BENEFIT-COST ANALYSIS METHODOLOGY
TOWN OF MOUNT PLEASANT
DOWNTOWN UTILITY DUCT BANK AND STORMWATER MITIGATION

SUBMITTED TO

FEMA BUILDING RESILIENT INFRASTRUCTURE AND

COMMUNITIES GRANT PROGRAM

Cabarrus County, NC

January 6, 2023

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1.0 PROJECT OVERVIEW

This methodology report consists of information used to complete the benefit-cost analysis (BCA), using FEMA's BCA toolkit, for the installation of utility duct banks for electric and communications infrastructure and stormwater mitigation measures within downtown Mount Pleasant. Providing this infrastructure will save the Town valuable time, effort, and money during severe storms. Determined from information entered into the BCA toolkit, the combined cost of the project is ***$4,373,270*** and the benefits provided to the Town are ***$26,365,950***, resulting in a benefit-cost ratio of ***6.03*****.** Information provided to FEMA's toolkit is broken down below to highlight the driving factors of this resiliency project and how the Town of Mount Pleasant will greatly benefit from this project.

1.1 Project Background

The proposed project includes the installation of utility duct banks for electric and communications infrastructure and stormwater mitigation measures within downtown Mount Pleasant. The project area is centered at the intersection of NC Highway 73 (Franklin Street) and Main Street, where a single utility pole holds up two Duke Energy backbone feeder lines, Windstream phone and internet service primary lines, Spectrum/Charter internet and cable TV service lines, and North Carolina Department of Transportation (NCDOT) traffic signalization for the intersection on a state highway. **Table 1** below represents the coordinates of the project area. Additionally, **Appendix A** includes maps of the areas where improvements are proposed.

Table 1. System Improvement Locations

Project Area	Latitude	Longitude
Town of Mount Pleasant	35.3989100	-80.4354199

1.2 Proposed Mitigation and Level of Protection

The Town of Mount Pleasant will contract a qualified engineering and construction team to implement the proposed project. The proposed project will greatly reduce the risk of risks of loss of electric and telecommunications services within the Town of Mount Pleasant along with portions of eastern Cabarrus County and western Stanly County. Additionally, the proposed project will greatly reduce the risk of risks the existing stormwater system becoming overwhelmed by future flood events. Failure events consist of windstorms, ice storms, traffic hazards, and stormwater overflowing onto and causing damage to commercial and residential properties throughout the Town, as well as inundating roads and preventing travel.

The proposed project will entail relocating the critical utility lines into underground, concrete encased duct banks, as well as replacing existing failing and/or undersized stormwater infrastructure within the system with new infrastructure that has appropriate capacity. This replacement/upsizing process will allow for the Town's stormwater system to convey stormwater more efficiently. Additionally, replacing failing infrastructure will reduce the amount of time that the Town maintenance staff will have address problem areas, giving them the freedom to focus on other issues with the Town's infrastructure, such as the water or wastewater systems the Town operates.

2.0 HISTORIC EVENTS

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. See attached power outage reports in **Appendix E**.

Hurricane Florence has been the most recent major flood event that has caused the stormwater system to fail. Mount Pleasant's stormwater system has also experienced flooding from smaller storms such as 10, 25, and 50-year storms, which produce enough rainfall to cause failure within the system. The Town of Mount Pleasant wants to have a proactive approach, not a reactive approach as it currently does. Community safety is of highest priority for the Town of Mount Pleasant and the stormwater infrastructure component of this project will help to provide the community with a safe and reliable stormwater system.

Figure 1: NC 73 – looking west

Figure 2: NC 73 – looking southeast

Figure 3: NC 73 – looking south

Figure 4: NC 73 – looking south

Above in **Figures 1 through 4** are pictures of NC-73, which is a major transportation corridor between the county seats of Albemarle and Concord. The stormwater system was overwhelmed, and rainfall backed up into the street and pooled there. This rendered the roadways unnavigable for the residents for a period. The drainage study existing conditions analysis map (attached in **Appendix F**) shows how the system is overwhelmed during major storm events.

3.0 PROJECT AND MAINTENANCE COSTS

The total combined project cost for the individual components of the proposed project is represented below in **Table 2**.

Table 2. Initial Capital Cost and Annual Maintenance Costs

Mitigation Activity	Project Cost	Annual Maintenance Cost
Stormwater Mitigation	$440,000	$0.00
Traffic Signalization Mast Arm Conversion	$220,000	$0.00
Utility Duct Bank Installation	$2,239,720	$0.00
IT/Communication Conversion	$1,430,000	$0.00

4.0 PROJECT USEFUL LIFE

The 2009 FEMA BCA Reference Guide Project Useful Life Summary Table attached in **Appendix C**, was referenced for calculations with the BCA Excel Tool. An export of the Benefit-Cost Analysis summary can be found in **Appendix B**.

5.0 SERVICE POPULATION

According to the US Census and FEMA criteria, the Town of Mount Pleasant is classified as an Economically Disadvantaged Rural Community (EDRC) with a population of under 3,000 and a per capita income of less than 80% of the national per capita income, based on best available data. The Town of Mount Pleasant has a population of 1,671 according to the 2020 US Decennial Census (data.census.gov). According to the latest available American Community Survey (2020-21), the per capita income of the Town of Mount Pleasant is $27,757, which is 72.4% of the national per capita income of $38,332 (data.census.gov).

The downtown utility duct bank and stormwater mitigation project will not only impact the Town's population of 1,671 people by improving the resilience of the Town's historic and economic core, but also the 4,700 people in the Mount Pleasant Rural Fire District and the 5,800 people (2,300 households) in the electric and communications services areas that rely on infrastructure within the project area, including portions of rural eastern Cabarrus County and western Stanly County to which the Mount Pleasant Fire Department provides automatic aid response. The project will also help protect transportation infrastructure from stormwater flooding for the 10,500 average daily vehicle trips along NC Highway 73, east-west travel between two county seats, Concord (Cabarrus) and Albemarle (Stanly). See attached service area map in **Appendix A**.

6.0 EFFECTS OF FLOODING AND POWER OUTAGES

6.1 Causes

6.1.1 Causes of Power Outage(s)

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. See attached power outage reports in **Appendix E**.

6.1.2 Causes of Flooding

Mount Pleasant's stormwater system has experienced flooding from two major events in the last 5 years, Hurricane Florence in September of 2018, and once in 2020. At the time of each event, areas of the downtown were inundated with water due to the stormwater system's inability to convey the extreme amounts of rainfall. Roadways were backed up, preventing residents from using their vehicles and the flood waters caused damage to infrastructure, as well as commercial and residential properties.

6.2 Service Impacts

The stormwater system's inability to effectively convey rainfall has adverse impacts on the Town and its citizens. These inefficiencies within the system lead to flooding that causes damages to all kinds of property throughout the Town. In some cases, water levels get high enough to flood National Register District Structures, causing water damage. In addition to the buildings getting damaged, flood water can damage Town-owned infrastructure such as the stormwater system itself, roadways, and components of the water and wastewater systems. The Town has a goal to decrease reactive maintenance that arises from these storm events. The resources could be better allocated towards proactive projects that address issues before they become a major nuisance to the Town and its citizens. For these reasons, the stormwater system infrastructure improvements will benefit all citizens of the Town of Mount Pleasant.

7.0 RESULTS

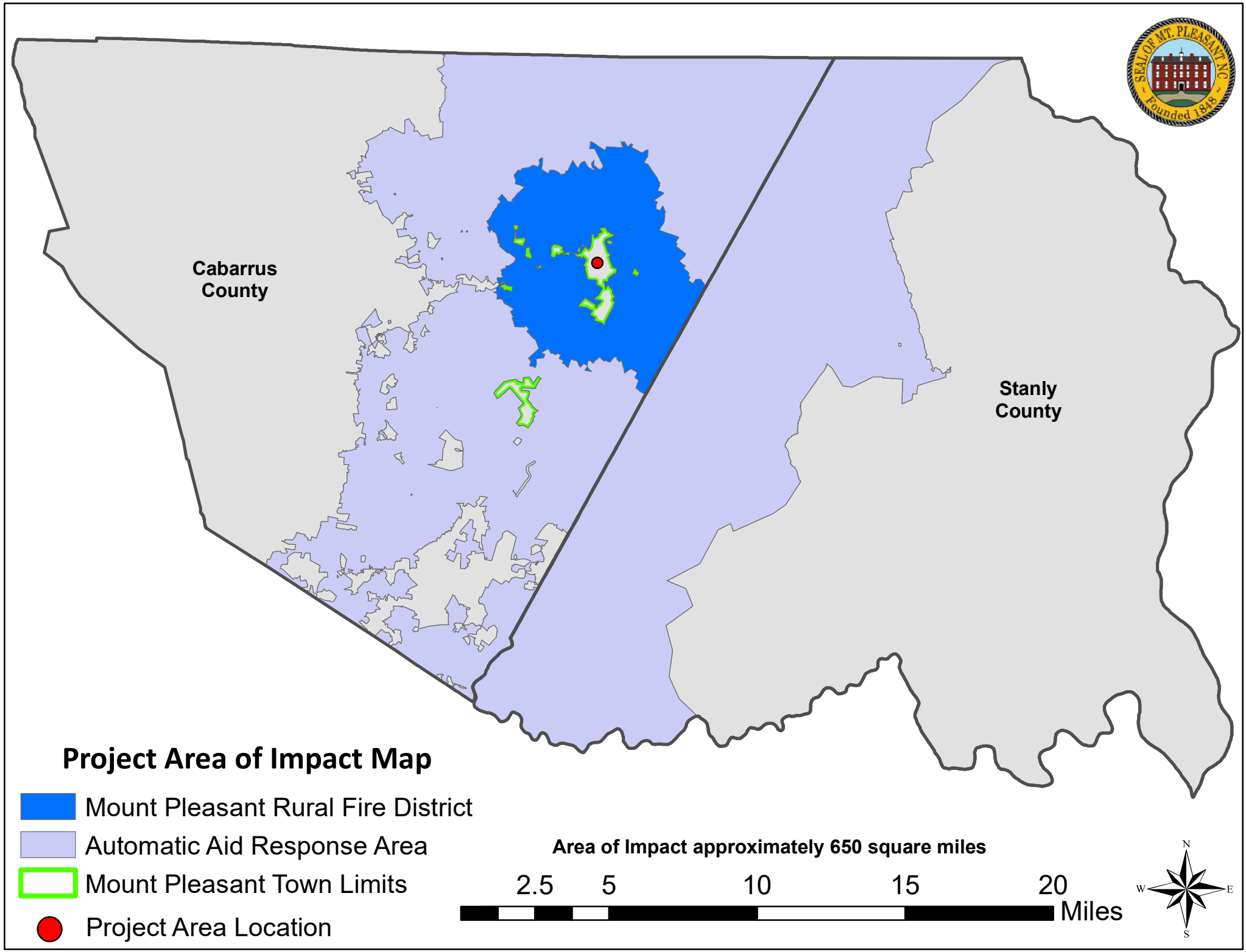
Using the benefit-cost analysis tool provided by FEMA GO through Microsoft Excel, the table below shows the Benefit-Cost Ratio for the Downtown Utility Duct Bank and Stormwater Mitigation Project. After all the information required was input into the provided BCA Tool, the determined benefit-cost ratio is 6.44. **Table 4** below shows a summary of the total benefits and costs associated with the proposed project.

Table 3. BCA Toolkit Results (3% Discount Rate)

Project	Benefits	Costs	Benefit-Cost Ratio
Stormwater Mitigation	$169,524	$484,000	0.35
Traffic Signalization Mast Arm Conversion	$11,141,837	$220,000	50.64
Utility Duct Bank Installation	$8,781,852	$2,239,270	3.92
IT/Communication Conversion	$6,272,737	$1,430,000	4.39
Project Total	**$26,365,950**	**$4,373,270**	**6.03**

The total benefits from the implementation of the Downtown Utility Duct Bank and Stormwater Mitigation Project approximately outweigh the cost of the project by over 6 times. Not only will the project provide reliable electrical and communications service to the areas served by the Town, but the Town of Mount Pleasant will maintain a clean and useful environment the next time a large rain event occurs.

APPENDIX A: PROJECT LAYOUT MAPS


Cabarrus
County
Stanly
County
Project Area of Impact Map
Mount Pleasant Rural Fire District
Automatic Aid Response Area
Mount Pleasant Town Limits
Project Area Location
Area of Impact approximately 650 square miles
2.5
5
10
15
20
Miles
N
W
E
S

Place

Mount Pleasant town, North Carolina

Mount Pleasant town, North Carolina is a city, town, place equivalent, and township located in North Carolina.

// United States / North Carolina / Mount Pleasant town, North Carolina

Display Sources

Populations and People
Total Population
1,671
P1 | *2020 Decennial Census*

Education
Bachelor's Degree or Higher
18.9%
S1501 | *2020 American Community Survey 5-Year Estimates*

Housing
Total Housing Units
692
H1 | *2020 Decennial Census*

Families and Living Arrangements
Total Households
729
DP02 | *2020 American Community Survey 5-Year Estimates*

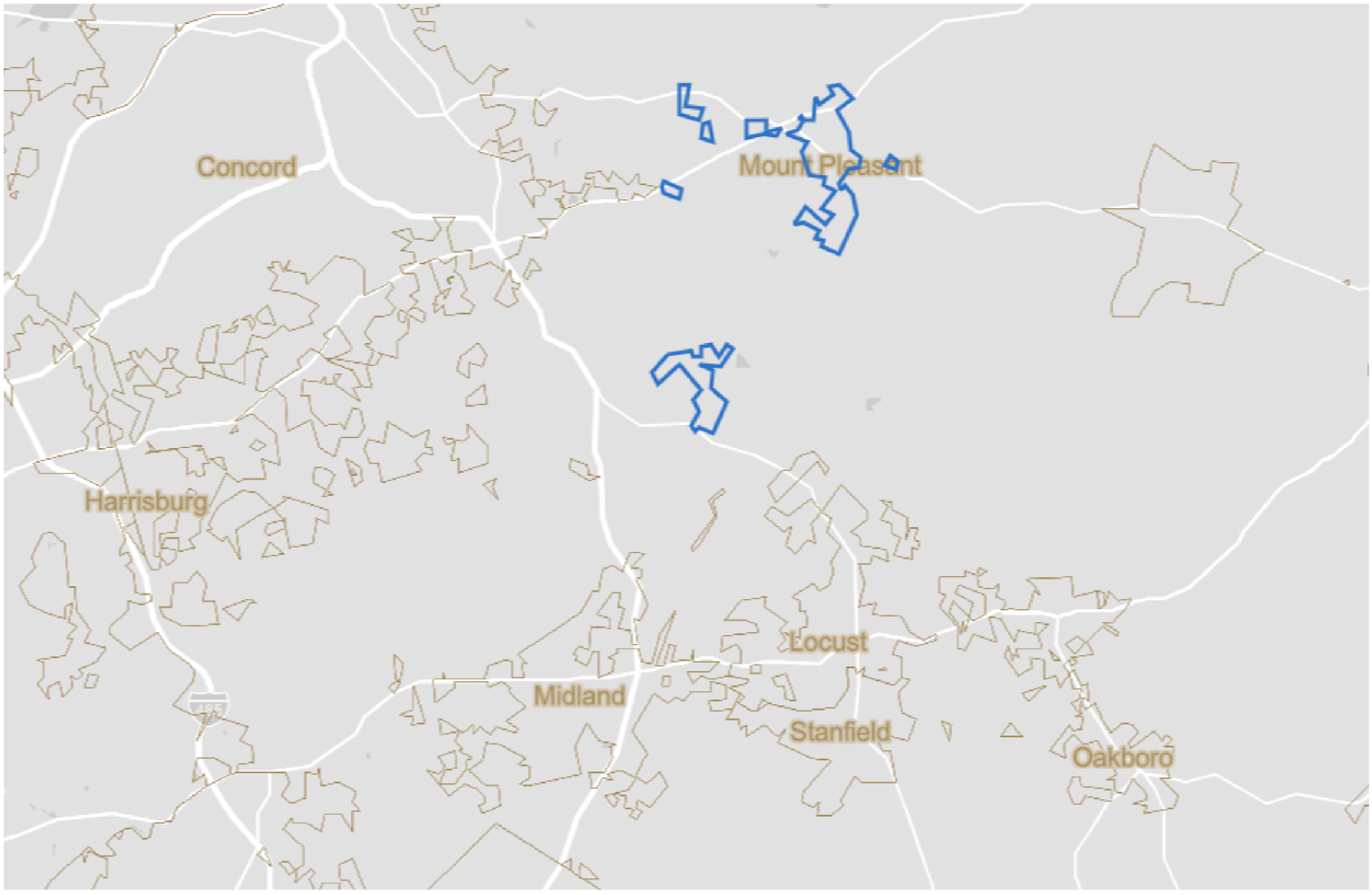
Income and Poverty
Median Household Income
$60,078
S1901 | *2020 American Community Survey 5-Year Estimates*

Employment
Employment Rate
56.4%
DP03 | *2020 American Community Survey 5-Year Estimates*

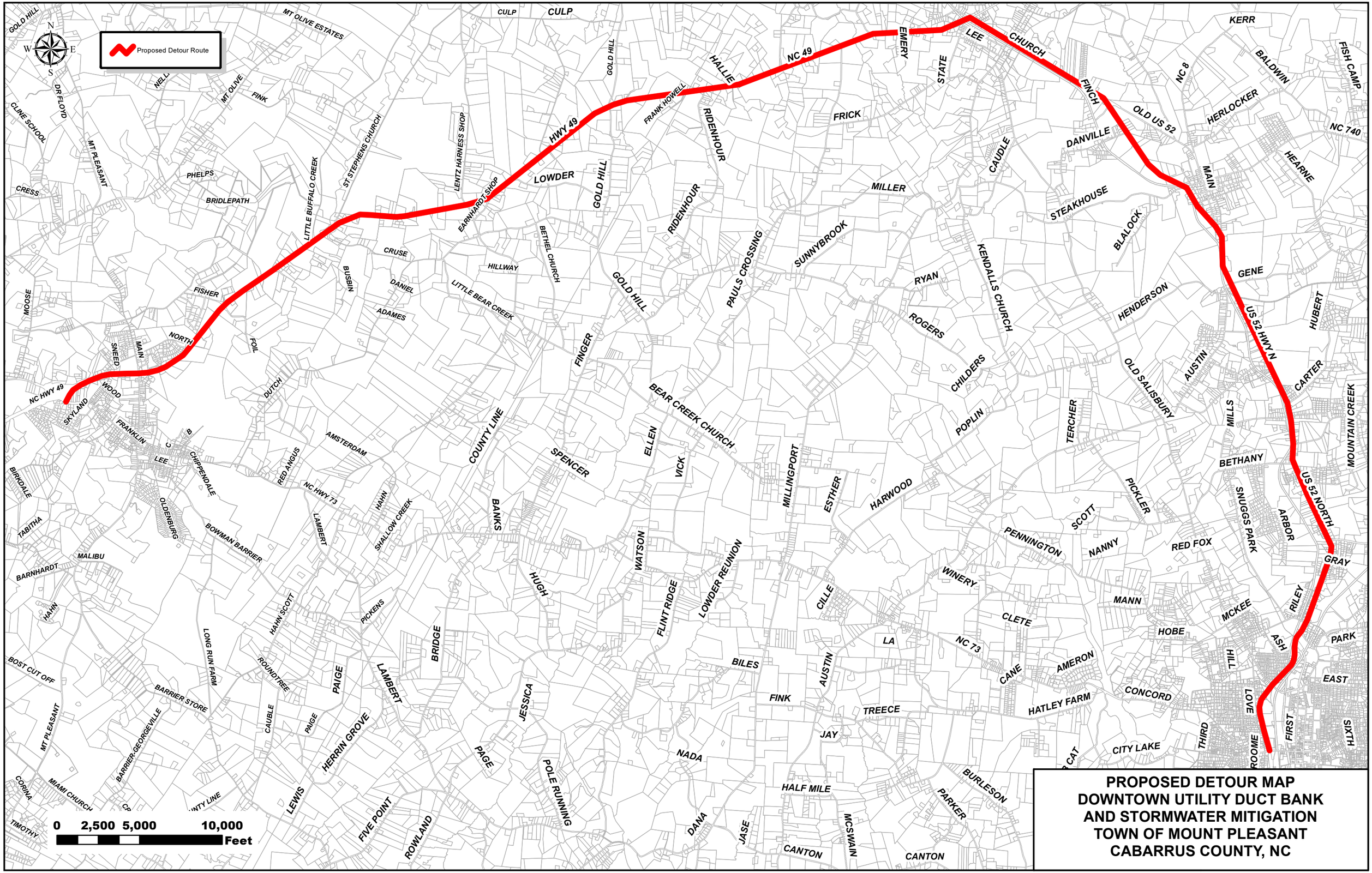
Health
Without Health Care Coverage
7.2%
S2701 | *2020 American Community Survey 5-Year Estimates*

Race and Ethnicity
Hispanic or Latino (of any race)
48
P2 | *2020 Decennial Census*

Mount Pleasant town, North Carolina Reference Map



Source: U.S. Census Bureau


Proposed Detour Route
N
S
E
W
0 2,500 5,000 10,000
Feet
PROPOSED DETOUR MAP
DOWNTOWN UTILITY DUCT BANK
AND STORMWATER MITIGATION
TOWN OF MOUNT PLEASANT
CABARRUS COUNTY, NC
NC 49
HWY 49
US 52 HWY N
US 52 NORTH
OLD US 52
NC HWY 49
NC HWY 73
NC 73
NC 8
NC 740
CHURCH
LEE
FINCH
MAIN
STATE
EMERY
HALLIE
FRANK HOWELL
RIDENHOUR
FRICK
CAUDLE
DANVILLE
KERR
BALDWIN
FISH CAMP
HERLOCKER
HEARNE
STEAKHOUSE
BLALOCK
GENE
HENDERSON
HUBERT
CARTER
AUSTIN
OLD SALISBURY
MILLS
MOUNTAIN CREEK
TERCHER
POPLIN
KENDALLS CHURCH
RYAN
ROGERS
CHILDERS
SUNNYBROOK
PAULS CROSSING
MILLER
GOLD HILL
LOWDER
EARNHARDT SHOP
LENTZ HARNESS SHOP
ST STEPHENS CHURCH
LITTLE BUFFALO CREEK
MT OLIVE ESTATES
MT OLIVE
FINK
NELL
DR FLOYD
CLINE SCHOOL
MT PLEASANT
CRESS
PHELPS
BRIDLEPATH
CULP
GOLD HILL
BETHEL CHURCH
HILLWAY
CRUSE
DANIEL
ADAMES
BUSBIN
FISHER
NORTH
FOIL
DUTCH
WOOD
SNEED
MAIN
MOOSE
SKYLAND
FRANKLIN
LEE
CHIPPENDALE
RED ANGUS
AMSTERDAM
OLDENBURG
BOWMAN BARRIER
LAMBERT
HAHN
SHALLOW CREEK
COUNTY LINE
SPENCER
ELLEN
VICK
BEAR CREEK CHURCH
LITTLE BEAR CREEK
FINGER
BANKS
WATSON
FLINT RIDGE
LOWDER REUNION
HUGH
MILLINGPORT
ESTHER
HARWOOD
CILLE
BIRKDALE
TABITHA
MALIBU
BARNHARDT
HAHN
HAHN SCOTT
PICKENS
LONG RUN FARM
BRIDGE
ROUNDTREE
PAIGE
LAMBERT
BOST CUT OFF
BARRIER STORE
MT PLEASANT
BARRIER-GEORGEVILLE
CAUBLE
PAGE
HERRIN GROVE
LEWIS
FIVE POINT
ROWLAND
CORINA
MIAMI CHURCH
TIMOTHY
JESSICA
POLE RUNNING
NADA
DANA
JASE
MCSWAIN
CANTON
HALF MILE
BURLESON
PARKER
JAY
FINK
TREECE
AUSTIN
BILES
LA
CLETE
WINERY
MANN
HOBE
MCKEE
RILEY
ASH
PARK
EAST
HILL
LOVE
BROOME
FIRST
SIXTH
THIRD
CITY LAKE
CONCORD
HATLEY FARM
CANE
AMERON
PENNINGTON
NANNY
SCOTT
PICKLER
BETHANY
SNUGGS PARK
ARBOR
RED FOX
GRAY

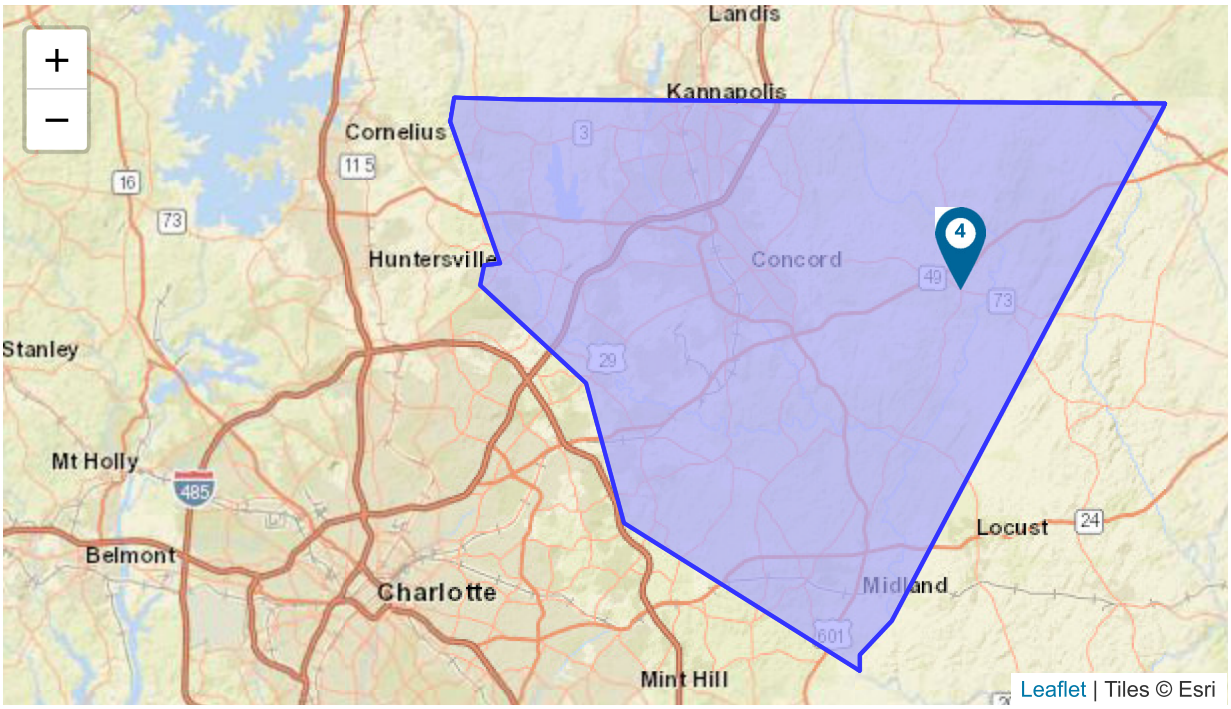
APPENDIX B: BENEFIT-COST ANALYSIS TOOLKIT EXPORT

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

-

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.

-

Mitigation Project Cost:

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

-

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

•

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

•

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

-

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

-

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.

-

Mitigation Project Cost:

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

-

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

-

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

-

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

-

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.

-

Mitigation Project Cost:

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

-

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

-

Number of Trips:

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

-

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

-

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

-

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

-

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.

-

Mitigation Project Cost:

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

-

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

•

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

-

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

APPENDIX C: BUDGET REFERENCE FROM SUBAPPLICATION

Town of Mount Pleasant
Downtown Utility Duct Bank and Stormwater Mitigation Project
Cost Estimate

ITEM	DESCRIPTION	COST CATEGORY	PHASE #	COST	SOURCE
1	Duke Energy Feasibility Study	Engineering	Pre-Award	$ 15,000	Duke Energy Invoice
2	Utility Duct Bank Construction Plans	Engineering	Pre-Award	$ 10,700	Carolina Conduit Proposal
			Pre-award Cost Total	**$ 25,700**	
3	Stormwater Construction Plans	Engineering	1	$ 40,000	LKC Engineering Estimate
4	Easement Acquisition	Legal	1	$ 10,000	Town Attorney/Town Engineer Estimate
			Phase 1 Cost Total	**$ 50,000**	
5	Duct Bank Installation	Construction	2	$ 1,600,000	Carolina Conduit Estimate
6	Duke Energy/Spectrum Conversion & Pole Removal	Construction	2	$ 400,000	Duke Energy Estimate minus Carolina Conduit
7	Windstream Conversion & Pole Removal	Construction	2	$ 1,300,000	Windstream Estimate
8	Stormwater Mitigation-W. Franklin St.	Construction	2	$ 200,000	NCDOT Drainage Investigative Narrative
9	Stormwater Mitigation-Additional Downtown Areas	Construction	2	$ 200,000	Downtown Stormwater Study
10	Traffic Signalization Mast Arm and Conversion	Construction	2	$ 200,000	NCDOT Estimate
			Phase 2 Cost Total	**$ 3,900,000**	
	Project Cost Estimate			$ 3,975,700	
	Project Contingency (10%)			$ 397,570	
	Total Project Cost Estimate			**$ 4,373,270**	

APPENDIX D: FEMA 2009 BCA REFERENCE GUIDE - PROJECT USEFUL LIFE TABLE

Project Type	Useful Life (years)		Comment
	Standard Value	Acceptable Limits (documentation required)	
Acquisition/Relocation			
All Structures	100	100	
Elevation			
Residential Building	30	30–50	
Non-Residential Building	25	25–50	
Public Building	50	50–100	
Historic Buildings	50	50–100	
Structural/Non-Structural Building Project			
Residential Building Retrofit	30	30	
Non-Residential Building Retrofit	25	25–50	
Public Building Retrofit	50	50–100	
Historic Building Retrofit	50	50–100	
Roof Diaphragm Retrofit	30	30	Roof hardening and roof clips
Tornado Safe Room – Residential	30	30	
Tornado Safe Room – Community	30	30–50	Retrofit or small community safe room ≤ 16 people (30 yr), New (50 yr)
Non-Structural Building Elements	30	30	Ceilings, electrical cabinets, generators, parapet walls, or chimneys
Non-Structural Major Equipment	15	15–30	Elevators, HVAC, sprinklers
Non-Structural Minor Equipment	5	5–20	Generic contents, racks, shelves
Infrastructure Projects			
Major Infrastructure (minor localized flood reduction projects)	50	35–100	
Concrete Infrastructure, Flood Walls, Roads, Bridges, Major Drainage System	50	35–50	
Culverts (concrete, PVC, CMP, HDPE, etc.)	30	25–50	Culvert **with** end treatment (i.e., wing walls, end sections, head walls, etc.)
	10	5–20	Culvert **without** end treatment (i.e., wing walls, end sections, head walls, etc.)
Pump Stations, Substations, Wastewater Systems, or Equipment Such as Generators	50	50	Structures
	5	5–30	Equipment
Hurricane Storm Shutters	15	15–30	Depends on type of storm shutter
Utility Mitigation Projects	50	50–100	Major (power lines, cable, hardening gas, water, sewer lines, etc.)
	5	5–30	Minor (backflow values, downspout disconnect, etc.)

Project Type	Useful Life (years)		Comment
	Standard Value	Acceptable Limits (documentation required)	
Miscellaneous Equipment Projects			
Equipment Purchases	2	2–10	Small, portable equipment (e.g., computer)
	30	5–30	Heavy equipment
Wildfire Mitigation Projects			
Defensible Space/Hazardous Fuels Reduction	4	2–4	Brush – Depends on drought conditions
Vegetation Management	1	1	Grass – Depends on geographic location and precipitation
	20	3–20	Forest canopy – Must be maintained every 3 years
Ignition-Resistant Construction	10	10–30	Depends on type of construction and materials used

APPENDIX E: DUKE ENERGY POWER OUTAGE REPORTS

DUKE ENERGY POWER OUTAGE REPORTS

Circuit	Substation	Time Off	Time On	Duration	Outage ID	Facility ID	Clearing Dev	Ph-ABC	Device Type	Failure Mode	WE	Eq	Mfg-Spec	Count	Cust Off	Duration	Cust Mins	Crew Remarks
22320401	MT PLEASANT	01/08/2014 19:46	01/08/2014 19:46	0:00	9164871	38348879	01	ABC	S-CKT	11	--	--	--	--	264	0	0	CIRCUIT BLINKED TRIP 50 TARGETS CG FMAG 1209...RESET TARGETS...CHAGER1
22320401	MT PLEASANT	01/10/2017 15:18	01/10/2017 15:18	0:00	10238727	38348879	01	ABC	S-CKT	11	07	--	--	--	333	0	0	SHOWS ALARMS AND BLINKS, BUT NO FAULT INFO ON ONE LINE AND NO COUNTS INSIDE STATION. WAYNE TALBERT CHECKED-*** See ev#
22320401	MT PLEASANT	08/29/2017 14:41	08/29/2017 14:41	0:00	10480165	38348879	02	ABC	S-CKT	28	--	--	--	--	335	0	0	--
22320401	MT PLEASANT	10/02/2017 11:22	10/02/2017 11:23	0:01	10529214	38348879	11	ABC	S-CKT	28	00	--	--	--	332	1	332	TCC was relay testing the 44KV line feeding Roberta Rd, Mt. Pleasant & Coleman... blinked high side.. power back on.. pmsecre
22320401	MT PLEASANT	12/18/2021 12:05	12/18/2021 12:09	0:04	12173840	38348879	01	ABC	S-CKT	41	--	--	--	--	352	3	1056	Transmission outage, line down, power restored
22320401	MT PLEASANT	12/18/2021 12:43	12/18/2021 12:44	0:01	12173892	38348879	01	ABC	S-CKT	28	--	--	--	--	352	0	0	BLINK PRIOR TO OUTAGE
22320401	MT PLEASANT	12/18/2021 12:44	12/18/2021 13:36	0:52	12173903	38348879	11	ABC	S-CKT	41	02	38	UU		352	51	17952	failed insulator due to rainTRANSMISSION OUTAGE
22320401	MT PLEASANT	03/05/2022 15:47	03/05/2022 20:03	4:16	12253007	38348879	01	ABC	S-CKT	16	00	PP			350	256	89600	NELSON BRADSHAW/ 704-305-3242 TO CO POLE // CTR'S TO WORK -- BROKE POLE @ 7921 W FRANKLIN ST // eta 5 minutes.. POSSIBLE - CKT LOCKOUT --- BROKE POLE DUE TO CAR VS POLE ECC Tech Billy Green 704-519-6810 - 25 min eta at 1609 no switching options- no tie points -- @ 1653, MADE TECH AWARE OF JUMPERS THAT COULD BE CUT & GET BREAKER BACK ON, HE STATED HE WAS IN A PICKUP TRUCK BUT HE HAD CONTACTED THE DUTY SUPV. & CONTRACTORE ARE ON THE WAY... ONCE CONTRACTORS ARE ONSITE, THE LAST PHASE CAN BE CUT LOOSE FROM THE POLE & FLOATED AND CAN HEAT BREAKER UP @ THAT POINT --- -- PER DUTY / MARTY - NELSON BRADSHAW TO CHANGE OUT POLE --
22320401	MT PLEASANT	03/05/2022 15:47	03/05/2022 15:47	0:00	12253006	38348879	01	ABC	S-CKT	28	--	--	--	--	350	0	0	Blink Targets BG FLMAG 1427

DUKE ENERGY POWER OUTAGE REPORTS

Resp System	Cause IEEE	Plan Event	Action Taken	Fault Location	Additional Remarks
OH	11	F2	10	--	--
OH	11	F2	10	--	--
--	28	F2	10	--	--
11	28	F2	53	--	--
11	41	F2	10	--	--
--	28	F2	10	--	--
11	41	F2	46	MT PLEASANT SUBSTATION	R&I - KILLION - (3) EVENTS TOTAL ON 12-18. TRIPS ON TRANSMISSION AT 8:04, 12:05 AND A SUBSTATION LOCKOUT AT 12:43. ALL EVENTS WERE DUE TO FAILED INSULATORS ON THE TIE DISCONNECTS FOR (MT PLEASANT NO1 AND MT PLEASANT NO2) AT THE UNION EMC DEL 2.
OH	09	F2	47	7921 W FRANKLIN ST	R&I - KILLION - REVIEWED OUTAGE AND CORRECTED CODING
--	28	F2	10	--	--

DUKE ENERGY POWER OUTAGE REPORTS

Circuit	Substation	Time Off	Time On	Duration	Outage ID	Facility ID	Clearing Dev	Ph-ABC	Device Type	Failure Mode	WE	Eq
22321201	MT PLEASANT	01/05/2014 13:46	01/05/2014 13:47	0:01	9158121	38348891	01	ABC	S-CKT	28	00	--
22321201	MT PLEASANT	07/13/2015 21:18	07/13/2015 21:18	0:00	9701744	38348891	01	ABC	S-CKT	11	04	--
22321201	MT PLEASANT	07/13/2015 21:18	07/14/2015 08:14	10:56	97017601	38348891	01	ABC	S-CKT	TD	04	P1
22321201	MT PLEASANT	08/18/2015 21:07	08/18/2015 23:01	1:54	9747067	38348891	01	ABC	S-CKT	LX	04	--
22321201	MT PLEASANT	09/02/2016 18:03	09/02/2016 18:03	0:00	10128138	38348891	01	ABC	S-CKT	LX	17	29
22321201	MT PLEASANT	06/21/2017 01:00	06/21/2017 01:00	0:00	10401578	38348891	01	ABC	S-CKT	VB	02	--
22321201	MT PLEASANT	10/02/2017 11:22	10/02/2017 11:23	0:01	10529215	38348891	11	ABC	S-CKT	28	00	--
22321201	MT PLEASANT	01/23/2018 02:56	01/23/2018 02:56	0:00	10637408	38348891	01	ABC	S-CKT	03	--	--
22321201	MT PLEASANT	01/23/2018 02:57	01/23/2018 07:26	4:29	10637531	38348891	01	ABC	S-CKT	LR	17	38
22321201	MT PLEASANT	12/18/2021 12:05	12/18/2021 12:09	0:04	12173834	38348891	01	ABC	S-CKT	41	--	--
22321201	MT PLEASANT	12/18/2021 12:43	12/18/2021 12:44	0:01	12173893	38348891	01	ABC	S-CKT	28	--	--
22321201	MT PLEASANT	12/18/2021 12:44	12/18/2021 13:36	0:52	12173896	38348891	11	ABC	S-CKT	D1	02	38
22321201	MT PLEASANT	11/18/2022 00:09	11/18/2022 01:32	1:23	12543374	38348891	11	ABC	S-CKT	07	00	76

DUKE ENERGY POWER OUTAGE REPORTS

Mfg-Spec	Count	Cust Off	Duration	Cust Mins
--	01	1067	0	0
--	--	1063	0	0
EL	24	1062	656	696672
PC	--	1065	114	121410
--	--	1074	0	0
--	--	1078	0	0
--	--	1078	1	1078
--	--	1084	0	0
OW	--	760	269	204440
--	--	1156	3	3468
--	--	1156	0	0
UU		1156	51	58956
UU		1163	82	95366

DUKE ENERGY POWER OUTAGE REPORTS

Crew Remarks

CIRCUIT BLINKED TARGETS TRIP 50 A C FMAG 1355

MOMENTARTY OUTAGE/BLINKS. STORMS IN AREA. CLEARING RMOâS.-*** Shows a A,B,C fault at 2302 amps.//tdu

CIR ON AT 0817....DOMS ISSUE/WILL NOT CLEAR/DMS SUPPORT WORKING ON INTEGRITY CHECKJ439/brandon taylor c/o pole and tx...oil spill inc# 00140316... back on @0817//...cir outage cleared at 0817. can't get ticket to clear.....mis-phased TX @ FACID 32918946.

CMPL 08/18/2015 23:10 on MWMS by KA345SVC1; RSN: ; RMK: MADE FOLLOW-UP TO GET PECAN TREE TRIMMED AWAY FROM 3 PHASE PRIMARY AND WOOD X-ARM, NEEDS TO BE COMPLETED ASAP TO AVOID ANOTHER OUTAGE AT LOCATION.

BLINK 50 TRIP BG FMAG 1528--See Ev#10128143-- trees-80t/tdu

BLINK.. RESET AT AB.. MAG 2005.. DGM JJK6168..-- relat to ev#10401614-200L operation/tdu

TCC was relay testing the 44KV line feeding Roberta Rd, Mt. Pleasant & Coleman... blinked high side.. power back on.. pmsecre

BLINK // SEE OUTAGE

DEAD OVERHANGING LIMB ON LINE AT COLLEGE AND MOUNT PLEASANT ON 1201 BUT BREAKER DID NOT OPEN CAUSING STATION TX TO OPEN // TCC ISOLATED 1201 BREAKER TO HEAT UP 1202

Transmission outage, line down, power restored

BLINK PRIOR TO OUTAGE

failed insulator due to rainTRANSMISSION OUTAGE

ECC BILLY GREEN 704-519-6810 DROPPED MT PLESANT RET 1201 AND 1202 CKTS TO C/O STATION SWITCH...

DUKE ENERGY POWER OUTAGE REPORTS

Resp System	Cause IEEE	Plan Event	Action Taken	Fault Location
OH	28	F2	10	--
OH	11	F2	10	--
OH	03	F2	47	1200 N College St./tdu
OH	03	F2	37	1453 NORTH MAIN ST, MT PLEASANT
OH	28	F2	10	--
OH	28	F2	10	--
11	28	F2	53	--
--	03	F2	10	SEE OUTAGE
OH	03	F2	D2	COLLEGE AND MOUNT PLEASANT, 35.403, -80.437
11	41	F2	10	--
--	28	F2	10	--
11	41	F2	MP	MT PLEASANT SUBSTATION
11	05	P2	54	MT PLEASANT RET SUB

DUKE ENERGY POWER OUTAGE REPORTS

Additional Remarks

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Danger tree WO#8084936-- DEFECTIVE TREE FELL BEFORE CREWS worked WO#8084936- DEFECTIVE ELM TREE FELL 24' from cnt or r/w. Broke 2 40/5 poles and one x-arm on another pole. One of the broken pole was guyed. This was at or near 1200 N College St in Mt Pleasant. Coord=35'24,151--080'26,197-,// No other fun./tdu

KA345/Matt Linker....Ckt locked out due to limbs from live pecan tree on primary at 1453 N Main St in Mt Pleasant. LIVE OVER GROWN PECAN TREE limbs was up and through and over primary lines. This site was already trimmed and no damage to primary at 1453 N Main St. // See WO#8425145 to cut pecan trees at 999 N Main St.

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TOMS Event: 2018-0038-SE
1201 failed to trip upon fault and backed up to Bank 2 CS
Unknown fault on distribution circuit initiated the outage. Josh Blackmon reports that auxiliary switch was out of adjustment causing the A finger that is in the trip circuit to just barely open. Switch was adjusted, breaker was tested and put back in service. (1/23/2018 MLH)
DEAD WILLOW OAK LIMB was at MPCI St. and N College
Coordinates: 35.403, -80.437

--

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R&I - KILLION - (3) EVENTS TOTAL ON 12-18. TRIPS ON TRANSMISSION AT 8:04, 12:05 AND A SUBSTATION LOCKOUT AT 12:43. ALL EVENTS WERE DUE TO FAILED INSULATORS ON THE TIE DISCONNECTS FOR (MT PLEASANT NO1 AND MT PLEASANT NO2) AT THE UNION EMC DEL 2.

R&I - KILLION - REVIEWED OUTAGE AND CORRECTED CODING

DUKE ENERGY POWER OUTAGE REPORTS

Circuit	Substation	Time Off	Time On	Duration	Outage ID	Facility ID	Clearing Dev	Ph-ABC	Device Type
22321202	MT PLEASANT	06/13/2013 17:31	06/13/2013 17:31	0:00	8964415	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	08/27/2016 16:12	08/27/2016 16:12	0:00	10121114	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	09/12/2017 03:42	09/12/2017 06:57	3:15	10502410	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	09/12/2017 03:42	09/12/2017 03:42	0:00	10502408	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	10/02/2017 11:22	10/02/2017 11:23	0:01	10529216	38375173	11	ABC	S-CKT
22321202	MT PLEASANT	01/23/2018 02:55	01/23/2018 04:45	1:50	10637424	38375173	00	ABC	S-CKT
22321202	MT PLEASANT	11/14/2018 16:11	11/14/2018 16:11	0:00	11008328	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	07/21/2020 18:09	07/21/2020 19:09	1:00	11662007	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	07/21/2020 18:09	07/21/2020 18:09	0:00	11661999	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	12/18/2021 12:05	12/18/2021 12:09	0:04	12173836	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	12/18/2021 12:43	12/18/2021 12:44	0:01	12173894	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	12/18/2021 12:44	12/18/2021 13:36	0:52	12173895	38375173	11	ABC	S-CKT
22321202	MT PLEASANT	08/03/2022 15:53	08/03/2022 15:53	0:00	12433030	38375173	02	ABC	S-CKT
22321202	MT PLEASANT	08/03/2022 16:40	08/03/2022 16:44	0:04	12433098	38375173	02	ABC	S-CKT
22321202	MT PLEASANT	08/04/2022 08:13	08/04/2022 08:13	0:00	12433615	38375173	02	ABC	S-CKT
22321202	MT PLEASANT	09/16/2022 10:57	09/16/2022 11:01	0:04	12475987	38375173	01	ABC	S-CKT
22321202	MT PLEASANT	11/18/2022 00:09	11/18/2022 01:32	1:23	12543375	38375173	11	ABC	S-CKT
22321202	MT PLEASANT	12/24/2022 08:01	12/24/2022 17:18	9:17	125893521	38375173	01	ABC	S-CKT

DUKE ENERGY POWER OUTAGE REPORTS

Failure Mode	WE	Eq	Mfg-Spec	Count	Cust Off	Duration	Cust Mins
11	04	--	--	--	483	0	0
TL	04	29	--	--	744	0	0
TL	17	P1	--	--	238	195	46410
28	04	--	--	--	757	0	0
28	00	--	--	--	752	1	752
DG	17	S9	A5	--	760	110	83600
28	--	--	--	--	761	0	0
LL	04	NA	AS	36	782	60	46920
28	--	--	--	--	782	0	0
41	--	--	--	--	792	3	2376
28	--	--	--	--	792	0	0
D1	02	38	UU		792	51	40392
11	--	--	--	--	785	0	0
11	--	--	--	--	785	4	3140
28	--	--	--	--	786	0	0
11	--	--	--	--	787	3	2361
07	00	76	UU		788	82	64616
41	--	--	--	--	345	557	192165

DUKE ENERGY POWER OUTAGE REPORTS

Crew Remarks

storm
circuit blinked...targets 50 C to G...FMAG 2178-*** Operation due to ev#10121117./tdu-tree
single phase 336 down with broke pole top and crossarm and cant tell how bad wire is burnt up in tree but tree crow on way at 350 with 25 minutes eta at 8875 Franklin St and possible bad tx...road phase and field phase still up
circuit locked out... ev# 10502410.. pmsecre
TCC was relay testing the 44KV line feeding Roberta Rd, Mt. Pleasant & Coleman... blinked high side.. power back on.. pmsecre

TREE ON LINE AT COLLEGE AND MOUNT PLEASANT ON 1201 BUT BREAKER DID NOT OPEN CAUSING STATION TX TO OPEN // TCC ISOLATED 1201 BREAKER TO HEAT UP 1202

non outage.. model error
CMPL 2020-07-21 19:06:00 by BRCLAYT RMK: . . . @1825 . Supv D Furr aware . . . have crew check near the intersection of Barringer St and Hwy 73
LOCKOUT - TRIP 51 TARGETS A C FMAG 2582 - RUNNING FAULT
blink before lockout trip 51 targets a c fmag 2582
Transmission outage, line down, power restored
BLINK PRIOR TO OUTAGE

failed insulator due to rainTRANSMISSION OUTAGE

BLINK . . . TARGETS BG GMAG 1103
BLINK . . . TARGETS BG FMAG 1103
BLINK FMAG 1103.00 targets BG
BLINK FMAG 1103 AG
--
tech closed station locally stale on our endTREE ON LINES HWY 73 NEAR 34863 FINGER RD, LINES LOW AND SAGGING

DUKE ENERGY POWER OUTAGE REPORTS

Resp System	Cause IEEE	Plan Event	Action Taken	Fault Location
OH	11	F2	10	--
OH	11	F2	10	--
OH	03	F2	40	8875 Franklin St E
--	28	F2	10	--
11	28	F2	53	--
00	20	F2	37	COLLEGE AND MOUNT PLEASANT, 35.403, -80.437
--	28	F2	--	--
OH	19	F2	DN	BARRINGER ST AND HWY 73
--	28	F2	10	--
11	41	F2	10	--
--	28	F2	10	--
11	41	F2	MP	MT PLEASANT SUBSTATION
--	11	F2	10	--
--	11	F2	10	--
OH	28	F2	10	--
--	11	F2	10	--
11	05	P2	54	MT PLEASANT RET SUB
--	41	F2	14	--

DUKE ENERGY POWER OUTAGE REPORTS

Additional Remarks

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isolated wire down by cutting jumpers see ev#10502932

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1201 failed to trip upon fault and backed up to Bank 2 CS
Unknown fault on distribution circuit initiated the outage. Josh Blackmon reports that auxiliary switch was out of adjustment causing the A finger that is in the trip circuit to just barely open. Switch was adjusted, breaker was tested and put back in service. (1/23/2018 MLH)
Burnt DEAD WILLOW OAK LIMB found at MPCI St. and N College
Coordinates: 35.403, -80.437
Work order: 27132593 - damaged insulators needed to be replaced

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R&I - KILLION - LARGE BRANCH FROM ASH TREE FELL ACROSS 3 PHASE 556 PRIMARY. FIELD VISITED AND PICS TAKEN. NO FUN

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--

R&I - KILLION - (3) EVENTS TOTAL ON 12-18. TRIPS ON TRANSMISSION AT 8:04, 12:05 AND A SUBSTATION LOCKOUT AT 12:43. ALL EVENTS WERE DUE TO FAILED INSULATORS ON THE TIE DISCONNECTS FOR (MT PLEASANT NO1 AND MT PLEASANT NO2) AT THE UNION EMC DEL 2.

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R&I - KILLION - REVIEWED OUTAGE AND CORRECTED CODING
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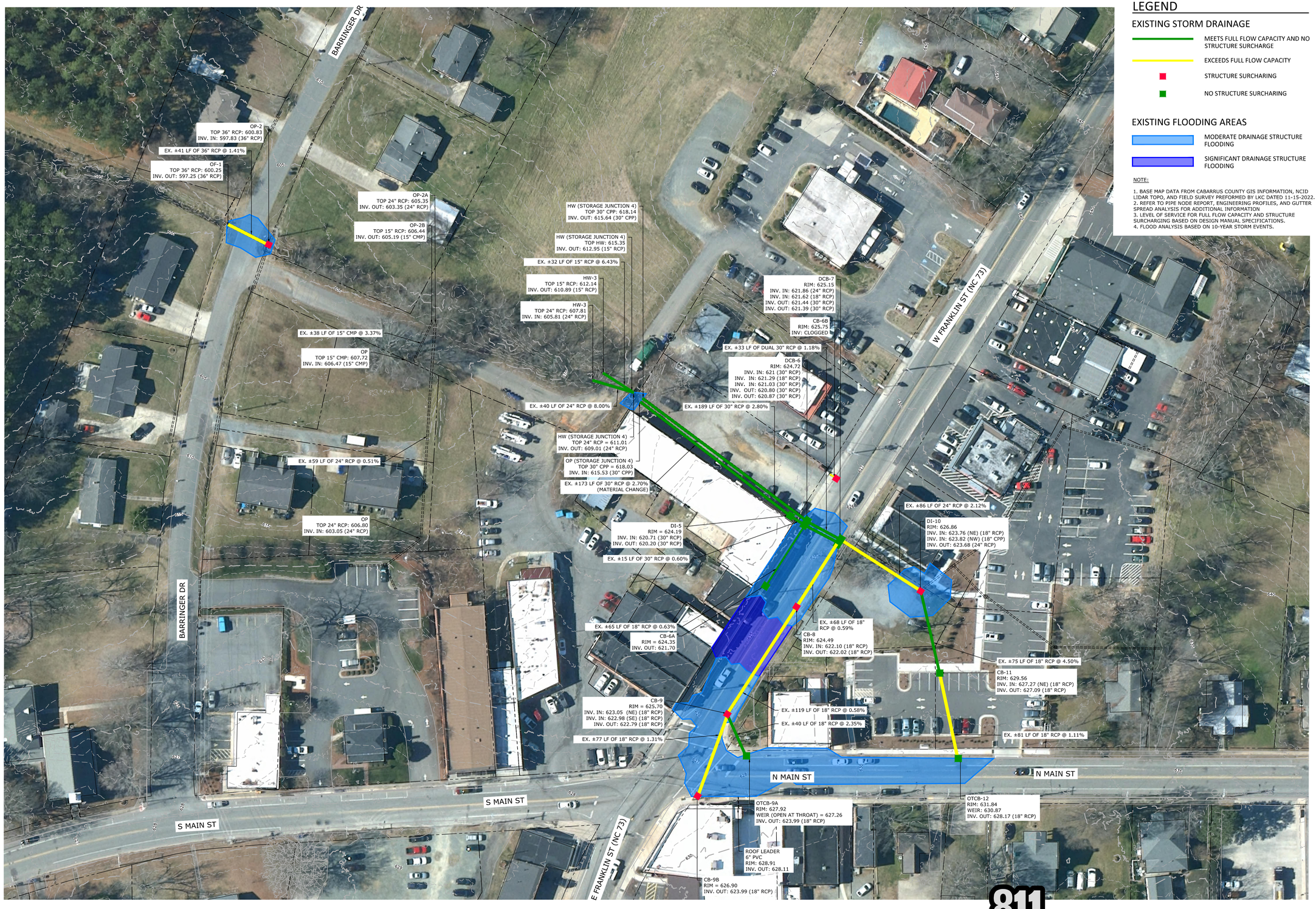
APPENDIX F: DRAINAGE STUDY
EXISTING CONDITIONS ANALYSIS MAP



LEGEND

EXISTING STORM DRAINAGE

- MEETS FULL FLOW CAPACITY AND NO STRUCTURE SURCHARGE
- EXCEEDS FULL FLOW CAPACITY
- STRUCTURE SURCHARING
- NO STRUCTURE SURCHARING

EXISTING FLOODING AREAS

- MODERATE DRAINAGE STRUCTURE FLOODING
- SIGNIFICANT DRAINAGE STRUCTURE FLOODING

NOTE:

1. BASE MAP DATA FROM CABARRUS COUNTY GIS INFORMATION, NCID LIDAR TOPO, AND FIELD SURVEY PREFORMED BY LKC DATED 11-15-2022.
2. REFER TO PIPE NODE REPORT, ENGINEERING PROFILES, AND GUTTER SPREAD ANALYSIS FOR ADDITIONAL INFORMATION
3. LEVEL OF SERVICE FOR FULL FLOW CAPACITY AND STRUCTURE SURCHARGING BASED ON DESIGN MANUAL SPECIFICATIONS.
4. FLOOD ANALYSIS BASED ON 10-YEAR STORM EVENTS.

Know what's below. Call before you dig. 811

GRAPHIC SCALE
0 20 40 80
1 inch = 40 ft.

2018 NCDOT STANDARDS AND SPECIFICATIONS

PRELIMINARY DRAWING - NOT RELEASED FOR CONSTRUCTION

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CLIENT

TOWN OF MOUNT PLEASANT
8590 PARK RD
MOUNT PLEASANT, NC 28124

MOUNT PLEASANT DRAINAGE STUDY

EXISTING CONDITIONS ANALYSIS

Mount Pleasant, NC, 28124

REVISIONS

NO.	DATE

PLAN INFORMATION

PROJECT NO.	SPEC22243
FILENAME	INFRAEXCON_SPEC22243
CHECKED BY	MTG
DRAWN BY	MTG
SCALE	1"=40'
DATE	01.03.2023

SHEET

EXISTING CONDITIONS
INFRASTRUCTURE & FLOODING

E1.06

M:\Projects\SPEC\SPEC 2022\SPEC22243 Mt Pleasant, DT Stormwater Study\04-Production\Water Resources\CAD Drawing\INFRAEXCON_SPEC22243.dwg, 1/12/2023 4:39:44 PM, Max Grogan