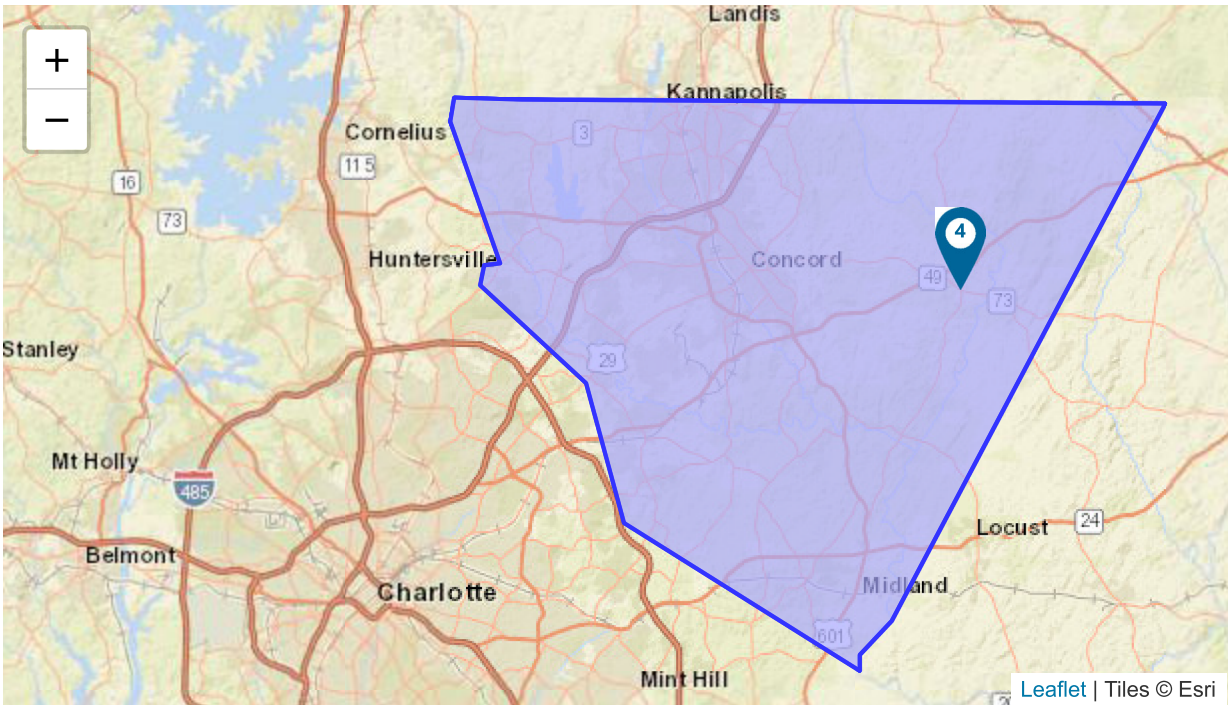
FEMA Benefit-Cost Calculator

V.6.0 (Build 20230103.1822 | Release Notes)

Benefit-Cost Analysis

Project Name: Town of Mount Pleasant Downtown Utility Duct Bank and Stormwater Mitigation



				Using 7% Discount Rate			Using 3% Discount Rate (For FY22 BRIC and FMA only)		
Map Marker ▲	Mitigation Title	Property Type	Hazard	Benefits (B)	Costs (C)	BCR (B/C)	Benefits (B)	Costs (C)	BCR (B/C)
1	Other @ Mt Pleasant, North Carolina		DFA - Infrastructure Failure	$ 4,710,347	$ 2,239,270	2.10	$ 8,781,852	$ 2,239,270	3.92
2	Other @ Mt Pleasant, North Carolina		DFA - Infrastructure Failure	$ 3,364,525	$ 1,430,000	2.35	$ 6,272,737	$ 1,430,000	4.39
3	Other @ Mt Pleasant, North Carolina		DFA - Infrastructure Failure	$ 5,976,179	$ 220,000	27.16	$ 11,141,837	$ 220,000	50.64
4	Other @ Mt Pleasant, North Carolina		DFA - Severe Storm	$ 107,326	$ 484,000	0.22	$ 169,524	$ 484,000	0.35
TOTAL (SELECTED)				**$ 14,158,377**	**$ 4,373,270**	**3.24**	**$ 26,365,950**	**$ 4,373,270**	**6.03**
TOTAL				**$ 14,158,377**	**$ 4,373,270**	**3.24**	**$ 26,365,950**	**$ 4,373,270**	**6.03**

Property Configuration

Property Title:	Other @ Mt Pleasant, North Carolina
Property Location:	28124, Cabarrus, North Carolina
Property Coordinates:	35.39891000000006, -80.43541999999997
Hazard Type:	Infrastructure Failure
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation
Other @ Mt Pleasant, North Carolina

Project Useful Life (years):	50
Project Cost:	$2,239,270
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Comments

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Project Useful Life:

50 years is the default useful life span used for major infrastructure such as power lines, communication lines, etc., the power lines that will be relocated to the concrete duct bank fall under this "Major Infrastructure" Category per FEMA's recommended useful lifespan.

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Mitigation Project Cost:

The mitigation project cost is based on the Carolina Conduit Estimate and the Duke Energy Estimate. See Attached Budget

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Annual Maintenance Cost:

The proposed project will be relocating Duke Energy power lines. These power lines will not be owned and operated by the Town of Mount Pleasant. As such, the Town's annual maintenance cost is zero.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ Mt Pleasant, North Carolina

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Utilities Properties
Other @ Mt Pleasant, North Carolina

Type of Service:	Electrical
Number of Customers Served:	5,800
Value of Unit of Service ($/person/day):	$182 Use Default:Yes
Total Value of Service Per Day ($/day):	$1,055,600

Comments

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Number of Customers Served:

There are 5,800 people (2,300 households) in the electric and communications services areas that rely on infrastructure within the project area. See attached maps

Professional Expected Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

	ELECTRICAL	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
3	1	0	0	0	0	0	1,055,600

Comments

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Damages Before Mitigation:

The Town of Mount Pleasant has experienced power loss from several events over the past 10 years. A tree fell, taking out two poles and the x-arm of another pole in 2015, causing power loss for 10 hours and 56 minutes. Two separate disruptions occurred on January 23, 2018: a dead overhanging limb disrupted power for 4 hours and 29 minutes, and a tree on the line disrupted power for 1 hour and 50 minutes.

Annualized Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
3	1,055,600	351,867
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,055,600	351,867

Professional Expected Damages After Mitigation
Other @ Mt Pleasant, North Carolina

	ELECTRICAL	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
100	1	0	0	0	0	0	1,055,600

Comments

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Damages After Mitigation:

Installing the power lines in concrete-encased duct bank will eliminate the possibility of wind, ice storms, or traffic hazards from taking out electrical service in the project area.

Annualized Damages After Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
100	1,055,600	10,556
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,055,600	10,556

Benefits-Costs Summary
Other @ Mt Pleasant, North Carolina

Total Standard Mitigation Benefits:	$4,710,347
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$4,710,347
Total Mitigation Project Cost:	$2,239,270
Benefit Cost Ratio - Standard:	2.10
Benefit Cost Ratio - Standard + Social:	2.10

Property Configuration

Property Title:	Other @ Mt Pleasant, North Carolina
Property Location:	28124, Cabarrus, North Carolina
Property Coordinates:	35.39891000000006, -80.43541999999997
Hazard Type:	Infrastructure Failure
Mitigation Action Type:	Other
Property Type:	Utilities
Analysis Method Type:	Professional Expected Damages

Cost Estimation
Other @ Mt Pleasant, North Carolina

Project Useful Life (years):	50
Project Cost:	$1,430,000
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Comments

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Project Useful Life:

50 years is the default useful life span used for major infrastructure such as power lines, communication lines, etc., the communication lines that will be relocated to the concrete duct bank fall under this "Major Infrastructure" Category per FEMA's recommended useful lifespan.

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Mitigation Project Cost:

The mitigation project cost was obtained from a cost estimate provided by Windstream. See Attached Budget

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Annual Maintenance Cost:

Since the communication lines being relocated will be owned and operated by Windstream, the Town of Mount Pleasant's maintenance cost will be zero

Damage Analysis Parameters - Damage Frequency Assessment
Other @ Mt Pleasant, North Carolina

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Utilities Properties
Other @ Mt Pleasant, North Carolina

Type of Service:	IT/Communications
Number of Customers Served:	5,800
Value of Unit of Service ($/person/day):	$130 Use Default:Yes
Total Value of Service Per Day ($/day):	$754,000

Professional Expected Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

	IT/COMMUNICATIONS	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
3	1	0	0	0	0	0	754,000

Comments

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Damages Before Mitigation:

The Town of Mount Pleasant has experienced power loss from several events over the past 10 years. A tree fell, taking out two poles and the x-arm of another pole in 2015, causing power loss for 10 hours and 56 minutes. Two separate disruptions occurred on January 23, 2018: a dead overhanging limb disrupted power for 4 hours and 29 minutes, and a tree on the line disrupted power for 1 hour and 50 minutes. Due to the Windstream communication lines being supported with the same infrastructure, similar historical damages were applied.

Annualized Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
3	754,000	251,333
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	754,000	251,333

Professional Expected Damages After Mitigation
Other @ Mt Pleasant, North Carolina

	IT/COMMUNICATIONS	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
100	1	0	0	0	0	0	754,000

Comments

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Damages After Mitigation:

Installing the communication lines in concrete-encased duct bank will eliminate the possibility of wind, ice storms, or traffic hazards from taking out IT/communication service in the project area.

Annualized Damages After Mitigation

Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
100	754,000	7,540
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	754,000	7,540

Benefits-Costs Summary

Other @ Mt Pleasant, North Carolina

Total Standard Mitigation Benefits:	$3,364,525
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$3,364,525
Total Mitigation Project Cost:	$1,430,000
Benefit Cost Ratio - Standard:	2.35
Benefit Cost Ratio - Standard + Social:	2.35

Property Configuration

Property Title:	Other @ Mt Pleasant, North Carolina
Property Location:	28124, Cabarrus, North Carolina
Property Coordinates:	35.39891000000006, -80.43541999999997
Hazard Type:	Infrastructure Failure
Mitigation Action Type:	Other
Property Type:	Roads & Bridges
Analysis Method Type:	Professional Expected Damages

Cost Estimation
Other @ Mt Pleasant, North Carolina

Project Useful Life (years):	50
Project Cost:	$220,000
Number of Maintenance Years:	50 Use Default:Yes
Annual Maintenance Cost:	$0

Comments

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Project Useful Life:

50 years is the default useful life span used for major infrastructure such as power lines, communication lines, etc. Although the Mast Arm itself is strictly a structural element, the electric lines necessary to run traffic signalization fall under this "Major Infrastructure" Category per FEMA's recommended useful lifespan.

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Mitigation Project Cost:

The initial project cost was estimated by NC DOT to be $200,000. See Attached Budget

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Annual Maintenance Cost:

The new Mast Arm to be constructed, allowing traffic signalization to be removed from the "Atlas Pole", will be owned and maintained by NC DOT. Since the Town of Mount Pleasant will not assume ownership of the new Mast Arm, the Town's maintenance cost will be zero.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ Mt Pleasant, North Carolina

Year of Analysis was Conducted:	2022
Year Property was Built:	0
Analysis Duration:	10 Use Default:Yes

Roads and Bridges Properties
Other @ Mt Pleasant, North Carolina

Estimated Number of One-Way Traffic Detour Trips per Day:	11,000
Additional Time per One-Way Detour Trip (minutes):	10
Number of Additional Miles:	22
Federal Rate ($):	0.625 Use Default:Yes
Economic Loss Per Day of Loss of Function ($):	216,516.67

Comments

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Number of Trips:

Per NC DOT Maintenance Records, the Annual Average Daily Trips along West Franklin Street during 2021 was ≈ 11,000.

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Time per Trip:

The one-way trip from Albemarle to Concord, through Hwy 73 takes approximately 17 minutes. The same trip being detoured via Hwy 49 takes approximately 27 minutes. Thus. the additional time per one-way detour was estimated to be 10 minutes

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Number of Miles:

This is the shortest detour through a comparable major corridor that would be fit for heavy traffic. See attached "Proposed Detour Map"

Professional Expected Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
1	5	0	0	0	0	0	1,082,583

Annualized Damages Before Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
1	1,082,583	1,082,583
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	1,082,583	1,082,583

Professional Expected Damages After Mitigation
Other @ Mt Pleasant, North Carolina

	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Impact (days)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
1	3	0	0	0	0	0	649,550

Comments

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Damages After Mitigation:

The expected damages after the installation of Traffic Signalization and conversion to a Mast Arm were projected to occur with a similar frequency, but to have less impact.

Annualized Damages After Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
1	649,550	649,550
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	649,550	649,550

Benefits-Costs Summary
Other @ Mt Pleasant, North Carolina

Total Standard Mitigation Benefits:	$5,976,179
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$5,976,179
Total Mitigation Project Cost:	$220,000
Benefit Cost Ratio - Standard:	27.16
Benefit Cost Ratio - Standard + Social:	27.16

Property Configuration

Property Title:	Other @ Mt Pleasant, North Carolina
Property Location:	28124, Cabarrus, North Carolina
Property Coordinates:	35.39891000000006, -80.43541999999997
Hazard Type:	Severe Storm
Mitigation Action Type:	Other
Property Type:	Non-Residential Building
Analysis Method Type:	Professional Expected Damages

Cost Estimation
Other @ Mt Pleasant, North Carolina

Project Useful Life (years):	30
Project Cost:	$484,000
Number of Maintenance Years:	30 Use Default:Yes
Annual Maintenance Cost:	$0

Comments

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Project Useful Life:

This proposed project includes mitigation activities related to culverts, flood storage and diversion, and stream restoration. All of these activities have a default/recommended Project Useful Life of 30 years.

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Mitigation Project Cost:

The proposed mitigation project cost was based on the combination of the NCDOT Drainage Investigation Narrative and the Downtown Stormwater Study.

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Annual Maintenance Cost:

Per feedback from FEMA the maintenance cost was estimated as $0 in order to have the BCA and project budget, which cannot contain management costs, match.

Damage Analysis Parameters - Damage Frequency Assessment
Other @ Mt Pleasant, North Carolina

Year of Analysis was Conducted:	2022
Year Property was Built:	2010
Analysis Duration:	13 Use Default:Yes

Comments

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Year Built:

The Town's most recent drainage improvements occurred in 2010 based on NCDOT and Town Records.

Professional Expected Damages Before Mitigation

Other @ Mt Pleasant, North Carolina

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
10	50,000	0	0	0	0	0	50,000
25	75,000	0	0	0	0	0	75,000
50	100,000	0	0	0	0	0	100,000
100	200,000	0	0	0	0	0	200,000

Comments

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Damages Before Mitigation:

Based on the StormCAD model provided by McAdams, the existing storm infrastructure begins to fail during a 10-year storm. This failure is what leads to water flooding the Town buildings near the intersection of Main Street and NC 73. As storms causing damage intensify, the estimated damages increase significantly.

Annualized Damages Before Mitigation

Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
10	50,000	3,674
25	75,000	1,732
50	100,000	1,414
100	200,000	2,000
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	425,000	8,820

Professional Expected Damages After Mitigation
Other @ Mt Pleasant, North Carolina

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
Recurrence Interval (years)	Damages ($)	Category 1 ($)	Category 2 ($)	Category 3 ($)	Number of Volunteers	Number of Days	Damages ($)
50	5,000	0	0	0	0	0	5,000
100	10,000	0	0	0	0	0	10,000

Comments

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Damages After Mitigation:

Based on StormCAD modelling conducted by McAdams, the proposed stormwater infrastructure mitigation would allow the Town's stormwater system to more effectively convey 10 and 25-year storms while limiting damage done as a result of the 50 and 100-year storms

Annualized Damages After Mitigation
Other @ Mt Pleasant, North Carolina

Annualized Recurrence Interval (years)	Damages and Losses ($)	Annualized Damages and Losses ($)
50	5,000	71
100	10,000	100
	Sum Damages and Losses ($)	Sum Annualized Damages and Losses ($)
	15,000	171

Benefits-Costs Summary
Other @ Mt Pleasant, North Carolina

Total Standard Mitigation Benefits:	$107,326
Total Social Benefits:	$0
Total Mitigation Project Benefits:	$107,326
Total Mitigation Project Cost:	$484,000
Benefit Cost Ratio - Standard:	0.22
Benefit Cost Ratio - Standard + Social:	0.22