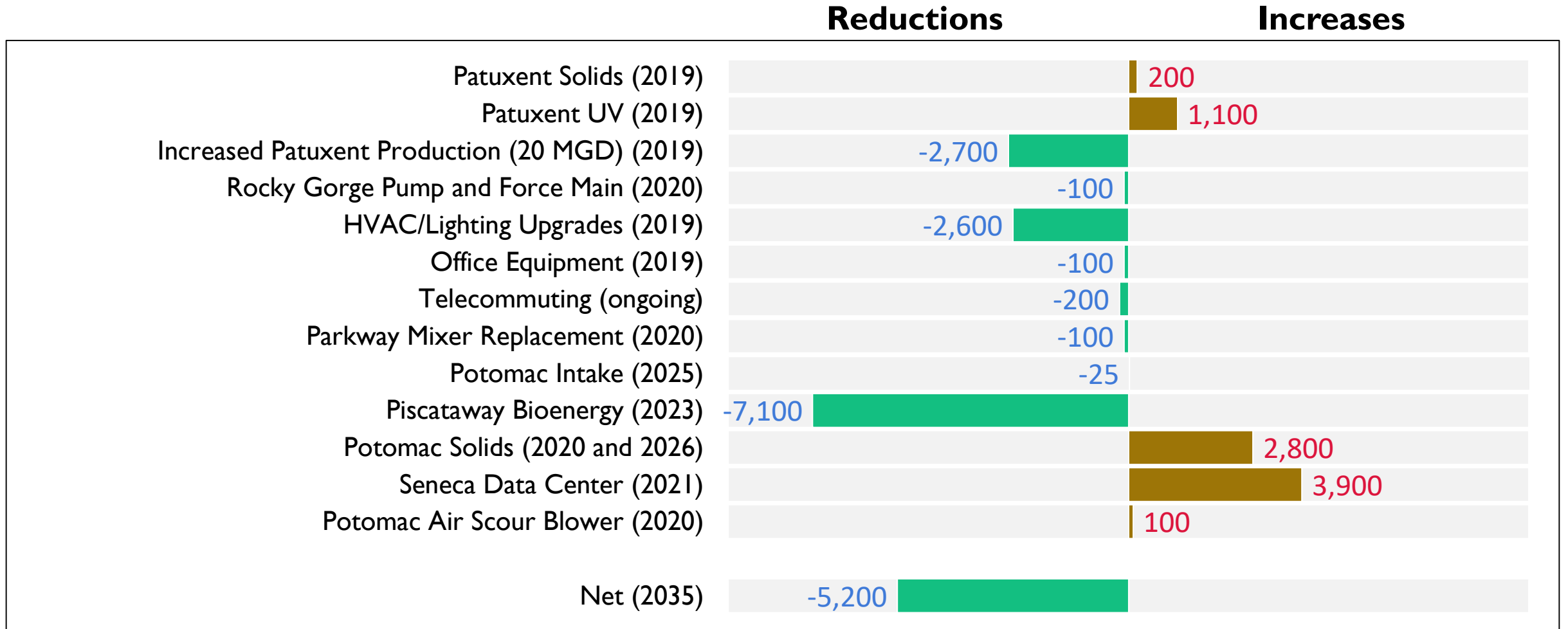
# What a Greenhouse Gas inventory includes...



Source: WRI/WBCSD GHG Protocol



# Greenhouse Gas Emissions Impacts of Current Projects

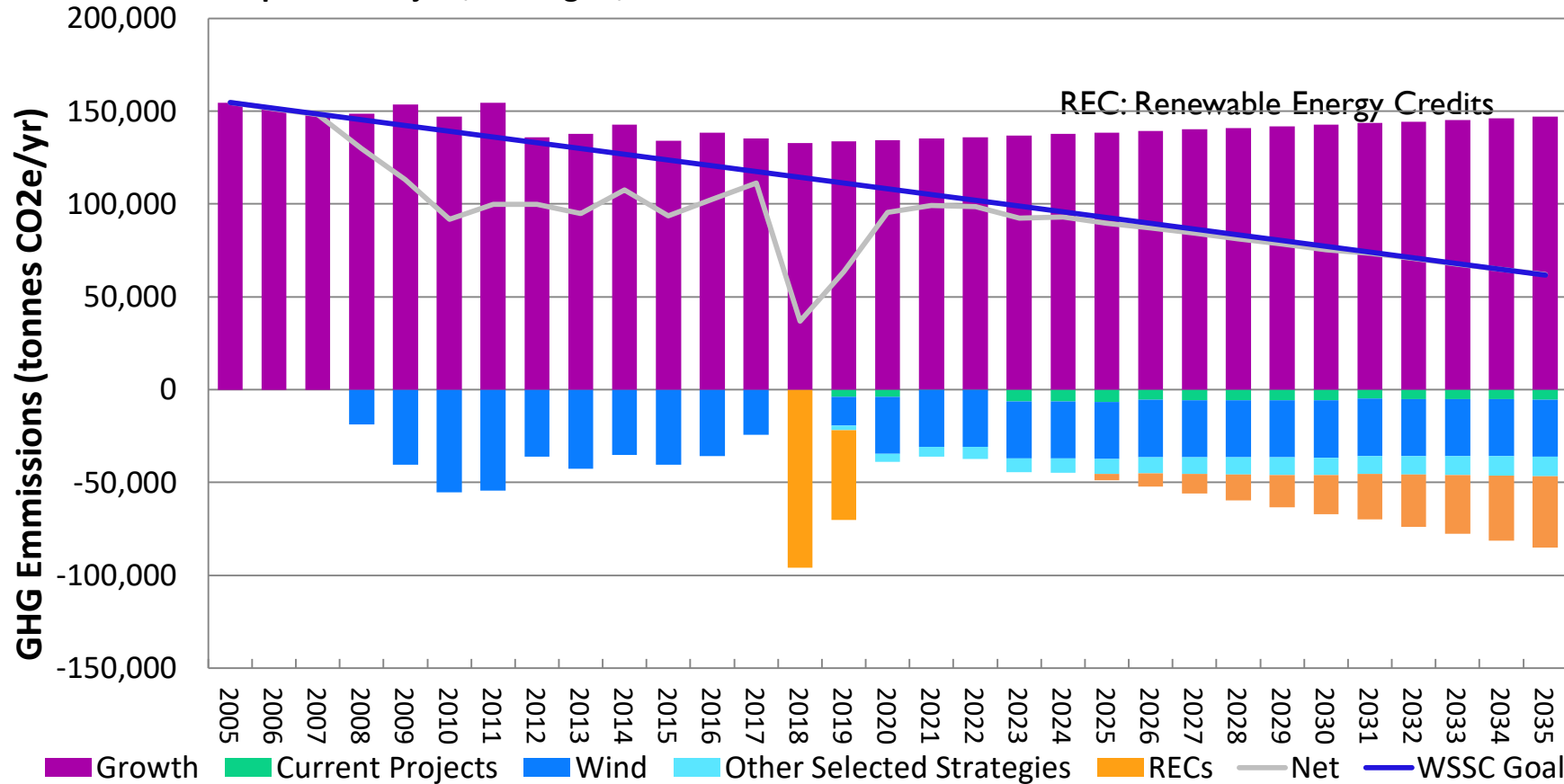


Unit: Metric tonnes of GHG emissions

# Greenhouse Gas Emissions Reductions

## WSSC Water GHG Projections (2005 - 2035)

Impact of Project, Strategies, Wind Contract and RECs vs. WSSC Water Goal



**WSSC Water**  
will reduce  
**Greenhouse Gas**  
emissions by **60%**  
by **2035**

### Future adjustments:

- Increased Tele-Commuting
- Increased use of electric vehicles
- Improved electrical efficiency of plant equipment

# Fiscal Year 2021 Tasks

## Facility Vulnerability Assessments for Linear Assets

- Complete detailed screenings and facility assessment for wastewater collection and water distribution pipelines and structures, e.g. manholes, PRVs, etc.
- Support WSSC in the implementation of Facility asset upgrades already identified.

## Design Guidelines

- Finalize Guidelines in conjunction with WSSC Engineering & Construction.

## Greenhouse Gas Inventory and Action Plan Update

- Compile CY'20 data to produce 2020 GHG inventory and Action Plan Update

# Questions?

