

Appendix C: State Profile Sheets

This appendix provides an overview of the results of a review of U.S states' post-construction stormwater standards. Each one-page profile sheet provides an overview of the standards, how each state ranked in terms of vulnerability to stormwater-related climate impacts and readiness to adapt stormwater standards, and a list of the top five recommendations for improvement. Click on your state to see the results.

Alabama	Kentucky	North Dakota
Alaska	Louisiana	Ohio
Arizona	Maine	Oklahoma
Arkansas	Maryland	Oregon
California	Massachusetts	Pennsylvania
Colorado	Michigan	Rhode Island
Connecticut	Minnesota	South Carolina
Delaware	Mississippi	South Dakota
District of Columbia	Missouri	Tennessee
Florida	Montana	Texas
Georgia	Nebraska	Utah
Hawaii	Nevada	Vermont
Idaho	New Hampshire	Virginia
Illinois	New Jersey	Washington
Indiana	New Mexico	West Virginia
Iowa	New York	Wisconsin
Kansas	North Carolina	Wyoming

STATE STORMWATER STANDARDS



ALABAMA

STATE STORMWATER MANUAL? Yes
Updated 2018

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Ensure that practices are resistant to erosion. Methods include prescribing non-erosive storm events, providing detention at the inlet, or designing practices off-line.

STATE STORMWATER STANDARDS



ALASKA

STATE STORMWATER MANUAL? Yes
Updated 2011

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
TP-47 with the note that it this storm data resource needs a critical update

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



ARIZONA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



ARKANSAS

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

Traditional target pollutant (e.g., 80% TP Removal presumed)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



CALIFORNIA

STATE STORMWATER MANUAL? Yes
Updated 2021

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

No Specific Storm

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

Provide guidance on how to modify plant selections based on changing climate conditions, including fire-resistant and drought-tolerant species.

Set specific goals for rainwater harvesting and incorporate design details for sizing of the systems.

Bioretention designs should incorporate methods to retain soil moisture such as internal water storage, or incorporating adding polymers or biochar to the media to retain soil moisture.

Review BMP materials and plantings to reduce carbon footprint and accommodate future climate change.

STATE STORMWATER STANDARDS



COLORADO

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



CONNECTICUT

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

STATE STORMWATER STANDARDS



DELAWARE

STATE STORMWATER MANUAL? Yes
Updated 2019

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Unknown or not identified

QUALITY STORMS

1-year

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



DISTRICT OF COLUMBIA STATE STORMWATER MANUAL? Yes

Updated 2020

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



FLORIDA

STATE STORMWATER MANUAL? Yes
Updated 2016

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
TP 40 or TP 49

QUALITY STORMS

Varies by District. Often First Flush or 90th Percentile.

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

STATE STORMWATER STANDARDS



GEORGIA

STATE STORMWATER MANUAL? Yes
Updated 2016

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



HAWAII

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



IDAHO

STATE STORMWATER MANUAL? Yes
Updated 2020

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

STATE STORMWATER STANDARDS



ILLINOIS

STATE STORMWATER MANUAL? Yes
Updated 2020

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual				The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Ensure that practices are resistant to erosion. Methods include prescribing non-erosive storm events, providing detention at the inlet, or designing practices off-line.

Expand permit coverage by applying standards to redevelopment, smaller sites, or outside of MS4 areas.

STATE STORMWATER STANDARDS



INDIANA

STATE STORMWATER MANUAL? Yes
Updated 2007

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Ensure that practices are resistant to erosion. Methods include prescribing non-erosive storm events, providing detention at the inlet, or designing practices off-line.

STATE STORMWATER STANDARDS



IOWA

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

Achieve Woods in Good Condition or Equivalent

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



KANSAS

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



KENTUCKY

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



LOUISIANA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



MAINE

STATE STORMWATER MANUAL? Yes
Updated 2016

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



MARYLAND

STATE STORMWATER MANUAL? Yes
Updated 2009

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
TP-40 (pre-Atlas 14)

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



MASSACHUSETTS

STATE STORMWATER MANUAL? Yes
Updated 2008

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Unknown or not identified

QUALITY STORMS

A short duration storm event (e.g., 5-yr, 1-hr)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



MICHIGAN

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



MINNESOTA

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

STATE STORMWATER STANDARDS



MISSISSIPPI

STATE STORMWATER MANUAL? Yes
Updated 2011

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



MISSOURI

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

Traditional target pollutant (e.g., 80% TP Removal presumed)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



MONTANA

STATE STORMWATER MANUAL? Yes
Updated 2017

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual				The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

Expand permit coverage by applying standards to redevelopment, smaller sites, or outside of MS4 areas.

STATE STORMWATER STANDARDS



NEBRASKA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



NEVADA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

Depth to achieve 80% Capture

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



NEW HAMPSHIRE

STATE STORMWATER MANUAL? Yes
Updated 2008

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
TP-40 (pre-Atlas 14)

QUALITY STORMS

Traditional target pollutant (e.g., 80% TP Removal presumed)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



NEW JERSEY

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed with Future storm to Pre-Developed with Current Storm

Storm Source:
Downscaled or Projected Data

QUALITY STORMS

A short duration storm event (e.g., 5-yr,1-hr)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

Incorporate advanced techniques such as Smart BMPs to provide long-term adaptability.

Review BMP materials and plantings to reduce carbon footprint and accommodate future climate change.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



NEW MEXICO

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



NEW YORK

STATE STORMWATER MANUAL? Yes
Updated 2022

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS
















90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development	  	The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation	  	
Drought	  	
Sea Level Rise	  	
Temperature	  	

READINESS

Medium

Modern Manual	   	The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation	   	
Drought	   	
Sea Level Rise	   	
Temperature	   	

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



NORTH CAROLINA

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Ensure that practices are resistant to erosion. Methods include prescribing non-erosive storm events, providing detention at the inlet, or designing practices off-line.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



NORTH DAKOTA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



OHIO

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Other. Critical Storm Identification

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

STATE STORMWATER STANDARDS



OKLAHOMA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



OREGON

STATE STORMWATER MANUAL? Yes
Updated 2016

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 2, but with more recent analyses in some cities.

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Expand permit coverage by applying standards to redevelopment, smaller sites, or outside of MS4 areas.

STATE STORMWATER STANDARDS



PENNSYLVANIA

STATE STORMWATER MANUAL? Yes
Updated 2023

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14+ (add depth as a factor of safety)

QUALITY STORMS

Water Quality Target based on long-term modeling or curves.

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

Incorporate advanced techniques such as Smart BMPs to provide long-term adaptability.

STATE STORMWATER STANDARDS



RHODE ISLAND

STATE STORMWATER MANUAL? Yes
Updated 2015

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Lists values from precip.net (Northeast Regional Climate Center)

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



SOUTH CAROLINA

STATE STORMWATER MANUAL? Yes
Updated 2005

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

Traditional target pollutant (e.g., 80% TP Removal presumed)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

Incorporate pretreatment, maintenance requirements, evaluation methods and schedule into the design standards.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



SOUTH DAKOTA

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



TENNESSEE

STATE STORMWATER MANUAL? Yes
Updated 2015

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

1-year

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Expand permit coverage by applying standards to redevelopment, smaller sites, or outside of MS4 areas.

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

STATE STORMWATER STANDARDS



TEXAS

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

High

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

STATE STORMWATER STANDARDS



UTAH

STATE STORMWATER MANUAL? Yes
Updated 2020

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

80th Percentile Storm

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Ensure that practices are resistant to erosion. Methods include prescribing non-erosive storm events, providing detention at the inlet, or designing practices off-line.

Expand permit coverage by applying standards to redevelopment, smaller sites, or outside of MS4 areas.

STATE STORMWATER STANDARDS



VERMONT

STATE STORMWATER MANUAL? Yes
Updated 2017

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS

90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Medium

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

STATE STORMWATER STANDARDS



VIRGINIA

STATE STORMWATER MANUAL? Yes
Updated 2024

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
Atlas 14

QUALITY STORMS
















90th Percentile (often about 1 inch)

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development
















VULNERABILITY

High

Land Development	  	The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation	  	
Drought	  	
Sea Level Rise	  	
Temperature	  	

READINESS

Medium

Modern Manual	   	The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation	   	
Drought	   	
Sea Level Rise	   	
Temperature	   	

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Revise stormwater quantity sizing to either over-control the storm event or match a historic peak discharge.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Add a section in the standards to include approaches and techniques that reduce the impact of sea level rise on stormwater practices, such as increasing conveyance capacity and elevating outfall inverts.

STATE STORMWATER STANDARDS



WASHINGTON

STATE STORMWATER MANUAL? Yes
Updated 2019

REFERENCES CLIMATE CHANGE? Yes

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Downscaled or Projected Data

QUALITY STORMS

Water Quality Target based on long-term modeling or curves.

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

Incorporate advanced techniques such as Smart BMPs to provide long-term adaptability.

Review BMP materials and plantings to reduce carbon footprint and accommodate future climate change.

STATE STORMWATER STANDARDS



WEST VIRGINIA

STATE STORMWATER MANUAL? Yes
Updated 2012

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Atlas 14

QUALITY STORMS

1-year

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Medium

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Add a section that discusses climate change and recommends specific adaptation measures.

For water quantity sizing, incorporate projected storm data or other options that account for increased storm depths. Ensure the precipitation data are referenced to their source.

Provide a factor of safety for conveying the water quality storm, by assuming a greater peak discharge, or providing additional freeboard.

Enhance ponding depth, storage design and filter media specifications in filtering/ bioretention systems to accommodate increasing storm intensities.

When siting stormwater BMPs, consider changes in floodplain and groundwater rise due to climate change.

STATE STORMWATER STANDARDS



WISCONSIN

STATE STORMWATER MANUAL? Yes
Updated 2022

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
Match Post-Developed to Pre-Developed conditions

Storm Source:
TP-40 permitted/Atlas 14 recommended

QUALITY STORMS

Size to achieve 90% of pre-developed annual infiltration.

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Medium

Land Development		The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

READINESS

Low

Modern Manual		The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation		
Drought		
Sea Level Rise		
Temperature		

PRIORITY RECOMMENDATIONS

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.

Include a plant list that identifies plant tolerances to drought, differing soil conditions, salt tolerance and inundation.

STATE STORMWATER STANDARDS



WYOMING

STATE STORMWATER MANUAL? No

REFERENCES CLIMATE CHANGE? No

APPLICABILITY

- Statewide
- MS4
- New Development
- Redevelopment

STORMWATER GOALS

- Flood Control
- Channel Protection
- Water Quality
- Runoff Reduction

QUANTITY STORMS

Goal:
No goal identified

Storm Source:
Unknown or not identified

QUALITY STORMS

None

GREEN STORMWATER PRACTICES

- Green Infrastructure Practices
- Low Impact Development

VULNERABILITY

Low

Land Development				The extent to which expected climate changes and future land development leaves the state vulnerable to impacts.
High Precipitation				
Drought				
Sea Level Rise				
Temperature				

READINESS

Low

Modern Manual					The extent to which state stormwater standards include modern elements and address climate change impacts.
High Precipitation					
Drought					
Sea Level Rise					
Temperature					

PRIORITY RECOMMENDATIONS

Revise or update stormwater standards to include specific design criteria and a list of acceptable practices.

Incorporate unified sizing criteria to address water quality, water quantity, channel protection and runoff reduction.

Update design storms to reference the most recent available storm data.

Provide treatment credits or requirements to implement green infrastructure.

Encourage redevelopment, impervious cover reduction, natural area conservation and tree protection and planting.