Attachment G

RMAT Climate Resilience Design Standards Tool Report

RMAT Climate Resilience Design Standards Tool Project Report

NE Wind Connector 2
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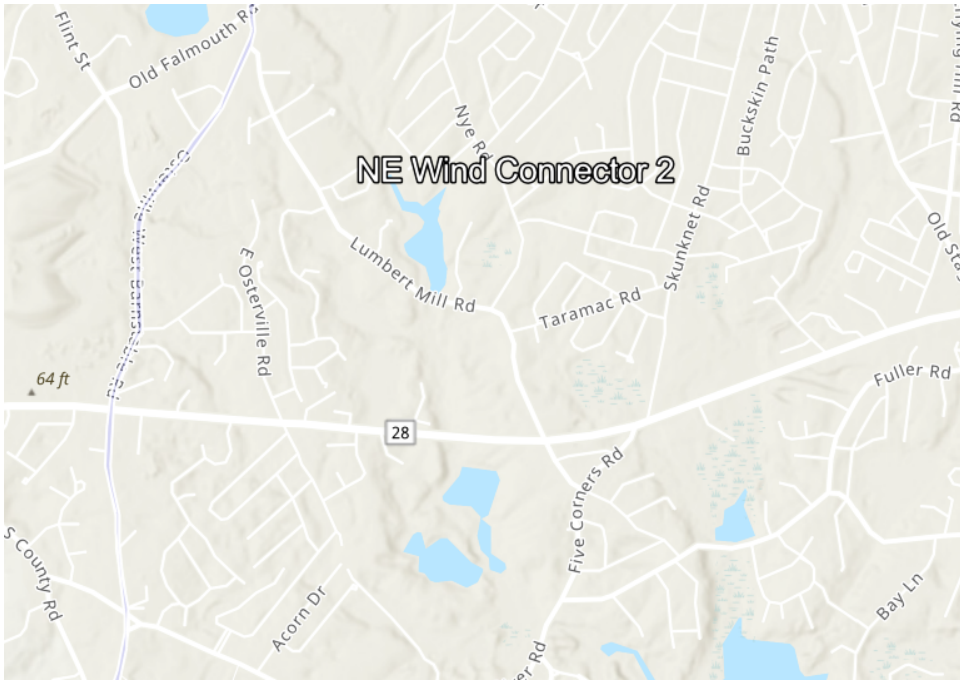
Project Summary

Link to Project

Estimated Construction Cost: $200000000.00
End of Life Year: 2055
Project within mapped Environmental Justice neighborhood: No

Ecosystem Benefits	Scores
Project Score	Low
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Urban Flooding	High Exposure
Extreme Precipitation - Riverine Flooding	Moderate Exposure
Extreme Heat	High Exposure



Asset Summary

Number of Assets: 2

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Substation including Equipment and Building and Control Room	High Risk	High Risk	High Risk	High Risk
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	High Risk	High Risk	Moderate Risk	High Risk

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Substation including Equipment and Building and Control Room	2050			200-yr (0.5%)	Tier 3
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050			100-yr (1%)	Tier 2
Extreme Precipitation					
Substation including Equipment and Building and Control Room	2050			50-yr (2%)	Tier 3
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050			25-yr (4%)	Tier 2
Extreme Heat					
Substation including Equipment and Building and Control Room	2050		90th		Tier 3
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050		90th		Tier 2

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Historic coastal flooding at project site

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Increased impervious area
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- Existing impervious area of the project site is between 10% and 50%

Extreme Precipitation - Riverine Flooding

This project received a "Moderate Exposure" because of the following:

- Part of the project is within 100ft of a waterbody
- No historic riverine flooding at project site
- The project is not within a mapped FEMA floodplain [outside of the Massachusetts Coast Flood Risk Model (MC-FRM)]
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "High Exposure" because of the following:

- Increased impervious area
- Existing trees are being removed as part of the proposed project
- Existing impervious area of the project site is between 10% and 50%
- Located within 100 ft of existing water body
- < 10 day increase in days over 90 deg. F within project's useful life

Scoring Rationale - Asset Risk Scoring

Asset - Substation including Equipment and Building and Control Room
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is greater than $100 million
- Spills and/or releases of hazardous materials would be relatively easy to clean up

Asset - Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between $30 million and $100 million
- There are no hazardous materials in the asset

Project Design Standards Output

Asset: Substation including Equipment and Building and Control Room	Building/Facility
Sea Level Rise/Storm Surge	High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: 200-yr (0.5%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Tidal Datums: Yes

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	4.6	4.3	2.6	1	0.8

Limitations: Tidal datums are recommended based on the user drawn polygon, user responses to the useful life of the selected asset, and intersection of the project polygon with the mean high water (MHW) polygon for 2030. Tidal datum values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Substation including Equipment and Building and Control Room	2050	0.5% (200-Year)	16.3	14.9	15.3

Limitations: Projected water surface elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected water surface elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Substation including Equipment and Building and Control Room	2050	0.5% (200-Year)	20.8	15.4	18

Limitations: Projected dynamic flood elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected dynamic flood elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Substation including Equipment and Building and Control Room	2050	0.5% (200-Year)	8	0	4.3

Limitations: Projected wave heights are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected wave height values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Duration of Flooding: Yes
Projected Design Flood Velocity: Yes
Projected Scour & Erosion: No

Extreme Precipitation High Risk

Target Planning Horizon: 2050
Return Period: 50-yr (2%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Substation including Equipment and Building and Control Room	2050	50-Year (2%)	8.2	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat High Risk

Target Planning Horizon: 2050
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): Yes

Asset: Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables — Infrastructure

Sea Level Rise/Storm Surge High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: 100-yr (1%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Tidal Datums: Yes

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	4.6	4.3	2.6	1	0.8

Limitations: Tidal datums are recommended based on the user drawn polygon, user responses to the useful life of the selected asset, and intersection of the project polygon with the mean high water (MHW) polygon for 2030. Tidal datum values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050	1% (100-Year)	14.7	13.9	14.1

Limitations: Projected water surface elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected water surface elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average (ft - NAVD88)
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050	1% (100-Year)	19.3	14.3	16.8

Limitations: Projected dynamic flood elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected dynamic flood elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average (Feet)
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050	1% (100-Year)	7.5	0	4.1

Limitations: Projected wave heights are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected wave height values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Duration of Flooding: Yes
Projected Design Flood Velocity: Yes
Projected Scour & Erosion: Yes

Extreme Precipitation High Risk

Target Planning Horizon: 2050
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables	2050	25-Year (4%)	7.3	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat High Risk

Target Planning Horizon: 2050
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): No

Project Inputs

Core Project Information

Name:	NE Wind Connector 2
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2055
Location of Project:	Barnstable
Estimated Capital Cost:	$200,000,000
Who is the Submitting Entity?	Private Other Park City Wind LLC Marc Bergeron (mbergeron@epsilonassociates.com)
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Design
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	New England Wind proposes to develop offshore renewable wind energy facilities in BOEM Lease Area OCS-A 0534 along with associated offshore and onshore cabling and a new onshore substation. The proposed offshore export cables will be installed beneath the seafloor via jet plow and will transition to shore via horizontal directional drilling (HDD) at the Dowse's Beach Landfall Site. The onshore export cables will be installed entirely underground in a concrete duct bank primarily within existing roadway rights-of-way. The Project will also provide an opportunity for the installation of a municipal sewer system in advance of the current planned scheduled which will reduce nitrogen loading from backyard septic systems. The Project is subject to numerous federal, state, regional, and local reviews. In addition to MEPA, the Project will require review by the following state, regional, and local entities: EFSB; DPU; MassDEP; MassDOT; MBUAR; NHESP; MHC; DMF; CCC; MVC, and the Towns of Barnstable, Edgartown, Mashpee, and Nantucket (Conservation Commissions and Town of Barnstable DPW, Town Council, Planning/Zoning, and Tree Warden). Federal agency reviews and approvals include BOEM, EPA, USACE, NMFS, USCG, FAA, and CZM. Attachment D to the ENF includes a list of permits, reviews, and approvals required for the Project and their status.
Project Submission Comments:	

Project Ecosystem Benefits

Factors Influencing Output

- ✓ Project promotes decarbonization
- ✓ Project filters stormwater using green infrastructure
- ✓ Project improves water quality
- ✓ Project improves air quality

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may provide flood protection
- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Protect public water supply by reducing the risk of contamination, pollution, and/or runoff of surface and groundwater sources used for human consumption
- ✓ Incorporate green infrastructure or nature-based solutions that recharge groundwater
- ✓ Incorporate nature-based solutions that sequester carbon carbon
- ✓ Increase biodiversity, protect critical habitat for species, manage invasive populations, and/or provide connectivity to other habitats
- ✓ Preserve, enhance, and/or restore coastal shellfish habitats
- ✓ Incorporate vegetation that provides pollinator habitat
- ✓ Identify opportunities to remediate existing sources of pollution
- ✓ Provide opportunities for passive and/or active recreation through open space
- ✓ Increase plants, trees, and/or other vegetation to provide oxygen production
- ✓ Identify opportunities to prevent pollutants from impacting ecosystems
- ✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No

Recharges groundwater	No
Protects public water supply	No
Filters stormwater using green infrastructure	Yes
Improves water quality	Yes
Promotes decarbonization	Yes
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	Yes
Prevents pollution	No
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	No
Protects land containing shellfish	No
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	Yes
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	Unsure
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	Yes
Are existing trees being removed as part of the proposed project?	Yes

Project Assets

Asset: Substation including Equipment and Building and Control Room
Asset Type: Typically Unoccupied
Asset Sub-Type: Generator
Construction Type: New Construction
Construction Year: 2024
Useful Life: 30
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Building must be accessible/operable at all times, even during natural hazard event
Identify the geographic area directly affected by permanent loss or significant inoperability of the building/facility.
State-wide or greater impacts
Identify the population directly served that would be affected by the permanent loss of use or inoperability of the building/facility.
Greater than 10,000 people
Identify if the building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
If the building/facility became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the building/facility would not be expected to result in injuries
If there are hazardous materials in your building/facility, what are the extent of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials would be relatively easy to clean up
If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Moderate – Inoperability may impact other facilities, assets, or buildings, but is not expected to affect their ability to operate
If this building/facility was damaged beyond repair, how much would it approximately cost to replace?
Greater than or equal to $100 million
Is this a recreational facility which can be vacated during a natural hazard event?
No
If the building/facility became inoperable for longer than acceptable in Question 1, what are the public and/or social services impacts?
Some alternative programs and/or services are available to support the community
If the building/facility became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected
If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the building is not able to serve or operate its intended users or function)?
Loss of building is not expected to reduce the ability to maintain government services.
If the building/facility became inoperable for longer than acceptable in Question 1, what are the impacts to loss of confidence in government (i.e. the building is not able to serve or operate its intended users or function)?
No Impact
Asset: Onshore Cable Package including Joint Bays, Transmission Cables, and Grid Interconnection Cables
Asset Type: Utility Infrastructure
Asset Sub-Type: Energy (electric, gas, petroleum, renewable)
Construction Type: New Construction
Construction Year: 2025
Useful Life: 30
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
State-wide or greater impacts

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Greater than 100,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
No
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Between $30 million and $100 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
No Impact

Report Comments

N/A