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June 26, 2020

VIA ELECTRONIC FILING

Mr. Adam Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399-0850

Re: Docket No. 20200070-EI
Review of 2020-2029 Storm Protection Plan, pursuant to
Rule 25-6.030, F.A.C., Gulf Power Company

Dear Mr. Teitzman:

I enclose for filing in the above-referenced docket the Rebuttal Testimony of Michael Spoor, together with Exhibit MS-2 and Exhibit MS-3, on behalf of Gulf Power Company. Copies of this filing will be provided as indicated on the enclosed Certificate of Service.

Please contact me if you or your Staff has any questions regarding this filing at (561) 691-7108 or jason.higginbotham@fpl.com.

Sincerely,

/s/ Jason A. Higginbotham
Jason A. Higginbotham
Attorney for Gulf Power Company
Fla. Authorized Counsel No. 1017875

Enclosure

CERTIFICATE OF SERVICE
DOCKET NO. 20200070-EI

I HEREBY CERTIFY that a true and correct copy of the Rebuttal Testimony of Michael Spoor, together with Exhibit MS-2 and Exhibit MS-3, on behalf of Gulf Power Company, has been furnished by electronic service on this 26th day of June, 2020 to the following:

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By: *s/ Jason A. Higginbotham*
Jason A. Higginbotham

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

GULF POWER COMPANY

2020-2029 STORM PROTECTION PLAN

DOCKET NO. 20200070-EI

REBUTTAL TESTIMONY OF

MICHAEL SPOOR

JUNE 26, 2020

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I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Michael Spoor. My business address is Gulf Power Company ("Gulf" or the "Company"), One Energy Place, Pensacola, Florida, 32520.

Q. Did you previously submit direct testimony?

A. Yes. I submitted written direct testimony on April 10, 2020, together with Exhibit MS-1 – Gulf Power Company's 2020-2029 Storm Protection Plan.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to respond to certain portions of the direct testimonies of Ralph Smith and Kevin J. Mara submitted on behalf of the Office of Public Counsel ("OPC"), and the direct testimonies of Steve W. Chriss and Lisa V. Perry submitted on behalf of Walmart Inc. ("Walmart"). My rebuttal testimony will respond to the concerns, questions, and recommendations raised by the witnesses of OPC and Walmart concerning Gulf's 2020-2029 Storm Protection Plan ("SPP") submitted as Exhibit MS-1.

I will also address OPC's recommendation that the Florida Public Service Commission ("PSC" or the "Commission") should adopt and implement a brand new resiliency test or metric in this proceeding to evaluate Gulf's SPP, and I will explain why such a recommendation is both inappropriate and unnecessary. Similarly, I will demonstrate that OPC's recommendations that the Commission should require further cost-benefit analyses for Gulf's SPP programs and projects are both inappropriate and unnecessary. Finally, I will respond to OPC's concerns regarding the economic impact

of COVID-19 and its recommendation that Gulf should delay certain components of its SPP programs and projects.

Q. In preparing your rebuttal testimony, did you collaborate and work with Florida Power & Light Company ("FPL") witness Michael Jarro?

A. Yes. FPL and Gulf are affiliate electric utilities owned by NextEra Energy, Inc. ("NextEra"). Throughout the process to prepare their respective SPPs, FPL and Gulf have worked very closely to incorporate and implement best practices and common approaches where appropriate and applicable. This collaborative effort has continued throughout the entire SPP proceeding, including the preparation of rebuttal testimony.

Notably, the testimony of OPC witnesses Smith and Mara assert many issues and recommendations that are largely identical for both FPL and Gulf. In responding to such issues and recommendations, my team and I have worked with FPL witness Michael Jarro and his team to develop common or joint testimony where the FPL and Gulf positions are aligned. As a result of this joint and collaborative effort, some portions of my rebuttal testimony may be similar and/or largely the same as certain portions of the rebuttal testimony of FPL witness Michael Jarro.

Q. Are you sponsoring any rebuttal exhibits in this case?

A. Yes, I am sponsoring Exhibit MS-2, Gulf Power Company's 2019-2021 Storm Hardening Plan, and Exhibit MS-3, Post Storm Analysis of Gulf Transmission Facilities.

II. GENERAL RESPONSE TO CONCERNS OF INTERVENORS

Q. Before addressing the specific issues and recommendations raised by the Intervenor testimonies, do you have any general observations?

A. Yes. The evaluation of Gulf's SPP must be grounded in the fact that Gulf has successfully been engaging in Commission-approved storm hardening for the last 14 years. During this time, the Commission has reviewed and had full transparency into all aspects of Gulf's storm hardening initiatives and activities, and interested parties and stakeholders had the opportunity to participate in these reviews. Indeed, in its report "Review of Florida's Electric Utility Hurricane Preparedness and Restoration Actions 2018", in Docket No. 20170215-EU, the Commission recognized the success of historical storm hardening efforts in Florida. Key findings by the Commission in that report included:

- Florida's aggressive storm hardening programs are working. (Section V);
- The length of outages was reduced markedly from the 2004-2005 storm season. (Section IV);
- The primary cause of power outages came from outside the utilities' rights of way including falling trees, displaced vegetation, and other debris (Section IV);
- Vegetation management outside the utilities' rights of way is typically not performed by utilities due to lack of legal access (Section IV);
- Hardened overhead distribution facilities performed better than non-hardened facilities. (Section V);
- Very few transmission structure failures were reported. (Section V); and

- Underground facilities performed much better compared to overhead facilities. (Section V)

In response to Hurricanes Matthew and Irma, the Florida Legislature passed section 366.96, Florida Statutes ("F.S.") "to mitigate restoration costs and outage times to utility customers" by "strengthen[ing] electric utility infrastructure to withstand extreme weather conditions by promoting the overhead hardening of electrical transmission and distribution facilities, the undergrounding of certain electrical distribution lines, and vegetation management." Section 366.96(1)(c)-(e). From these facts, one can logically and reasonably conclude that the Legislature did not pass Section 366.96, F.S., to limit or eliminate storm hardening activities in Florida, nor can one assume that the passage of Section 366.96, F.S., was an indictment or criticism against storm hardening activities previously undertaken by electric utilities in the state of Florida. Rather, it is reasonable to assume that the Legislature passed this statute to encourage, streamline, and advance storm hardening efforts in the state.

Q. How did the acquisition of Gulf by NextEra impact Gulf's methodology for its 2019-2021 Storm Hardening Plan?

A. Since 2006, Gulf has submitted its Storm Hardening Plans every 3 years for the required immediate 3-year planning period. These successful plans were initially developed by incorporating the Commission's 10-Part Storm Preparedness Initiatives, set forth in certain of the Commission's Orders, including Order No. PSC-06-0351-PAA-EI, and further enhancing Gulf's existing storm preparedness programs in accordance with its commitment to continually refine those programs by evaluating best practices. Since the acquisition of Gulf by NextEra on January 1, 2019, Gulf has

begun to adopt and incorporate the best practices of FPL's proven and successful storm hardening program into Gulf's storm hardening program. Specifically, Gulf has focused on strengthening its distribution feeders to extreme wind loading standards; piloted undergrounding of certain distribution laterals; substation flood mitigation; and transmission wood structure replacement. These programs and initiatives, as well as Gulf's transmission and distribution inspection and distribution vegetation management programs, are all included in Gulf's Commission-approved 2019-2021 Storm Hardening Plan.

Q. Having reviewed the testimonies of OPC witnesses Smith and Mara, do you have any general observations or responses?

A. Yes. First and foremost, on page 15, line 22 and page 16, lines 1-14 of his direct testimony, OPC witness Mara states that it would not be unreasonable for the Commission to allow Gulf to implement the "core programs" that have been in use for many years and approved by the Commission.

In its SPP, Gulf has proposed the following seven programs:

- Distribution Inspection Program
- Transmission Inspection Program
- Distribution Feeder Hardening Program
- Distribution Hardening – Lateral Undergrounding Program
- Transmission Hardening Program
- Vegetation Management – Distribution Program
- Vegetation Management – Transmission Program

Of these seven programs, the following six programs were previously reviewed and approved as part of Gulf's Storm Hardening Plans, storm initiatives, and annual reliability filings: Distribution Inspection, Transmission Inspection, Distribution Feeder Hardening, Transmission Hardening, Vegetation Management – Distribution; and Vegetation Management – Transmission. Stated differently, these six SPP programs are "core programs" that have been filed with, reviewed, and approved by this Commission. Under Mr. Mara's conclusion, it would not be unreasonable for the Commission to allow Gulf to implement (or continue) these six "core programs."

Q. What is your response to OPC witness Mara's identification of the new initiatives in Gulf's 2020-2029 SPP?

A. On page 16, lines 17-23, OPC witness Mara identifies the following programs as new initiatives in Gulf's SPP:

- Distribution Hardening – Lateral Undergrounding Program
- Substation Flood Monitoring and Hardening Program
- Transmission and Substation Resiliency Program

I disagree with witness Mara's characterization of what is new in Gulf's SPP. Gulf's Transmission and Substation Resiliency Program is the only program in Gulf's 2020-2029 SPP that could arguably be considered a completely new program because it has not been previously reviewed by the Commission. The Transmission and Substation Resiliency program, is a subset and expansion of Gulf's existing Transmission Hardening Program. Gulf's proposed Distribution Hardening – Lateral Undergrounding Program is a pilot program that was described in Gulf's Commission approved 2019-2021 Storm Hardening Plan. Gulf's SPP provided further information

about the implementation of this program and indicated that it will be largely based on FPL's Commission-approved Storm Secure Undergrounding Pilot program. The Substation Flood Monitoring and Hardening Program (switch house construction standards), which is a subset and expansion of Gulf's existing Transmission Hardening Program, was also included in Gulf's Commission-approved 2019-2021 Storm Hardening Plan as a component of Gulf's Transmission Hardening Program and therefore is not new.

Based on the testimony of OPC witness Mara associated with previously approved programs, OPC appears to essentially agree with the majority of programs included in Gulf's SPP. It further appears that the only truly contested programs in Gulf's SPP are the three programs OPC witness Mara identifies as new initiatives in his direct testimony: Distribution Hardening – Lateral Undergrounding, Substation Flood Monitoring and Hardening, and Transmission and Substation Resiliency Program. I will respond to OPC's criticisms of these programs later in my testimony.

Q. Do you have any additional general observations about the testimonies of OPC witnesses Smith and Mara?

A. Yes. Other than its specific criticisms of the Distribution Hardening – Lateral Undergrounding; Substation Flood Monitoring and Hardening; and Transmission and Substation Resiliency Programs, OPC witnesses make three other general arguments.

First, OPC spends a majority of its witnesses' testimony discussing the difference between reliability and resilience, arguing that the Commission should apply new resiliency standards when reviewing utility proposed SPP expenditures to ensure that the approved projects meaningfully improve resiliency. Although Gulf agrees that

the primary and intended purpose of SPPs is to improve storm resiliency of the transmission and distribution electric system, there is no need for OPC's proposed new resiliency test because the Florida Legislature and Commission have already defined storm resiliency in Section 366.98, F.S., and Rule 25-6.030, Florida Administrative Code ("F.A.C.") – reduction in restoration costs and outage times associated with extreme weather conditions. As further explained below, OPC's proposed new resiliency test is unnecessary and inappropriate given the clear direction and guidance of the Florida Legislature and Commission.

Second, OPC also argues that the Commission should require formulaic cost-benefit justifications before additional investments in grid resiliency are approved for rate recovery. As explained in my direct testimony, Gulf's SPP has fully complied with all the requirements of what must be included in a SPP pursuant to Rule 25-6.030, F.A.C. OPC's proposal is an attempt to add a new requirement to the Rule that does not exist today. For the reasons explained below, OPC's proposal is inappropriate and unnecessary for several reasons.

Third, OPC witness Smith makes several arguments regarding recovery of SPP costs, and whether such costs are currently being recovered in base rates. However, as stated in Commission Order No. PSC-2020-0161-PCO-EI, these issues are beyond the scope of this SPP proceeding because they pertain to costs that will be addressed in the Storm Protection Plan Cost Recovery Clause proceeding in Docket No. 20200092.

Because the Prehearing Officer has already concluded that these issues are not appropriate for the SPP docket, I will not further respond to such issues.

Q. Having reviewed the testimonies of the Walmart witnesses Chriss and Perry, do you have any general observations or responses?

A. Yes. Walmart does not appear to take any specific issues or have any concerns with the programs and projects included in Gulf's SPP pending before the Commission. Walmart witness Perry proposes that the utilities work with large commercial and industrial customers in the future to include customer-sited generation in future SPPs. OPC witness Perry's proposal is a future proposal and does not impact the programs and projects included in Gulf's SPP. Therefore, Walmart's proposal should not hold up or delay the implementation of Gulf's SPP if the Commission finds it is in the public interest. That said, Gulf is willing to work with Walmart on discussing potential future SPP programs and projects.

Walmart witness Chriss indicates that Walmart opposes cost allocations used by Gulf, which recovers SPP costs from demand-metered customers through a $/kWh energy charge. Gulf notes that issues related to the recovery of SPP costs, including cost allocation and rate design, are beyond the scope of this proceeding and will be addressed in the Storm Protection Plan Cost Recovery Clause proceeding at Docket No. 20200092 as further explained in Commission Order No. PSC-2020-0161-PCO-EI issued on May 18, 2020.

III. OPC'S PROPOSED NEW RESILIENCY TEST FOR SPPS IS NOT APPROPRIATE OR NECESSARY FOR GULF'S SPP

Q. OPC spends a majority of its testimony discussing resilience and arguing that the Commission should apply new resiliency standards when reviewing Gulf's proposed SPP programs. Before addressing the specifics of OPC's recommendation, do you have any preliminary observations about OPC's proposal?

A. Yes. As stated earlier and as will be explained in greater detail below, OPC witness Mara essentially agrees that the Commission should allow Gulf to implement its core storm hardening programs. Therefore, although OPC proposes the adoption of a new resiliency test, OPC essentially agrees that no such test is necessary for, at a minimum, Gulf's core storm hardening programs. Accordingly, in the event OPC's resiliency test is adopted in this proceeding, which it should not for the reasons I explain next, it should only apply to the contested Substation Flood Monitoring and Hardening, Transmission and Substation Resiliency, and the Distribution Hardening – Lateral Undergrounding Programs.

Q. OPC witnesses Smith and Mara dedicate significant portions of their direct testimonies to discussing the difference between reliability and resiliency, and both OPC witnesses assert that the objective or goal of Section 366.96, F.S., and Rule 25-6.030, F.AC., is to improve the resiliency of the electric system and not day-to-day reliability. Do you agree?

A. I agree that the intent and purpose of Section 366.96, F.S., is to improve the storm resiliency of the electric system by "[p]rotecting and strengthening transmission and

distribution electric utility infrastructure from extreme weather conditions" to "mitigate restoration costs and outage times to utility customers." Rule 25-6.030, F.AC., likewise makes it clear that SPP programs and projects are "undertaken to enhance the utility's existing infrastructure for the purpose of reducing restoration costs and reducing outage times associated with extreme weather conditions." Thus, I agree with the OPC witnesses that the intent and purpose of Section 366.96, F.S., and Rule 25-6.030, F.AC., is to promote and encourage storm hardening programs and projects that enhance the resiliency of the electric system from extreme weather conditions.

That being said, it should be noted that programs and projects that are designed to strengthen and protect the electric system from extreme weather conditions may also have a secondary benefit of improving overall service reliability. For example, as presented in Appendix B to Exhibit MS-1, an independent forensic analysis conducted immediately after Hurricane Michael to assess damages to Gulf's distribution system suggested that "…investments in storm hardening may improve system performance during future storm events." These investments are also likely to improve day-to-day reliability. Importantly, however, this does not mean that such programs and projects are "reliability" projects because their primary purpose is to reduce restoration cost and outage time associated with extreme weather. In fact, both the Statute and Rule contemplate that the programs and projects included in a utility's SPP may "improve overall service reliability for customers."

Q. Both OPC witnesses Mara and Smith argue that the Commission should adopt and apply new resiliency standards and tests to review Gulf's SPP to ensure that the programs and projects provide meaningful improvement to resiliency. Do you agree with this recommendation?

A. No. There is no need to develop a new resiliency standard or test because the Florida Legislature and Commission have already defined storm resiliency for purposes of SPP in Section 366.96, F.S., and Rule 25-6.030, F.A.C. As stated previously, both the Statute and Rule define storm resiliency as enhancing the electric infrastructure for the purpose of reducing restoration costs and outage times associated with extreme weather conditions. Therefore, there is no need to develop a new resiliency test as recommended by OPC because the Florida Legislature and Commission have already done so.

Q. Has Gulf demonstrated that its SPP programs will improve storm resiliency by reducing restoration costs and outages associated with extreme weather conditions?

A. Yes. Gulf has demonstrated in Sections II and IV, and Appendix B of Exhibit MS-1 that each of its SPP programs will improve storm resiliency by reducing restoration costs and outages associated with extreme weather conditions.

Q. Do you have concerns with OPC's proposal to adopt and implement a new resiliency test in this proceeding?

A. Yes. My view is that OPC is attempting to re-litigate the Storm Protection Plan Rule 25-6.030, F.A.C., approved by this Commission. OPC is trying to add formulaic and highly prescriptive requirements that were not provided by the Statute or Rule that

would tie the Commission's hands when determining whether an SPP is in the public interest. When it adopted Section 366.96, F.S., the Florida Legislature did not prescribe a specific test or set of metrics to be applied when reviewing SPPs to determine if they are in the public interest. Instead, the Florida Legislature left that determination to the discretion of the Commission by directing it to adopt rules necessary to implement the statute. In adopting Rule 25-6.030, F.A.C., the Commission could have prescribed specific metrics, standards, and formulas to determine benefits from SPPs, but it wisely did not because each program must be evaluated on its particular facts and merits. The Commission can and should consider all relevant facts and merits when determining if the SPP programs are in the public interest; however, this determination should be based on the requirements prescribed in Rule 25-6.030, F.A.C.

Q. Do you have any additional concerns with the resiliency metrics proposed by OPC witnesses Smith and Mara?

A. Yes. First and foremost, there are no Commission-approved or industry-accepted standards for resiliency. Indeed, both OPC witnesses concede that there is no clear and widely accepted standards to test for resiliency of electric systems. See page 7 of the direct testimony of OPC witness Smith, and pages 9 of the direct testimony of OPC witness Mara. Additionally, on pages 4-5 of his direct testimony, Mr. Smith quotes an excerpt from a paper issued by the U.S. Department of Energy that "…Resilience is in large part about what does not happen," which calls into question the metrics offered by Mr. Mara. For these reasons alone, OPC's proposed resiliency metrics should not be adopted.

Additionally, the four resiliency metrics proposed by OPC witness Mara on pages 10-11 of his direct testimony should be rejected for the following additional reasons: they address matters that utilities already take into account in their extreme weather event restoration efforts; they ignore that all storms are different in path, intensity, level of damage and the number of resources available; they seek to alter existing storm restoration prioritization practices; and in at least one case provides a recommendation that does not pass the common sense test.[1]

Likewise, the twelve "resiliency" metrics proposed on pages 8-9 of the direct testimony of OPC witness Smith should be rejected for the following reasons: Florida's Legislature and this Commission through Rules 25-6.030 F.A.C., and 25-6.031 F.A.C., have already addressed many of these metrics; they are an attempt by OPC to re-litigate the SPP rules approved by this Commission; they aim to arbitrarily limit investments and cost recovery of SPP projects; and, in one instance, basically ask this Commission to never approve for prudency any SPP until some undetermined time at which some arbitrary objectives have been reached.

[1] For example, the "Community Function" metric proposed on page 10 of Mr. Mara's testimony is not a test of resiliency because it does not measure or reflect a reduction in restoration costs or outage times on the utilities' system. Indeed, this metric ignores the fact that the utility still needs to repair all damaged facilities and safely restore all power outages notwithstanding the fact that some customers may have a temporary backup supply of power. Additionally, this metric suggests that the utilities should alter the prioritization of restoration of service based on the type of back-up equipment and fuel reserves of individual customers.

IV. OPC'S REQUESTS FOR FURTHER COST-BENEFIT ANALYSES FOR GULF'S SPP ARE NOT APPROPRIATE OR NECESSARY

Q. On page 10 of his direct testimony, OPC witness Smith recommends that the Commission should require further cost-benefit analyses for Gulf's SPP programs and projects, and on page 13 of his direct testimony, OPC witness Mara recommends an analysis for estimating benefits associated with the proposed SPP programs. Before addressing the specifics of OPC's recommendations, do you have any preliminary observations about OPC's proposals?

A. Yes. As stated earlier, and as will be explained in greater detail below, OPC witness Mara essentially agrees that the Commission should allow Gulf to implement the core storm hardening programs in Gulf's SPP because they have been in use for many years. Therefore, although OPC recommends further cost-benefit analyses, OPC essentially agrees that no such further analyses or modeling are necessary for, at a minimum, these core programs. Accordingly, OPC's recommendations that Gulf be required to perform further cost-benefit analyses and modeling could only apply to the contested Substation Flood Monitoring and Hardening, Transmission and Substation Resiliency, and the Distribution Hardening – Lateral Undergrounding Programs.

Q. On page 6 of his direct testimony, OPC witness Mara asserts that the Rule 25-6.030, F.A.C., requires the SPP programs to be cost-effective, and on page 10, OPC witness Smith recommends that Commission should require further cost-benefit analyses for Gulf's SPP programs and projects. Do you agree with the OPC's application of Rule 25-6.030, F.A.C., as it pertains to the costs and benefits of the SPP?

A. No. First, Section 366.96, F.S., and Rule 25-6.030, F.A.C., do not prescribe or require a traditional cost-benefit analysis or cost-effectiveness test for the SPP programs and projects. The Statute makes no mention of any such analysis or test and, instead, the Florida Legislature left that determination to the discretion of the Commission by directing it to adopt rules necessary to implement the statute. In adopting the Rule, the Commission could have directed the utilities to provide a specific cost-benefit analysis or cost-effectiveness test. However, the Commission declined to do so for SPPs. Instead, Rule 25-6.030(3)(d)(4), F.A.C., requires the SPP to include a "comparison" of the estimated costs and estimated benefits for each SPP program, which is provided in the following portions of Gulf's SPP: Section II; the "Comparison of Costs and Benefits" included in each SPP program description in Section IV. As such, a cost/benefit analysis or cost-effectiveness test for each major component of the SPP is not required under either the Statute or Rule 25-6.030, F.A.C. My view is that OPC is, once again, attempting to re-litigate the Storm Protection Plan Rule 25-6.030, F.A.C., approved by this Commission.

Second, in Rule 25-6.030, F.A.C., the Commission prescribed specific information and data that must be included with each SPP, including, but not limited to, estimated costs, estimated benefits, criteria to prioritize and select projects, and estimated rate impacts. In its SPP, Gulf provided all of the information required by Rule 25-6.030 as explained in my direct testimony. The Commission can use and "compare" all of the information provided by Gulf in its SPP to determine if, pursuant to Section 366.96, F.S., the programs and projects included in the SPP are in the public interest and should be approved, or if the SPP programs should be modified or denied.

Each program is different and, therefore, the comparison of costs and benefits must be evaluated on its particular facts and merits.

Third, the analysis of whether the benefits of a SPP program or project justify the estimated costs is not a one-size-fits-all proposition as suggested by OPC. This is clearly demonstrated by the fact that each of the electric utilities took very different approaches to comparing the estimated costs and benefits of their SPP programs. Further, such analyses are necessarily dependent on several highly variable factors that, in large part, are beyond the utility's control and cannot be accurately predicted, including, but not limited to: the number of annual storms; the path of each storm; the strength or category of each storm; the speed or duration of each storm; the availability of resources to respond to and provide storm restoration services for each storm; and the extent to which the infrastructure has been storm hardened at the time of each projected storm. Moreover, the benefits to be included in such should not be limited to only avoided utility costs as I will explain further.

Q. Besides not being required by the Statute or Rule, do you have additional concerns with the recommendation on page 10 of OPC witness Smith's direct testimony that the Commission should require Gulf to provide further cost-justification before additional investments in grid resiliency are approved?

A. Yes. Mr. Smith's recommendation that Gulf's SPP programs require further cost-benefit analysis or cost-justification before they can be approved is directly contrary to OPC witness Mara's testimony on pages 11-12 and 15-17 that it would be reasonable for the Commission to allow Gulf to implement the "core programs" that have been reviewed and approved by the Commission, as I stated earlier and further explain

below. Either these SPP programs are in the public interest and should be approved, or they are not. The fact that OPC witness Mara, who is an engineer, has essentially agreed that most of these programs should be approved without further cost-justification clearly suggests that OPC believes Gulf has provided sufficient information about each of the SPP programs for the Commission to determine if they are in the public interest.

Additionally, storm hardening is not a simple cost-effective proposition as suggested by OPC. OPC's approach focuses only program costs and savings in restoration associated with extreme weather conditions, *i.e.*, a strictly quantitative analysis, and completely ignores the qualitative component required by both the Statute and Rule – reduction in outage times associated with extreme weather conditions. Stated differently, OPC's proposed cost-benefit and cost-effectiveness approach ignores half of the benefits side of the equation.

It cannot be reasonably disputed that customers want the extended outage times associated with extreme weather events to be reduced. Indeed, the Florida Legislature concluded that reducing outage times for utility customers, as well as restoration costs, is in the public interest. The Commission can and should compare these factors and determine whether the estimated benefits of the storm hardening programs are justified by the estimated rate impacts. Therefore, for these reasons, I disagree with OPC witness Smith that the further cost-justification of Gulf's SPP programs is needed or appropriate.

Q. Do you agree with Mr. Mara's general statement on page 11 lines, 20-21, where he states "Gulf did not provide any quantifiable benefits for any project nor did Gulf provide projected savings for its proposed SPP as a whole.

A. No. Section 366.96 states that an SPP must contain, "the estimated costs and benefits to the utility and its customers of making the improvements proposed in its plan.". Gulf has met these criteria in Sections II and IV.A.4, IV.B.4, IV.C.4, IV.D.4, IV.E.4, IV.F.4, and IV.G.4 of its SPP.

Q. Do you agree with Mr. Mara's specific statement that Gulf did not provide any quantifiable benefits to its feeder hardening program?

A. No. As an initial matter, Mr. Mara incorrectly states on page 14, lines 5-6, that "Gulf began its feeder hardening initiative in 2006 and by 2019 had completed hardening on 269 feeders". This is not true. Gulf has 269 feeders remaining to be hardened at year-end 2019, and Gulf has only hardened segments of feeders and not entire feeders. In any event, Gulf did provide benefits for the distribution feeder hardening program per the SPP rules. In fact, in Section 1.3 of an independent forensic analysis of damages sustained following Hurricane Michael in 2018, that was provided as Appendix B of Exhibit MS-1 (Gulf's SPP), Gulf provided specific benefits of its storm hardening efforts. Additionally, as stated earlier in my testimony, since the acquisition of Gulf by NextEra Energy in 2019, Gulf has begun to model its storm hardening activities on FPL's successful storm hardening guidelines. For instance, Gulf began to implement best practices such as the extreme wind loading construction standard for distribution feeders and replacement of transmission wood structures with concrete or steel. These two programs are part of FPL's successful storm hardening efforts as indicated by

FPL's experiences in the aftermath of Hurricanes Matthew and Irma. By adopting FPL's storm hardening guidelines, Gulf should realize essentially the same quantifiable benefits as FPL has outlined and provided in testimony. In addition, I have attached Exhibit MS-3, Post Storm Analysis of Gulf Transmission Facilities, which Gulf previously provided to OPC in discovery in response to OPC's Fifth Request for Production of Documents, No. 71, to demonstrate the effects of storm hardening impacts during Hurricane Michael on the transmission system, and the analysis that demonstrates concrete poles far exceeded the performance of wood poles. From this it can be deduced that the programs proposed in Gulf's SPP both individually and collectively will provide benefits to customers with reduced restoration costs and outage times associated with extreme weather.

V. GULF'S SPP PROGRAMS ARE IN THE PUBLIC INTEREST AND SHOULD BE APPROVED

Q. You have stated previously that OPC essentially agrees with the majority of the programs included in Gulf's SPP. Doesn't Mr. Mara state that he agrees with these "core programs" only if the Commission orders a delay in implementing the other hardening programs until Gulf can provide the rate impact of all programs updated with the economic impact of COVID-19 pandemic?

A. Yes, on page 16 of his direct testimony, Mr. Mara appears to make his agreement with the following five core programs in Gulf's SPP conditional on the Commission's acceptance of his proposal to delay implementation of the other hardening programs: Distribution mainline feeder patrols, Distribution – Pole Inspections; Transmission –

Inspections; Distribution – Vegetation Management; and Transmission – Vegetation Management. Notably, Mr. Mara's conditions have no substantive impact on the SPP programs or whether they are in the public interest. A storm hardening program is either in the public interest as proposed and should be approved, or it is not. As a result, it appears that Mr. Mara essentially agrees that the SPP programs I previously identified provide benefits and should be implemented.

Q. On pages 17-18 of his direct testimony, OPC witness Mara states that Gulf has not included a methodology to select and prioritize storm protection projects for lateral hardening and has not made a comparison of the costs and benefits of lateral undergrounding in its SPP. What is your response to Mr. Mara's testimony?

A. I disagree with Mr. Mara's statements regarding Gulf's proposed lateral undergrounding pilot. As described in its SPP, Gulf is still in the early implementation stages of the program and plans to utilize a systematic, targeted approach in the selection of certain lateral feeders to be converted from overhead to underground as outlined in the SPP. Additionally, consistent with its commitment set forth in Section 1.0 of its Commission-approved 2019-2021 Storm Hardening Plan: "Gulf Power Company will continue to review available data and undergrounding pilots currently underway by FPL to determine the best approach for undergrounding as a storm hardening tool". In Mr. Mara's testimony regarding FPL's SPP at pages 20-21, he does not appear to take issue with the lateral undergrounding pilot that FPL conducted, so logically, he should not take issue with Gulf performing the same type of pilot in its service territory. In its next Storm Protection Plan, Gulf can share the results and

information collected from its lateral undergrounding pilot program, which will help determine how that program may go forward in future years.

Q. On pages 18-19 of his direct testimony, OPC witness Mara suggests that Gulf should utilize data from Hurricane Michael to compare the costs and benefits of lateral undergrounding. What is your response to Mr. Mara's recommendation?

A. Again, Gulf's lateral undergrounding program is in the pilot phase as I have discussed previously and Gulf intends to learn from the information that it collects and use it to further analyze and scope the program into the future, just as FPL did with its pilot. However, I agree with FPL witness Jarro's rebuttal response to this similar recommendation that Mr. Mara made regarding FPL's lateral undergrounding program where he concludes that Mr. Mara's proposal to evaluate this, and other SPP programs, on a strict, cost/benefit only basis is not consistent with prior storm hardening policy or the requirements of Section 366.96, F.S.

Q. On pages 19-20 of his direct testimony, Mr. Mara contends that Gulf has not included a comparison of the costs and benefits for its proposed Substation Flood Monitoring and Hardening Program in its SPP. What is your response to Mr. Mara's testimony?

A. I disagree with Mr. Mara's comments regarding Gulf's Substation Flood Monitoring and Hardening Program. This program was included in Gulf's Commission-approved 2019-2021 Storm Hardening Plan and was implemented following the 2018 storm season, and based on data from the National Oceanic and Atmospheric Administration ("NOAA") Sea, Lake and Overland Surges from Hurricanes ("SLOSH") model, used to define potential maximum flooding conditions. In section 9.1.3 of Gulf's

Commission-approved 2019-2021 Storm Hardening Plan, Gulf's program is presented to target a very specific and limited number of substations based on the surge model. The program is also incorporating the review of critical switch house wind modeling to target specific strengthening of switch houses. This program was originally slated as a 5-year, $5 million program to complete the identified projects. As stated in Gulf's response to OPC's Fourth Set of Interrogatories, No. 162, one switch house suffered wind damage, which cost over $750,000 to replace. This program was implemented to mitigate these types of costs following a severe weather event. Gulf provided the costs of this program in Section IV.E.3 of its SPP and discussed the benefits of this program in Section IV.E.1 of its SPP. Accordingly, Mr. Mara's assertions are incorrect.

Q. On pages 21-23 of his direct testimony, OPC witness Mara states that Gulf has not included a methodology to select and prioritize storm protection projects or made a comparison of the costs and benefits for its Transmission and Substation Resiliency Program in its SPP. What is your response to Mr. Mara's testimony?

A. I disagree and would refer Mr. Mara to Section IV.E of the SPP where the costs and benefits of this program are discussed as well as how Gulf will prioritize projects. As stated in Gulf's SPP, this program is designed to invest in the overall resiliency of the electric grid at the transmission and substation level by removing critical single points of failure that have the potential to impact large numbers of customers for extended periods of time. The program will build redundancy into the system to improve resiliency, eliminate the frequency and duration of outages, and shorten restoration times following major weather events. This program is a long-term program that meets the definition of resiliency as outlined by the Legislature in Section 366.96, F.S. as well

as the definition that OPC witness Mara uses, "infrequent, often unexpected, widespread/long duration power interruptions, generally with significant corollary impacts." As Mr. Mara further states on page 10, lines 13-14, "[a] more resilient system would help prevent or minimize the outages and, if outages did occur, to restore the system more quickly." That is exactly the intent and purpose of this program and how it will be designed to strengthen the resiliency of the transmission and substation system to respond during extreme weather events to reduce outages and reduce restoration times.

VI. CONCERNS REGARDING COVID-19 SHOULD NOT DELAY APPROVAL OF GULF'S SPP PROGRAMS

Q. On page 15, lines 10-11 of his direct testimony, Mr. Mara states that the uncertainty of the economic impacts of COVID-19 on the Florida economy should be considered by the Commission in reviewing Gulf's SPP. Do you have a response?

A. Yes. Gulf understands just how disruptive and impactful the coronavirus (COVID-19) pandemic has been and we remain committed to doing the right thing for our customers and the communities we serve. For example, Gulf obtained approval from this Commission to provide fuel savings to customers through a one-time bill decrease of nearly 25% in May. Gulf also implemented certain policies to further assist customers in a hardship situation, such as providing payment extensions.

Importantly, our customers are depending on us now more than ever due to the fact that many customers are working remotely due to the COVID-19 pandemic. While

we recognize that the COVID-19 pandemic has caused hardships for customers and the communities we serve, Gulf must not delay our efforts and should continue working to improve the resiliency of the energy grid, particularly given that hurricanes will continue to threaten Gulf's service areas and customers regardless of economic conditions.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Gulf Power

March 1, 2019

Mr. Adam Teitzman, Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee FL 32399-0850

Dear Mr. Teitzman:

In accordance with Rule 25-6.0342 and Order No. PSC-07-1022-FOF-EI, attached for electronic filing is Gulf Power Company's 2019-2021 Storm Hardening Plan.

Please call me if you have any questions.

Sincerely,

C. Shane Boyett

C. Shane Boyett
Regulatory Issues Manager

md

attachments

cc w/att: Gulf Power Company
Russell Badders, Esq., VP & Associate General Counsel
Beggs & Lane

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

GULF POWER COMPANY

STORM HARDENING PLAN
2019-2021

March 1, 2019

APPENDICES

1.0 Overview

Pursuant to Florida Public Service Commission (FPSC) Order No. PSC 07-1022-FOF-EI, Gulf Power Company (Gulf) submits the following Storm Hardening Plan (Plan) for calendar years 2019-2021. This proposed Storm Hardening Plan is intended to address the requirements set forth in Rule 25-6.0342, F.A.C.

Gulf Power views this submission as an ongoing process to identify and implement ways to minimize future storm damages and customer outages. Gulf plans to continue to build on what works well and to improve in areas that perform below expectations, as learned through daily system operations, analysis of storm-related damage data, and examination of best practices. Gulf is committed to the improvement of its electrical system by building upon its experience and supporting research to address the potential benefits of initiatives that will harden transmission and distribution facilities, which could lead to less-frequent outages, improved continuity of service, and reduced restoration times during both major storm-related events and typical seasonal weather.

As in Gulf's 2016-2018 Storm Hardening Plan, the proposed 2019-2021 Storm Hardening Plan incorporates the 10-Part Storm Preparedness Plan initiatives in Section 2.0 that were originally approved in Order Nos. PSC-06-0781-PAA-EI and PSC-06-0947-PAA-EI. These initiatives have been updated to reflect approved FPSC changes and the latest company information.

Section 3.0, Wood Pole Inspection Plan, will continue to incorporate Gulf's 8-year cycle of wood pole inspection approved by the FPSC in Order No. PSC-07-0078-PAA-EU to meet storm hardening requirements.

Performance data for Sections 2.0 and 3.0 initiatives are currently filed as part of the annual March 1st Distribution Reliability Report. These initiatives comprise the foundation of Gulf's Storm Hardening Plan.

Sections 4.0 through 9.0 will address each of the requirements contained in the FPSC Storm Hardening Rules 25-6.0341 and 25-06.0342. Specifically, Section 5.0 addresses extreme wind loading for distribution facilities. As the Company proceeds with efforts to further strengthen its distribution feeders, Gulf will continue to review incoming data from the 2018 Hurricane Season and to implement best practices as learned from Florida Power & Light (FPL) –regarding extreme wind loading plans. Gulf is proposing additional storm hardening initiatives in its 2019-2021 Plan that have the potential to mitigate future storm damages and to reduce storm restoration times to both underground and overhead distribution facilities.

Section 10.0 summarizes Gulf's incremental cost estimates and benefits contained in the Plan. The details are provided in Appendix 4.

Sections 11.0 and 12.0 address storm hardening cost and impact to Third-Party Attachers.

Gulf Power Company will continue to review available data and undergrounding pilots currently underway by Florida Power & Light (FPL) to determine the best approach concerning undergrounding as a storm hardening tool. Gulf recognizes the need to address the concerns expressed by both its customers and the FPSC to find ways to storm harden the system, and Gulf is committed to pursuing every option available to provide reliable service and balance costs to achieve the expected results.

2.0 Ten-Part Storm Preparedness Plan Initiatives

2.1 Vegetation Management

Gulf Power has assessed the performance of its vegetation management (VM) plan, approved in 2010 by FPSC Order No. PSC-10-0688-PAA-EI. This plan included:

- Three-year trim cycle on all main line feeders;
- Annual inspection and corrective action plan on the remaining two-thirds of main line feeders; and
- Lateral distribution lines managed on a reliability-based program to achieve a four-year average cycle.

When evaluated on an annual basis, determining trends in tree-related reliability can be difficult, as annual fluctuations in weather can greatly influence tree-related reliability from year to year. Instead, Gulf has analyzed its distribution VM program's effectiveness by analyzing total tree-related reliability for each three-year storm hardening plan, using Gulf's initial 2007-2009 storm hardening plan as the baseline.

Since the time period of the 2007-2009 Storm Hardening Plan, system-wide adjusted tree-caused CI has increased 12.68% and unadjusted CI increased 33.22%. Adjusted tree-caused CMI for the same time period increased 7.74% while unadjusted CMI increased 69.87%. The tree-related performance of Gulf's system for this time period is summarized in Tables 1-4.

Table 1. Adjusted Distribution Vegetation Caused Customer Interruptions (Does not include storm outages)						
Plan Years	**Feeder CI**	**Inc / Dec**	**Lateral CI**	**Inc / Dec**	**Total CI**	**Inc / Dec**
2007-2009	100,940	-	133,829	-	234,769	-
2010-2012	53,103	-47.39%	139,130	3.96%	192,233	-18.12%
2013-2015	53,432	0.62%	140,546	1.02%	193,978	0.91%
2016-2018	47,724	-10.68%	216,824	54.27%	264,548	36.38%
Total		**-52.72%**		**62.02%**		**12.68%**

Table 2. Unadjusted Distribution Vegetation Caused Customer Interruptions (Includes storm outages)						
Plan Years	**Feeder CI**	**Inc / Dec**	**Lateral CI**	**Inc / Dec**	**Total CI**	**Inc / Dec**
2007-2009	114,605	-	153,764	-	268,369	-
2010-2012	63,726	-44.40%	177,100	15.18%	240,826	-10.26%
2013-2015	60,581	-4.94%	179,929	1.60%	240,510	-0.13%
2016-2018	57,239	-5.52%	300,281	66.89%	357,520	48.65%
Total		**-50.06%**		**95.28%**		**33.22%**

Table 3-. Adjusted Distribution Vegetation Caused Customer Minutes of Interruption (Does not include storm outages)						
Plan Years	**Feeder CMI**	**Inc / Dec**	**Lateral CMI**	**Inc / Dec**	**Total CMI**	**Inc / Dec**
2007-2009	6,473,809	-	19,876,303	-	26,350,112	-
2010-2012	4,274,516	-33.97%	19,092,585	-3.94%	23,367,101	-11.32%
2013-2015	4,398,808	2.91%	17,096,408	-10.46%	21,495,216	-8.01%
2016-2018	3,923,757	-10.80%	24,465,780	43.10%	28,389,537	32.07%
Total		**-39.39%**		**23.09%**		**7.74%**

Table 4. Unadjusted Distribution Vegetation Caused Customer Minutes of Interruption (Includes storm outages)						
Plan Years	**Feeder CMI**	**Inc / Dec**	**Lateral CMI**	**Inc / Dec**	**Total CMI**	**Inc / Dec**
2007-2009	8,065,242	-	23,195,274	-	31,260,516	-
2010-2012	5,754,781	-28.65%	28,375,018	22.33%	34,129,799	9.18%
2013-2015	5,194,068	-9.74%	30,129,920	6.18%	35,323,988	3.50%
2016-2018	5,838,450	12.41%	47,264,235	56.87%	53,102,685	50.33%
Total		**-27.61%**		**103.77%**		**69.87%**

Gulf's vegetation reliability in the 2016-2018 timeframe was driven primarily by severe weather, including thunderstorm activity. As described in Section 15.3 of the Annual Reliability and Storm Hardening filings, a small number of un-excluded severe weather days disproportionately influence the SAIDI and SAIFI metrics.

These days contributed over 22% of CMI and 12% of CI, while comprising only approximately 1% of the 2016-2018 timeframe.

	Feeder				Lateral				System Total			
Event	**CMI**	**% of Total**	**CI**	**% of Total**	**CMI**	**% of Total**	**CI**	**% of Total**	**CMI**	**% of Total**	**CI**	**% of Total**
1/01/17		0.0%		0.0%	797,019	3.2%	1,972	0.9%	797,019	2.8%	1,972	0.7%
1/02/17	682,029	17.4%	4,682	9.8%	116,574	0.5%	824	0.4%	798,603	2.8%	5,506	2.0%
1/18/18		0.0%		0.0%	8,106	0.0%	66	0.0%	8,106	0.0%	66	0.0%
1/22/16		0.0%		0.0%	243,671	1.0%	1,704	0.8%	243,671	0.8%	1,704	0.6%
5/01/17	256,578	6.5%	1,591	3.3%	2,593,304	10.4%	6,623	3.0%	2,849,882	9.9%	8,214	3.0%
5/20/16	88,323	2.3%	694	1.5%	340,304	1.4%	1,603	0.7%	428,627	1.5%	2,297	0.9%
6/10/18		0.0%		0.0%	305,872	1.2%	1,932	0.9%	305,872	1.1%	1,932	0.7%
6/28/18	47,773	1.2%	1,942	4.1%	193,379	0.8%	1,373	0.6%	241,152	0.8%	3,315	1.2%
6/30/18		0.0%		0.0%	175,957	0.7%	1,822	0.8%	175,957	0.6%	1,822	0.7%
7/17/16		0.0%		0.0%	11,629	0.1%	80	0.0%	11,629	0.0%	80	0.0%
8/04/16	84,375	2.2%	1,751	3.7%	493,521	2.0%	4,388	2.0%	577,896	2.0%	6,139	2.3%
12/01/18		0.0%		0.0%	69,755	0.3%	567	0.3%	69,755	0.2%	567	0.2%
Severe Weather Days	1,159,078	29.5%	10,660	22.3%	5,349,091	21.4%	22,954	10.3%	6,508,169	22.5%	33,614	12.4%
All Other Days	2,764,680	70.5%	37,064	77.7%	19,608,274	78.6%	200,494	89.7%	22,372,954	77.5%	237,558	87.6%
16-18 Total	3,923,758		47,724		24,957,365		223,448		28,881,123		271,172	

If these days were excluded, since the time period of the 2007-2009 Storm Hardening Plan, system-wide adjusted tree-caused CI would have increased only 1.19%. Adjusted tree-caused CMI for the same time period decreased 15.09%.

Gulf's distribution VM program recognizes the importance of placing emphasis on the mainline feeders in order to improve overall system reliability because mainline outages have a major impact on system reliability. Gulf's mainline program of pruning one-third (1/3) of its mainline feeders each year and performing an annual inspection and taking corrective action on the remaining two-thirds (2/3) of its mainline feeders has been beneficial to Gulf's customers in terms of overall system reliability. As can be seen in the above data tables, Gulf's mainline feeder reliability has improved dramatically since Gulf adopted this philosophy in 2007.

Gulf has continued to utilize the Distribution Lock-Out Reporting process (DLOR) to evaluate all tree-caused outages on main line feeders. DLOR was created to track distribution feeder lock-outs, identify root causes of lock-outs, and identify systems and operational modifications that could be implemented to prevent future feeder lock-outs.

The majority of Gulf's distribution lines are located on public road right-of-way. Throughout the years, the widening of roads has forced Gulf to relocate its distribution facilities close to the right-of-way edge. As a result, some of Gulf's facilities are now immediately adjacent to privately-owned property where Gulf has no legal rights to prune or remove vegetation.

In 2016, Gulf launched a pilot program to expand its storm hardening philosophy by attempting to buy vegetation management easements from private property owners on select feeders to enhance Gulf's ability to adequately address VM concerns. The criteria used to select feeders were:

- Mainline feeders that serve key customers, such as hospitals
- Feeders that experience reliability issues due to off right-of-way vegetation conflicts
- Feeders that have heavy exposure to off right-of-way vegetation

The program has met expectations to this point. Gulf has successfully purchased easements on 89 miles of line giving Gulf the right to clear and maintain a 15-ft. wide corridor on private property adjacent to the public right-of-way and Gulf's distribution facilities.

Gulf plans to continue this program to provide VM reliability improvements on its system.

Gulf has maintained its lateral lines using a reliability-based methodology to determine which areas require VM work while achieving an average four-year cycle. Gulf's initial storm hardening plan was approved for a six-year cycle on laterals. Beginning in 2010, Gulf began transitioning to a four-year cycle on laterals in response to a rapid rise of trouble tickets under the six-year cycle.
Using this management philosophy, tree-related reliability on lateral lines has increased by 23.09% in terms of adjusted CMI, even though adjusted CI has increased by 103.77%, primarily due to Hurricane Michael. Gulf's present distribution VM program has maintained a relatively stable level of tree-related reliability on its lateral lines, while improving overall customer reliability.

Gulf will continue coordination with local officials on vegetation management activities, emphasize tree removals during new line construction, and continue public education efforts to encourage the planting of compatible tree species near power lines.

Gulf will also continue to provide "TreeGulf" as a proactive way for any employee to efficiently notify Gulf's Forestry Services department of a potential vegetation problem.

2.2 Joint-Use Pole Attachment Audits

Field audits of joint-use poles are conducted every five years as outlined in contractual agreements with third-party attachers. The audit includes poles owned by the electric utility to which other utility attachments are made (i.e., telecommunication and cable) and poles not owned by the electric utility to which the electric utility has attached its equipment. Gulf completed its last audit of attachments on the distribution system in 2016. It is anticipated that similar data will be collected and/or verified in the next field audit scheduled for 2021.

Any dangerous situations identified during the joint-use field audits or random field visits are immediately reported to the pole owner. Dangerous conditions may include buckling, splitting or broken poles, or low hanging conductors or cables.

2.3 Inspection Cycle of Transmission Structures

Gulf Power's current transmission inspection plans meet or exceed the approved 6-year inspection cycle of the FPSC. In 2004, Gulf adopted its current program. The details of the program have been filed with the Commission as outlined in FPSC Order No. PSC-06-0144-PAA-EI. In general, Gulf contracts ground line inspections and uses a combination of

company employees and contractors to perform comprehensive walking and aerial inspections. Gulf's transmission structure inspection program is based on two alternating twelve-year cycles, which results in a structure being inspected at least every six years. Gulf will continue the use of the same transmission inspection program in the 2019-2021.

Historically, Gulf has not inspected a set number of poles each year. Gulf plans to utilize the same flexible approach in its proposed 2019-2021 Storm Hardening Plan to ensure the completion of its inspection cycle as required.

Gulf Power currently inspects all of its substations at least once annually. These inspections include visual inspection of all structures, buss work, switches and capacitor banks for defects. Gulf proposes to continue the same inspection process for the 2019-2021 Storm Hardening Plan.

2.4 Storm Hardening Activities for Transmission Structures

Gulf Power will continue the design and construction of new facilities based on the standards set forth by the most current version of the National Electric Safety Code (NESC). In addition, when it is practical and feasible, consideration will be given to upgrade existing transmission facilities when capital maintenance is performed. It is Gulf's position that the adherence to current design and construction standards using generally accepted engineering practices, in conjunction with the recommended 6-year structure inspection program, will maintain adequate hardening of the system in all areas.

During the 2016-2018 Storm Hardening Plan, Gulf completed its previous plan that was focused on additional storm guying on all wooden H-frame structures and replacement of all wood cross-arms with steel cross arms on the transmission system.

Based on data from Hurricane Michael and the overall performance of wooden structurers on the transmission system, Gulf will begin a program to replace all wooden structurers with concrete or steel structurers in a systematic approach going forward. For the 2019-2021 Storm Hardening Plan, Gulf is proposing to spend approximately $5 - $12 million dollars on transmission hardening in 2019 and an estimated $14 to $40 million during the final two years of this Plan.

With respect to storm hardening for "new" transmission facilities in the 2019-2021 Storm Hardening Plan, Gulf Power will continue the best practice of designing all new transmission construction facilities using loading criteria found in the NESC with a 1.0 overload factor. This criterion includes both NESC rule 250C (extreme wind loading) and 250D (extreme ice with concurrent wind loading), found on page 212, Table 253-1, in Section 25 of

the 2012 NESC book. The overload factors of 1.0 call for Grade B construction, which is the standard used by Gulf on all new transmission lines. The main objective is to design a structure that has a capacity greater than the maximum expected load. The combined effect of load factors and strength factors provides an appropriate level of safety and reliability.

2.5 Geographic Information System (GIS)

Gulf Power's Geographic Information System (GIS) uses database information that is continuously maintained and updated with Transmission, Distribution and Land information from across the service area.

During the 2019-2021 Storm Hardening Plan, Gulf Power will transition its GIS data from its current systems to systems utilized by NextEra Energy, a change driven by the Company's acquisition by NextEra Energy.

Gulf Power's transmission and distribution data that are essential for asset management and forensic data analysis were mapped in GIS as part of the 2007-2009 Storm Hardening Plan. This GIS data will be maintained and updated as needed for the 2019-2021 Storm Hardening Plan.

2.6 Post-Storm Data Collection and Forensic Analysis

Gulf Power has in place a post-storm forensic process for the collection, evaluation, and reporting of storm damage data. Contractors will aid Gulf in the collection of field data after a major storm. Hand-held computers (downloaded with Gulf's GIS database) will be utilized to collect the pertinent field data. This data will be collected on pre-determined projects constructed to extreme wind loading criteria and in other designated overhead and underground areas. The information collected by the contractor will be utilized to perform a forensic analysis for Gulf. This analysis will be the basis of a report containing an executive summary, description of the data collected, preliminary storm data, areas affected and the analysis results in tabular and graphical forms. This "fact finding" assessment of existing facilities will help in the evaluation of our construction standards going forward.

The data collection and transfer process is tested annually to ensure the process of collecting and exchanging information electronically between Gulf and its contractors will not encounter any problems during a storm situation.

Gulf will utilize the above forensic program as part of its 2019-2021 Storm Hardening Plan. On-going refresher training will be given as needed over the next three years to ensure all responsible parties are fully prepared to execute the program.

The Gulf Power Transmission department's storm forensics team will be led by the transmission engineering function. Utilizing an aerial patrol, the team will capture an initial assessment of the level of storm damage to the transmission system. Follow-up aerial patrols utilizing helicopters and unmanned aerial vehicles (UAVs) will capture details and locations of failures and the results will be conveyed to the Transmission Engineering department. When ground crews arrive on the scene, the construction inspector with the crew will be responsible for assessing all damage and determining the cause of the failure. Gulf's Transmission Engineering department will review all findings of the field inspections and determine if additional information should be gathered, and building an analysis report of the findings.

2.7 Outage Data differentiating between Overhead and Underground Systems

Gulf will continue to record the number of overhead (OH) and underground (UG) customers on its system at the end of each year. This data will allow the calculation of SAIDI and SAIFI indices based on the experiences of both overhead and underground customers.

Gulf will also continue to collect the type of Underground cable construction or the Pole type for relevant outages. The data will include:

- UG cable construction is:
  - Direct Buried
  - Direct Buried with Injection Treatment
  - In Conduit
- Pole type is:
  - Concrete
  - Wood
  - Steel

Gulf Power will continue to collect Pole and UG Cable outage data for future analysis as recommended by the FPSC.

2.8 Coordination with Local Governments

Consistent with its 2016-2018 Storm Hardening Plan, Gulf Power will continue its current local government coordination efforts in Northwest Florida for the 2019-2021 Storm Hardening Plan.

Gulf Power district managers are located in Pensacola, Ft. Walton, and Panama City. Local managers, who report to the district managers, are located in Milton, Crestview, Niceville, and Chipley. These employees interact with city and county personnel on a regular basis regarding numerous issues, including emergency preparedness. They are also actively involved in joint government and business committees that focus on emergency preparedness needs in Northwest Florida.

Gulf Power's Line Clearance specialists and Forestry Services technicians communicate routinely with local governmental officials, community groups, and homeowner associations to ensure local area involvement and to effectively maintain communications regarding vegetation management projects.

Gulf Power representatives are assigned to county emergency operations centers (EOCs) in Northwest Florida. During emergencies that warrant activation of the county EOCs, the Company's EOC representatives assist city and county agencies and officials. Gulf Power provides extensive coverage throughout the duration of the EOC activation.

With a significant weather event, Gulf Power's Corporate Communications department will provide ongoing communications, both pre-storm and post-storm. Relevant and timely Gulf Power news releases will be provided to the county EOCs during storm restoration events to keep local government agencies and officials apprised of the latest restoration activities.

2.9 Collaborative Research

As part of its 2019-2021 Storm Hardening Plan, Gulf Power will continue collaborative efforts to conduct research and development (R&D) on the effects of major hurricanes on the electrical system throughout the state of Florida. The Public Utility Research Center (PURC) located at the University of Florida continues to provide the leadership necessary to serve as the R&D coordinator in the state. PURC has strong working relationships with Florida's investor-owned utilities, cooperatives and municipals.

Gulf Power will continue to participate in R&D activities that PURC initiates. These activities involve utility managers and hazard research professionals discussing means to prepare Florida's electrical infrastructure to better withstand and recover from hurricanes.

2.10 Disaster Preparedness and Recovery Plan

2.10.1 Gulf's Storm Recovery Plan

Gulf Power uses the plans described in its Storm Recovery Manual to respond to any disaster or major interruption of service to customers that may occur within its service area. These plans have proven to be effective both historically and as recently as the 2018 storm season. As part of its annual operations, Gulf Power has developed and continues to refine its planning and preparations for the possibility of a disaster within Gulf Power's service area. This planning is updated each year in order to improve processes by incorporating industry best practices and the Company's own experiences during actual events. In these updates, Gulf Power strives for continuous improvement by building on recovery effort experiences within the service area, as well as experiences gained through off-system events when assisting other utilities with their recovery from weather-related natural disasters. Gulf Power's plan has been encapsulated within a detailed and proprietary Storm Recovery Manual.

2.10.2 Gulf's Storm Recovery Preparations

All Gulf Power employees are given a specific storm assignment as part of the planning process. At Gulf, the Emergency Preparedness Specialist works with Human Resources to ensure that each restoration area is staffed with the appropriate number of employees and that every employee has the proper skill set to perform their storm assignment. Training manuals are updated, and training is conducted to ensure that employees are competent to perform the job to which they are assigned. As hurricane season approaches, internal communications remind all employees to review their storm plans at work and for their homes and families. Additionally, storm preparedness and storm responsibilities are included as one of the topics at new employee orientation meetings.

Members of the Company Emergency Management Center (CEMC) leadership team attend conferences such as the Southeastern Electric Exchange (SEE) Mutual Assistance meetings each year in an effort to benefit from lessons learned by others. Gulf Power also participates in the yearly statewide storm drill under the direction of the State Emergency Operations Center (SEOC). Gulf Power will continue to conduct numerous internal storm drills for varying responsibilities, teams, and the company as a whole.

Contracts are reviewed, negotiated and confirmed with vendors for services such as food, lodging, materials, transportation, fuel, staging sites, and other support functions. Gulf Power's Supply Chain Management department ensures that materials on hand, along with

available supplies from material vendors, are sufficient to meet the anticipated demands of the upcoming storm season.

2.10.3 Gulf's Company Emergency Management Center

The objective of the CEMC is to provide overall direction in the restoration of electric service to Gulf Power's customers as quickly as possible, while protecting the safety of everyone involved. In order to provide a coordinated response and to maximize the restoration effectiveness, Gulf organizes into three major restoration areas headquartered in Pensacola, Fort Walton Beach and Panama City. The CEMC consists of functional teams which provide support to Generation, Transmission, and Distribution as they restore their respective systems. The functional teams that are represented in the CEMC and that report to the CEMC Manager are: CEMC Staff; Accounting, Finance and Treasury; Aircraft Operations; Check-In Sites; Contractor Coordination; Customer Operations Support; Customer Service; Distribution; Environmental; Emergency Operations Center; Facilities; Fleet Services; Generation; External Affairs; Human Resources; Information Technology; Logistics; Public Affairs; Risk Management; Safety & Health; Security; Supply Chain Management and Transmission.

When the National Weather Service announces that a tropical storm or hurricane has entered the Gulf of Mexico, the CEMC leadership will communicate with appropriate management and Gulf's executives. Storms are monitored for development, and if there is a possibility that Gulf Power's service area will be affected, the CEMC is set up and readied for activation at Gulf Power's Pine Forest facility located in Cantonment, Florida. The hurricane is closely monitored when it may threaten Gulf Power's service area within 36 hours.

After evaluation of wind profiles and consultation with weather services, a decision is made as to when it will become unsafe for employees to travel. At that time, and after consultation with senior management, the CEMC Manager will determine when the CEMC will be formally activated. CEMC leaders are notified of the activation plan and are responsible for ensuring their respective areas are in a state of readiness and properly staffed.

Once activated, the CEMC is staffed by a core group for the duration of the event. The CEMC is operational 24 hours a day, 7 days a week, until such time the power is substantially restored to all customers who are able to receive service. Depending on the severity of the event, repair work on the system may continue after the CEMC is deactivated.

3.0 Wood Pole Inspection Plan

Gulf Power has been evaluating its distribution poles through ground-line inspection since the early 1990's. Gulf's distribution pole inspection program was originally based on a ten-year cycle, completing its first cycle in 2002. In 2007, Gulf Power moved from a ten-year cycle to an eight-year cycle as required by Order No. PSC-07-0078-PAA-EU. Gulf completed the first eight-year cycle one year ahead of schedule in 2013. In 2014, Gulf began its second eight-year cycle.

Historically, Gulf has not inspected a set number of poles each year. The number of poles inspected annually often varies; however, Gulf has successfully completed all pole inspection cycles on schedule utilizing this approach. Gulf will typically inspect poles in one year and ensure all necessary repairs are completed by the end of the following year. This approach has been utilized in Gulf's previous Storm Hardening Plans. For the period 2019-2021, Gulf plans to continue the same inspection program and philosophy that has received FPSC approval since 2007 and has provided superior service to our customers.

Gulf utilizes an inspection matrix that ensures all poles (Creosote, Penta, and CCA) receive a visual inspection with sounding, boring and excavation as appropriate. This inspection matrix has been approved by the FPSC in all previous plans. Utilizing this philosophy, Gulf's wooden pole plant has continued to perform admirably. Pole failures have been limited to times of extremely adverse weather, tree failures, or vehicle strikes.

Gulf Power's rate of rejection for distribution wood poles has fallen from approximately 15% during its first ten-year inspection cycle to less than 5% on the second inspection cycle. The annual pole rejection rates during the second eight-year inspection cycle are shown in Table 5.

Table 5: Annual pole rejection rates for Gulf Power during second eight-year ground line pole inspection cycle.

Year	**2014**	**2015**	**2016**	**2017**	**2018**
Reject Rate (%)	2.48	2.71	2.92	3.52	2.71

Gulf has repaired or replaced all poles identified as rejects in previous years and is on schedule to replace or repair all poles identified during the 2018 inspection in 2019.

4.0 Compliance with National Electric Safety Code (NESC) in regards to Storm Hardening

4.1 Distribution

Gulf Power's distribution system complies with all applicable sections of the National Electric Safety Code and exceeds the NESC with the transition to Extreme Wind Loading standards for all new feeder construction.

4.2 Transmission

Gulf Power's transmission system complies with all applicable sections of the National Electric Safety Code in effect at the time of initial construction.

4.3 Substation

Gulf Power uses the American Society of Civil Engineers (ASCE) 7 extreme wind loading criteria for structure design and selection, which complies with the National Electric Safety Code extreme wind loading requirements for Gulf's service area.

5.0 Adoption of Extreme Wind Loading standards specified by Figure 250-2(d) of the 2012 edition of the NESC for Distribution Facilities

As a result of its system performance during Hurricane Michael and the associated data obtained from forensic analysis, combined with the sharing of Florida Power and Light Company's (FPL) experience with its own storm hardening initiatives, Gulf is proposing to increase its future storm hardening efforts. Initially, in addition to continuing other aspects of its previously approved plans that have proven to be beneficial, Gulf is proposing to invest approximately $5 - $12 million in 2019 and an estimated $14 to $40 million over the remainder of this plan in projects associated with strengthening existing critical infrastructure facilities (e.g., facilities that serve hospitals, shelters, first responders) to extreme wind loading standards per the NESC guidelines. As the Company learned during Hurricane Michael, mitigating damage to these key facilities and minimizing restoration times for these key services is critical to the communities Gulf Power serves.

To determine future implementation of hardening initiatives and construction standards, Gulf will continue to review its Hurricane Michael forensic analysis as well as best practices associated with other utilities storm hardening initiatives,

including lessons learned from undergrounding pilots underway by FPL. Developing a systematic and strategic approach to continue to storm harden the system is crucial to ensuring the electric grid is more resilient and reliable for Northwest Florida and the customers of Gulf Power.

Appendix 1 shows communities within Gulf's service area and the extreme wind loading standards lines as specified by figure 250-2(d) of the 2012 edition of the NESC.

6.0 Mitigation of damage to Underground Facilities and Supporting Overhead Transmission and Distribution Facilities due to Flooding and Storm Surges

6.1 Distribution

Gulf Power has developed overhead and underground storm hardening specifications (Appendices 2 and 3) to minimize damage in areas subject to flooding and storm surges. These specifications will continue to evolve as Gulf continues to seek out best practices and learns from the review of gathered forensic data with respect to storm hardening and storm surge mitigation.

6.2 Transmission

Gulf Power Transmission utilizes overload and strength factors greater than or equal to those required in Sections 25 and 26 of the National Electric Safety Code. Gulf's loading criteria for new line design is derived from Section 25 of the National Electric Safety Code.

All future Gulf Power underground transmission projects located within the possible storm surge area will be engineered to consider the impact of flooding or storm surge from weather events.

7.0 Placement of New and Replacement Distribution Facilities so as to Facilitate Safe and Efficient Access for Installation and Maintenance

Gulf Power has always recognized that accessibility to distribution facilities is essential to safe and efficient maintenance and storm restoration. Therefore, Gulf continues to strive to promote placement of facilities adjacent to public roads; to use easements, public streets, roads and highways; to obtain

easements for underground facilities; and to use road right-of-ways for conversions of overhead to underground.

Gulf will continue these initiatives in the 2019-2021 Storm Hardening Plan.

8.0 Other Key Elements

8.1 Feeder Patrols

Annually, by June 1, all critical lines will be inspected up to the first protective device for loose down guys, slack primary and leaning poles. All problems found will be corrected.

8.2 Infrared Patrols

Annually, by June 1, infrared inspections of critical equipment on main line three phase feeders will be performed. Problematic devices identified, such as, feeder switches, capacitors, regulators and automatic over-current protective devices, will be repaired.

8.3 Additional Proposed Storm Hardening Initiatives

8.3.1 Distribution Automation

Gulf Power proposes to continue the installation of additional distribution automation devices to further segment the feeders for outage restoration. These devices protect customers by limiting those affected by temporary faults and sustained outages. These devices will either be controlled by DSCADA and/or function as a part of automated restoration schemes.

8.3.2 Strategic Installation of Automated Overhead Faulted Circuit Indicators

Faulted Circuit Indicators (FCIs) are devices designed to indicate the passage of fault current. These devices will reduce customer outage time by helping to expedite locating outage causes, aiding in the isolation of the problem. This process will help restore service to some customers while the problem is being corrected.

Gulf proposes to continue to install new FCIs at strategic locations and upgrade existing ones annually as part of the 2019-2021 Storm Hardening Plan.

8.3.3 Distribution Supervisory Control and Data Acquisition (DSCADA) System

In order to reduce customer outage times, Gulf has implemented a DSCADA system used to remotely control and monitor the distribution system by Distribution Control Center personnel. The DSCADA system will continue to be expanded with the addition of line devices in this Plan.

9.0 Storm Plan Deployment Strategy for Distribution, Transmission and Substation

9.1 Description of the facilities affected, including technical design specification, construction standards, and construction methodologies employed

9.1.1 Distribution

Gulf continues to develop overhead and underground storm hardening specifications which are contained in Appendices 2 and 3. These specifications continue to evolve as Gulf seeks out best practices and learns from the review of gathered forensic data.

As stated in Section 5.0, Adoption of Extreme Wind Loading standards specified by Figure 250-2(d) of the 2012 Edition of the NESC for all new Distribution Facilities, Gulf will construct all new feeder lines using the extreme wind loading standards.

9.1.2 Transmission

Gulf Power Transmission utilizes overload and strength factors greater than or equal to those required in Sections 25 and 26 of the National Electric Safety Code. Gulf's loading criteria for new line design is derived from Section 25 of the National Electric Safety Code. These design criteria are used on all new installation and complete rebuild projects throughout Gulf's service area.

9.1.3 Substation

Coastal Substation Risk Assessments will be reviewed for all substations following Hurricane Michael. As part of this process, a National Oceanic and Atmospheric Administration (NOAA) SLOSH (Sea, Lake and Overland

Surges from Hurricanes) model is used to define the potential maximum. SLOSH is a computerized model run by the National Hurricane Center (NHC) to estimate storm surge heights and winds resulting from historical, hypothetical, or predicted hurricanes.
Gulf will implement flood monitoring on vulnerable substations and review switch house construction standards for possible replacement and strengthening. Gulf is proposing to spend approximately $3 million over the next three years on substation mitigation and strengthening as part of its Storm Hardening Plan.

An Emergency Response Plan has been established for all substations on Gulf's system.

9.2 Communities and areas affected and critical infrastructure as illustrated by Gulf Power Company Service Area/DistGIS Maps

9.2.1 Distribution

Appendix 1 shows communities within Gulf's service area and the extreme wind loading standards lines as specified by figure 250-2(d) of the 2012 edition of the NESC. Gulf proposes in this 2019-2021 Storm Hardening Plan for all new feeder construction and work performed on critical infrastructure facilities to meet the extreme wind loading construction standards.

9.2.2 Transmission

The storm hardening initiative of replacing wooden transmission structures with concrete or steel will be implemented on the entire Gulf Power Transmission system in a systematic approach.

10.0 Gulf Power Company's Estimate of Incremental Costs and Benefits

The total estimated cost for Gulf Power's 2019-2021 Storm Hardening Plan is approximately $80 to $135 million. This estimated cost includes the continuance of successful initiatives pursued under Gulf's previous Storm Hardening Plans and investment in new, additional measures intended to further harden the Company's distribution and transmission systems.

As discussed in Sections 4.0 and 5.0 of this Plan, Gulf will construct all new distribution feeders and upgrades of critical infrastructure to extreme wind loading standards. Gulf's proposes approximately $5 - $12 million in distribution

hardening for 2019, with an estimated $14 - $40 million to be spent during the remaining two years of this Plan.

For its transmission system, Gulf proposes approximately $5 - $12 million in transmission storm hardening for 2019, with the replacement of wooden transmission structures, and an estimated $14 - $40 million during the following two years of the Plan.

Gulf plans to spend an estimated $3 million dollars on substation mitigation across the system during the three years covered by this Plan. This proposed investment is based upon experiences learned from the damage incurred during Hurricane Michael.

In addition to the feeder patrols discussed in Section 8.0, Gulf plans to continue the storm hardening initiatives identified in Sections 6.1 and 8.3 at a cost of approximately $18 million during the 2019-2021 Plan.

Gulf Power's 2019-2021 Storm Hardening Plan is designed to include initiatives which have the most potential to meet the intent of storm hardening and provide the most cost-effective approach based on Gulf's years of experience with transmission and distribution construction and storm restoration.

During Hurricane Michael restoration efforts, Gulf Power did see benefits in lessened storm damage and shortened restoration times on those facilities that had been hardened and were outside the epicenter of the storm.

See Appendix 4 for an itemized summary of Gulf's storm hardening costs.

11.0 Impact of Collocation Facilities

11.1 Distribution

Gulf Power evaluates attachments made to its poles, towers, and structures to provide storm hardening for the future through the following means:

- Pole Strength and Loading Engineering calculations are performed before attachment to any pole, tower or structure and before any existing cables are upgraded or overlashed in order to determine if the increase in pole loading would necessitate pole modifications.
- Attachers comply with a pre-notification process designed to inform Gulf Power of plans to attach, upgrade, or overlash cables to any Gulf Power poles, towers, or structures. This process includes a field pre-inspection with pole measurements, strength and loading calculations, work order preparation (if necessary), and a post-

inspection of all work. The requesting Attacher is responsible for post-inspection costs and any corrective actions, if needed.

- Specification plates reflect storm hardening initiatives such as additional guying standards and the use of pole foam in potential flood prone or storm surge areas.
- Gulf has provisions in its agreement with the Florida Cable Telecommunication Association (FCTA) Attachers to place an identification tag on their facilities for ease of contacting the Attachers when supporting poles or facilities are damaged and the Attacher is needed to help remove, clear the right-of-way, or transfer their cables to a new pole in emergencies, such as storm restoration.
- Every effort is made by all pole Attachers not to box or bracket a pole, tower, or structure on both sides. This practice ensures that the attachment will not encumber the climbing space or impede the ability to straighten a leaning pole in a timely manner.

11.2 Expansion, Rebuild, or Relocation of Distribution Facilities

Each Attacher should refer to the contract they have with Gulf Power for details on notification protocol for new attachment permits and overlashing projects and any associated construction coordination. Gulf Power uses the National Joint Use Notification System (NJUNS) for joint-use notifications and coordination of construction activities with affected parties.

12.0 Estimate of Costs and Benefits

12.1 Seeking Input from Attachers

Pursuant to Rule 25-6.0342(6), Gulf Power will continue to seek input from Third-Party Attachers in the development of its Storm Hardening Plan. The following Attachers will be provided information and communication about the plan.

- AT&T
- Brighthouse Networks
- CenturyLink
- CHELCO
- City of Pensacola
- Comcast Joint Holding
- Cox Communications
- Escambia County Schools
- Fairpoint Communications

- Kentucky Data Link, Inc. / Windstream
- Knology
- Level 3 Communications
- Mediacom
- RSAE Labs
- Southern Light
- Springfield Cable
- Valparaiso Broadband Communications
- Verizon
- Walton County
- WOW

Gulf Power will continue to coordinate face-to-face semi-annual meetings with interested Third-Party Attachers to discuss major company and customer construction projects, construction standards, inspection programs, and operational issues.

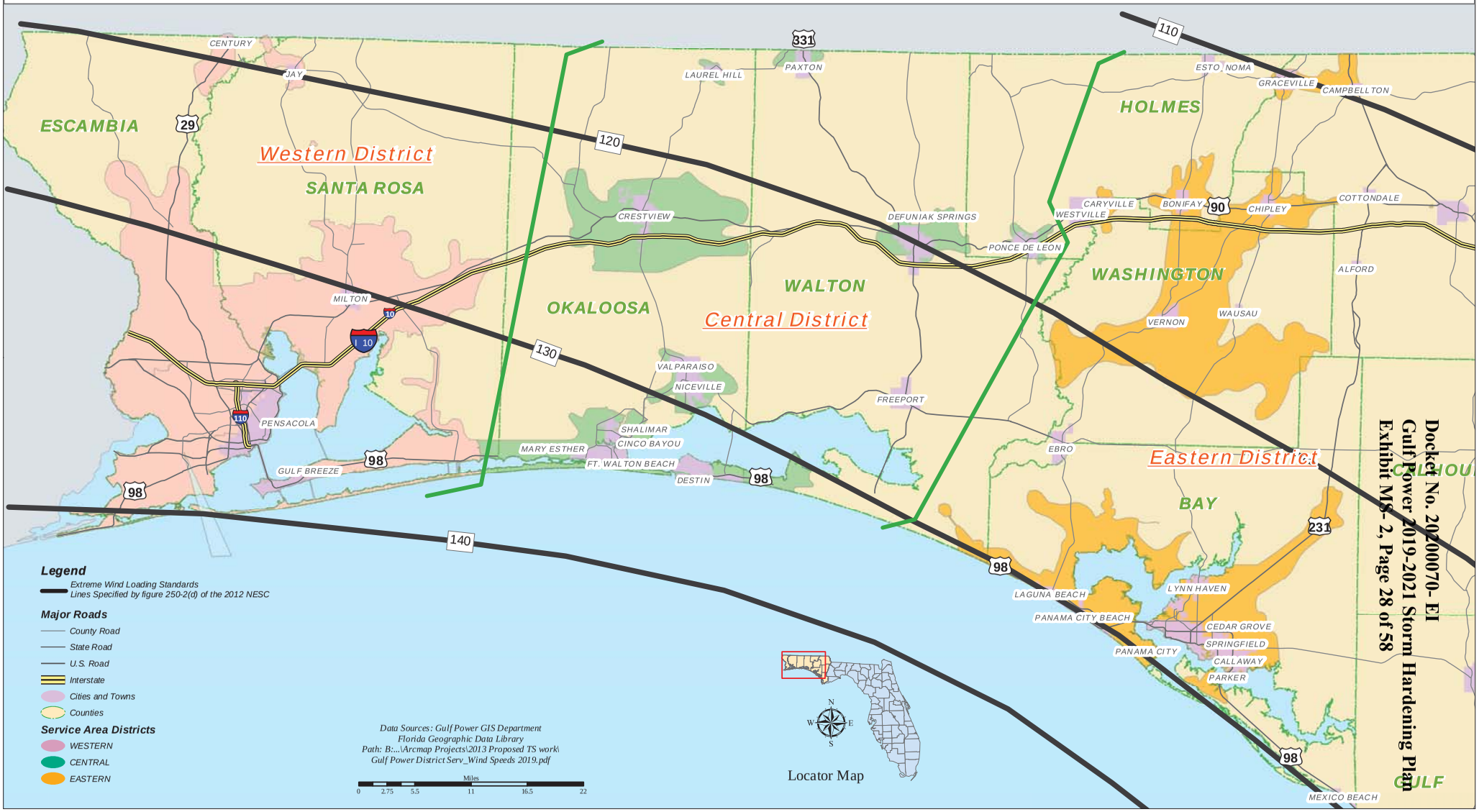
12.2 Attachers Costs and Benefits

No cost and benefit data was received from Third-Party Attachers prior to the published date of this Storm Hardening Plan. Gulf Power welcomes any such data that the Attachers desire to include at a later date.

Appendix 1

Map of Northwest Florida with Extreme Wind Loading Standards

GULF POWER DISTRICT SERVICE AREAS



Legend

Extreme Wind Loading Standards
Lines Specified by figure 250-2(d) of the 2012 NESC

Major Roads

- County Road
- State Road
- U.S. Road
- Interstate
- Cities and Towns
- Counties

Service Area Districts

- WESTERN
- CENTRAL
- EASTERN

Data Sources: Gulf Power GIS Department
Florida Geographic Data Library
Path: B:...\Arcmap Projects\2013 Proposed TS work\
Gulf Power District Serv_Wind Speeds 2019.pdf

Miles
0 2.75 5.5 11 16.5 22

Locator Map

Docket No. 20200070- EI
Gulf Power 2019-2021 Storm Hardening Plan
Exhibit MS- 2, Page 28 of 58

Appendix 2

OVERHEAD STORM HARDENING

Gulf Power Company Electrical Distribution Facilities shall be storm hardened to the extent practical using the methods described or shown in the specification plates in this section.

The definition of "Storm Guying" is as follows and is used throughout this section:

Storm type down guys are additional down guys and anchors, positioned perpendicular to the path of conductors. These storm type down guys are not normally needed for support of the structure but provide support in the event of high winds. They are installed in pairs with as much anchor lead as possible and have the same requirements as any other down guy as far as insulating and grounding.

The following storm hardening methods shall be utilized:

Main feeder lines shall be located as far away as practical from the source of any storm surge and shall have storm guys on every pole where practical. The use of laterals from the main feeder to the coastline is highly encouraged.

Any controls for OCRs, capacitor banks, voltage regulators shall be placed as high as practical to avoid flooding with a storm surge. The use of wireless accessing is encouraged.

Any poles with OCRs, voltage regulators, capacitor banks, and underground riser poles shall be storm guyed where practical.

Pole Foreman shall be utilized to determine proper pole selection and proper anchoring. Emphasis needs to be placed upon the correct lead lengths for anchoring.

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DETAIL STORM HARDENING				
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OVERHEAD STORM HARDENING

Continued from plate OZZ-1.

Poles set in our coastal areas or storm surge areas should be set using Pole Foam to strengthen the base to lessen leaning after flooding. This is commodity number 05-5014-8 and is located in JETS under Misc. UG. Generally, one package of pole foam is used for each pole and each package comes with instructions for use.

These areas are generally defined as areas within 1 mile of the Gulf or large bays. Spec plates OSZ-1,2,3,4,5,6 & 7 illustrate these areas. Of course there are other areas where this may be useful as well.

In these areas, shorter spans should be utilized to strengthen the system. This involves the use of more poles especially in main line construction.

As a means to strengthen existing poles, Osmose or equivalent pole bracing can be used.

In a flood/storm surge prone area, customers should install meters and metering equipment above the expected maximum flood level. Where this results in meters or metering equipment being above the standard specified heights above the ground, the customer will need to build permanent platforms and stairs to allow reading and servicing of the meters and equipment, unless the location of the equipment coincides with existing porches or platforms with ready access by Gulf Power employees. The platform must extend at least three feet out from the wall and at least 18" to either side of the metering equipment. Refer the customer to the local building inspector for other requirements for the platform and stairs.Gulf' metering handbook is another source of information.

Under normal circumstances, rear lot line construction shall be avoided and metering equipment shall not be placed on the rear of buildings.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL STORM HARDENING

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OVERHEAD STORM HARDENING

Joint-Use attachments

Third party attachers shall use proper anchoring and guying techniques to ensure that strength and integrity of the system is maintained.

Proper installation techniques shall be used. EX. Stringing of messengers shall be done between anchors.

Third party anchors shall be no closer than 4' from Gulf Power Company anchors to ensure integrity of the soil surrounding the anchors.

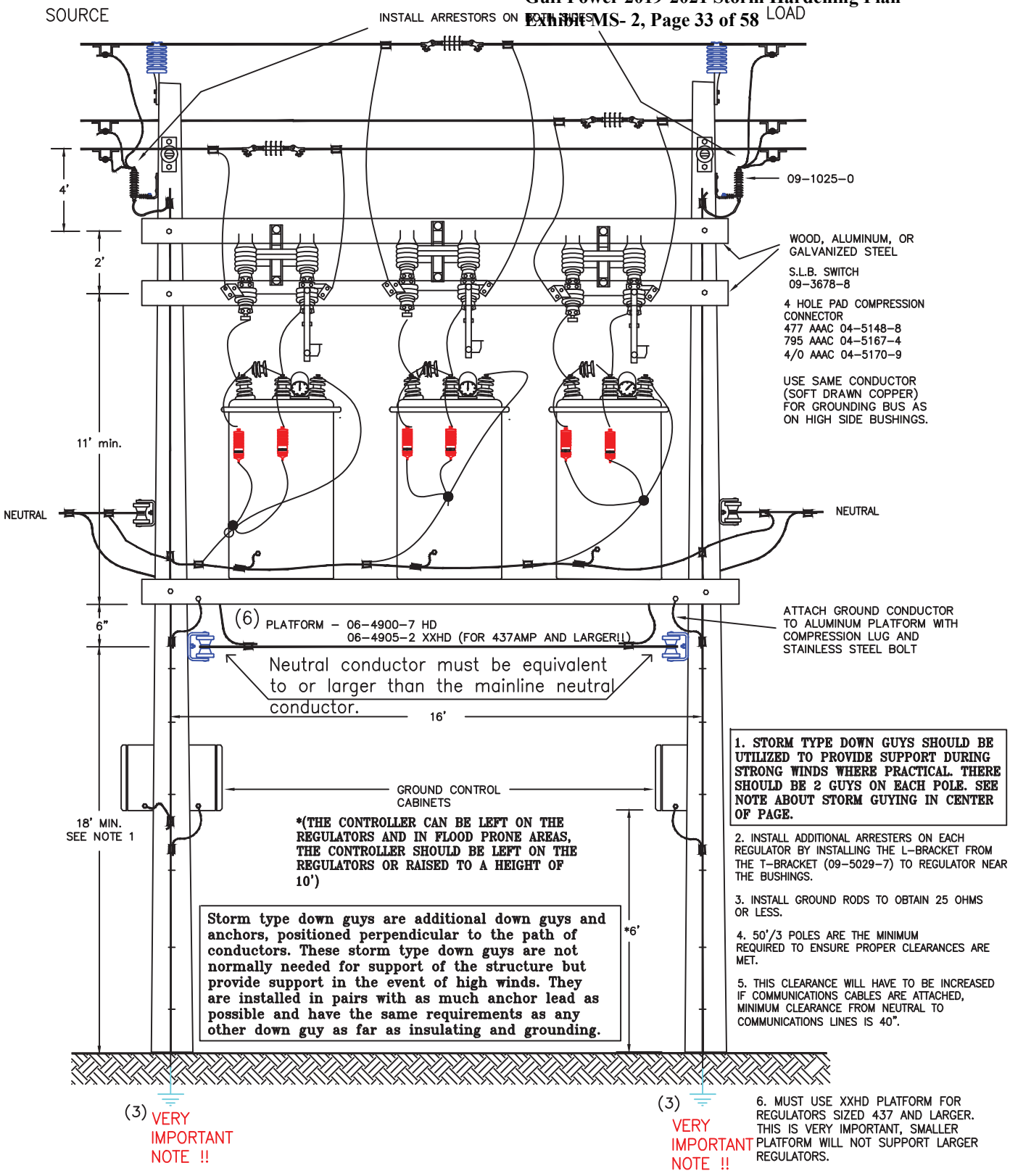
Third parties setting poles in flood prone or storm surge areas should utilize pole setting foam while setting poles to avoid leaning poles. These areas are generally defind as areas within 1 mile of the Gulf of Mexico or large bays.

SUBJECT OVERHEAD DISTRIBUTION				
DETAIL STORM HARDENING				
Date 10-18-2007	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-3 A

Overhead Storm Hardening

12 KV REGULATOR PLATFORM

FOR THREE 150 AMP. OR LARGER REGULATORS



1. STORM TYPE DOWN GUYS SHOULD BE UTILIZED TO PROVIDE SUPPORT DURING STRONG WINDS WHERE PRACTICAL. THERE SHOULD BE 2 GUYS ON EACH POLE. SEE NOTE ABOUT STORM GUYING IN CENTER OF PAGE.

***(THE CONTROLLER CAN BE LEFT ON THE REGULATORS AND IN FLOOD PRONE AREAS, THE CONTROLLER SHOULD BE LEFT ON THE REGULATORS OR RAISED TO A HEIGHT OF 10')**

Storm type down guys are additional down guys and anchors, positioned perpendicular to the path of conductors. These storm type down guys are not normally needed for support of the structure but provide support in the event of high winds. They are installed in pairs with as much anchor lead as possible and have the same requirements as any other down guy as far as insulating and grounding.

2. INSTALL ADDITIONAL ARRESTERS ON EACH REGULATOR BY INSTALLING THE L-BRACKET FROM THE T-BRACKET (09-5029-7) TO REGULATOR NEAR THE BUSHINGS.

3. INSTALL GROUND RODS TO OBTAIN 25 OHMS OR LESS.

4. 50'/3 POLES ARE THE MINIMUM REQUIRED TO ENSURE PROPER CLEARANCES ARE MET.

5. THIS CLEARANCE WILL HAVE TO BE INCREASED IF COMMUNICATIONS CABLES ARE ATTACHED, MINIMUM CLEARANCE FROM NEUTRAL TO COMMUNICATIONS LINES IS 40".

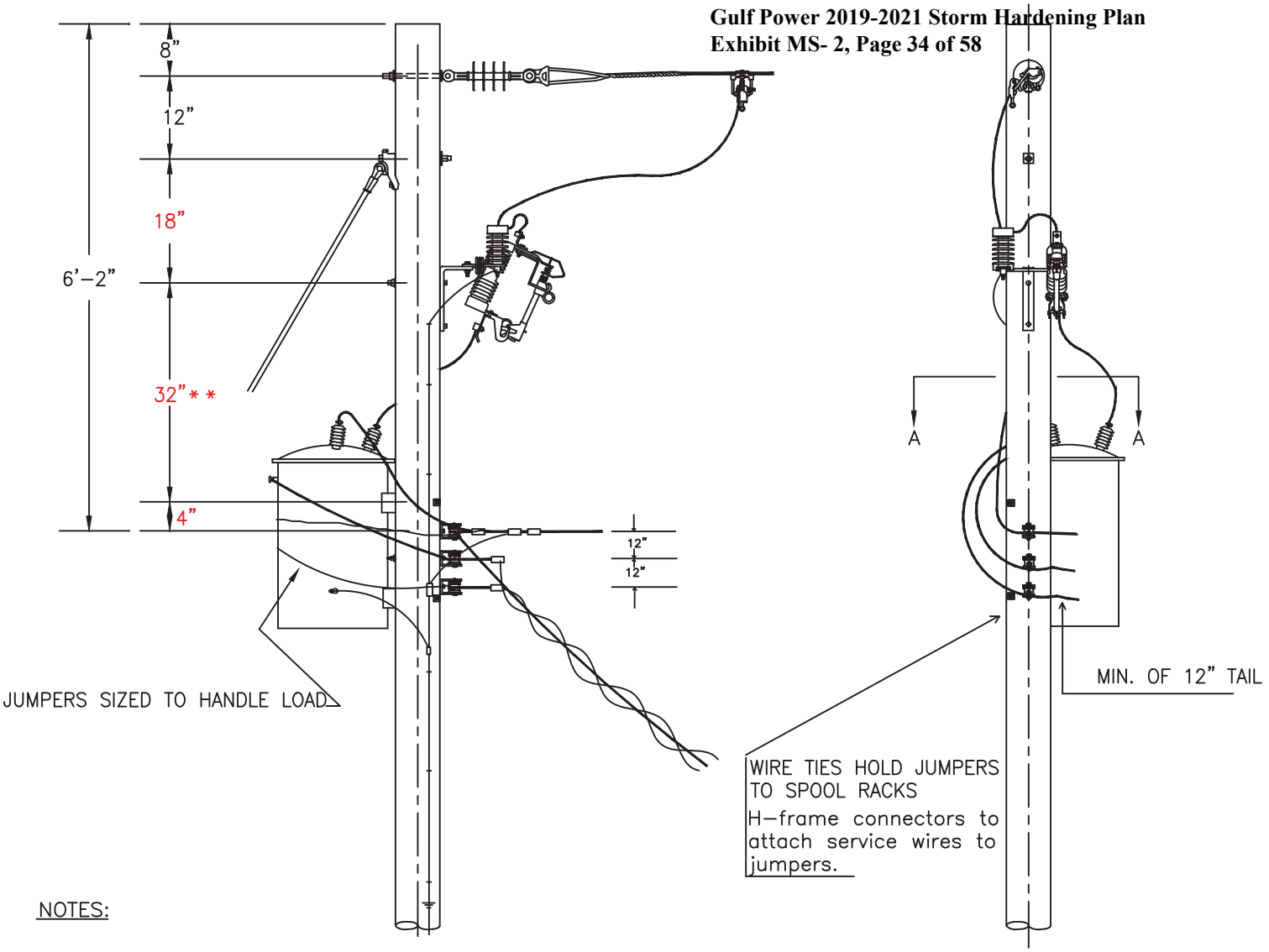
6. MUST USE XXHD PLATFORM FOR REGULATORS SIZED 437 AND LARGER. THIS IS VERY IMPORTANT, SMALLER PLATFORM WILL NOT SUPPORT LARGER REGULATORS.

SUBJECT 12KV REGULATOR PLATFORM

DETAIL STORM HARDENING

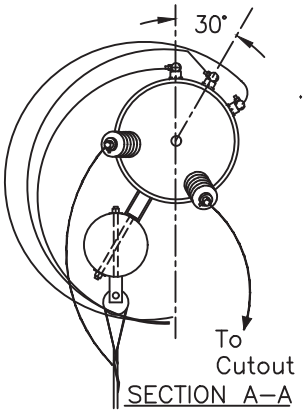
Date 10-18-2007	SUPERSEDES / DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-4 A

Overhead Storm Hardening



NOTES:

1. This example shows a one phase transformer. The same method is to be used for three phase installations as well.
2. Connect transformer secondary neutral lead to system neutral and leave approximately 12 inch tail for service neutral connections.
3. Use wildlife guards and covered riser wire in areas where wildlife is expected.
4. Avoid placing cutout directly above transformer.
5. If secondary is to extend in line, extend primary wire if practical to eliminate conflict between secondary and anchor guy.
6. "FLAG" connectors may be used instead of pin–type connectors at the transformer.

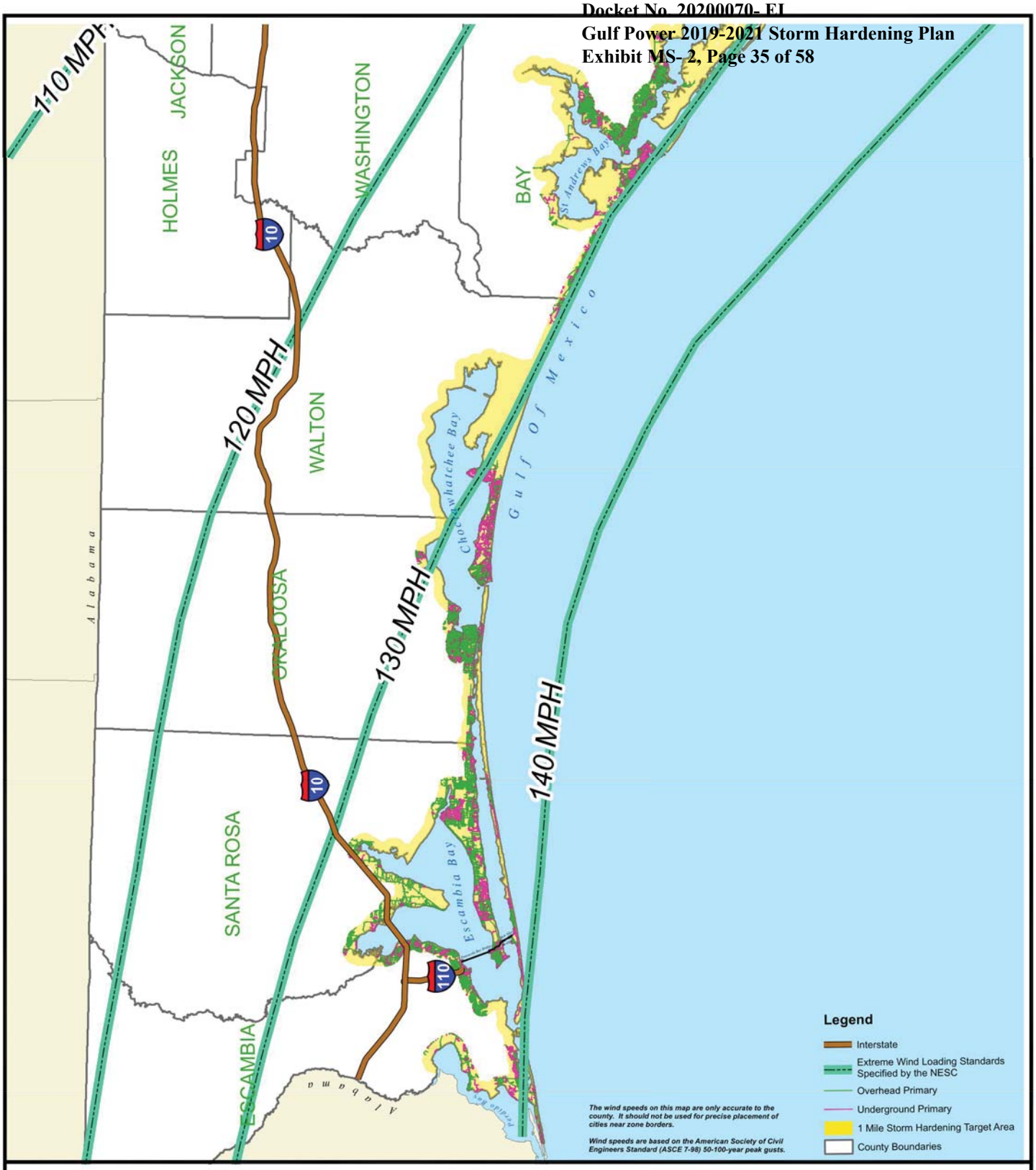


SECTION A–A

SUBJECT OVERHEAD DISTRIBUTION

DETAIL STORM HARDENING

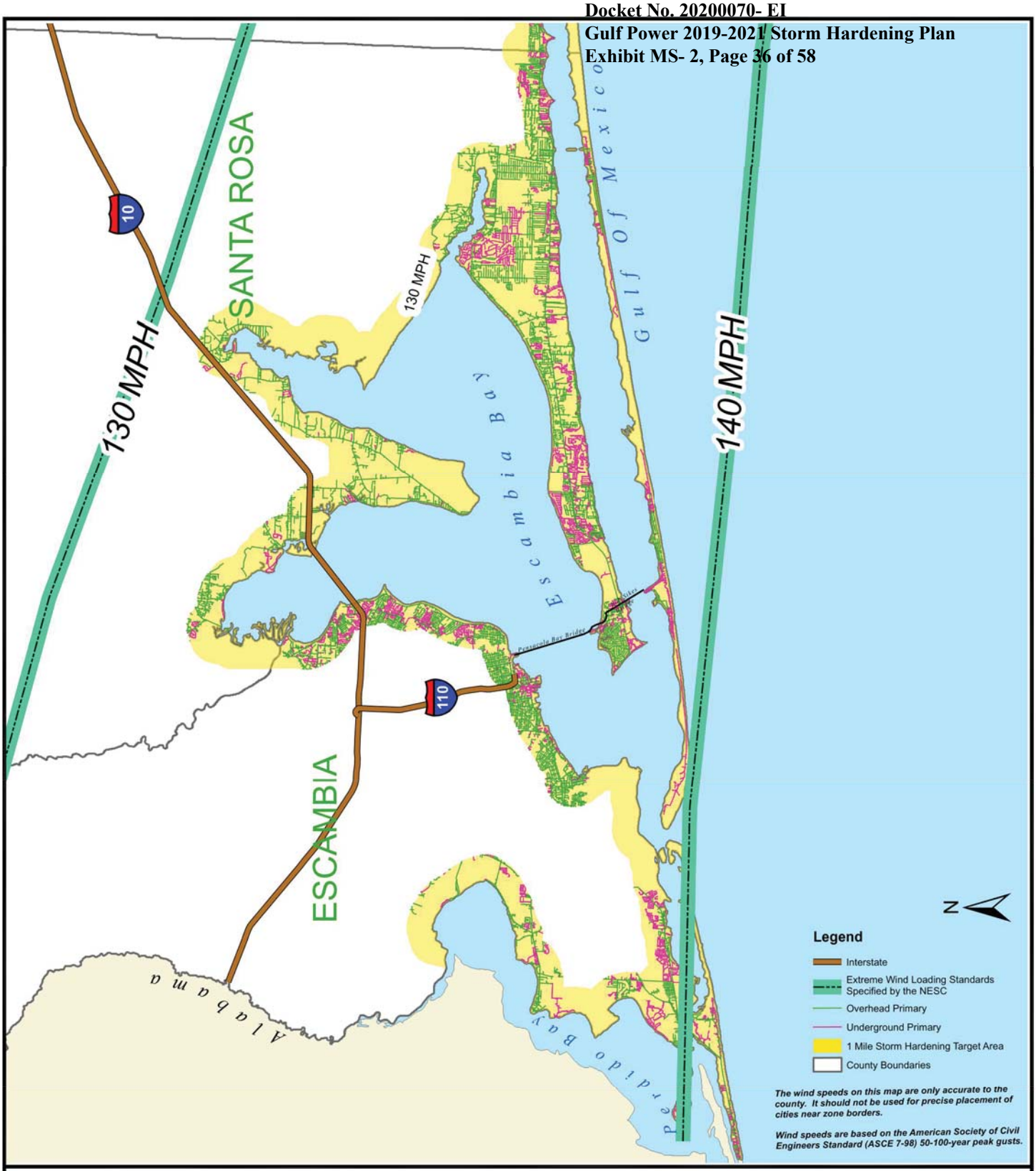
Date 10-18-2007	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-5 A



SUBJECT OVERHEAD DISTRIBUTION

DETAIL GULF POWER STORM HARDENING AREAS

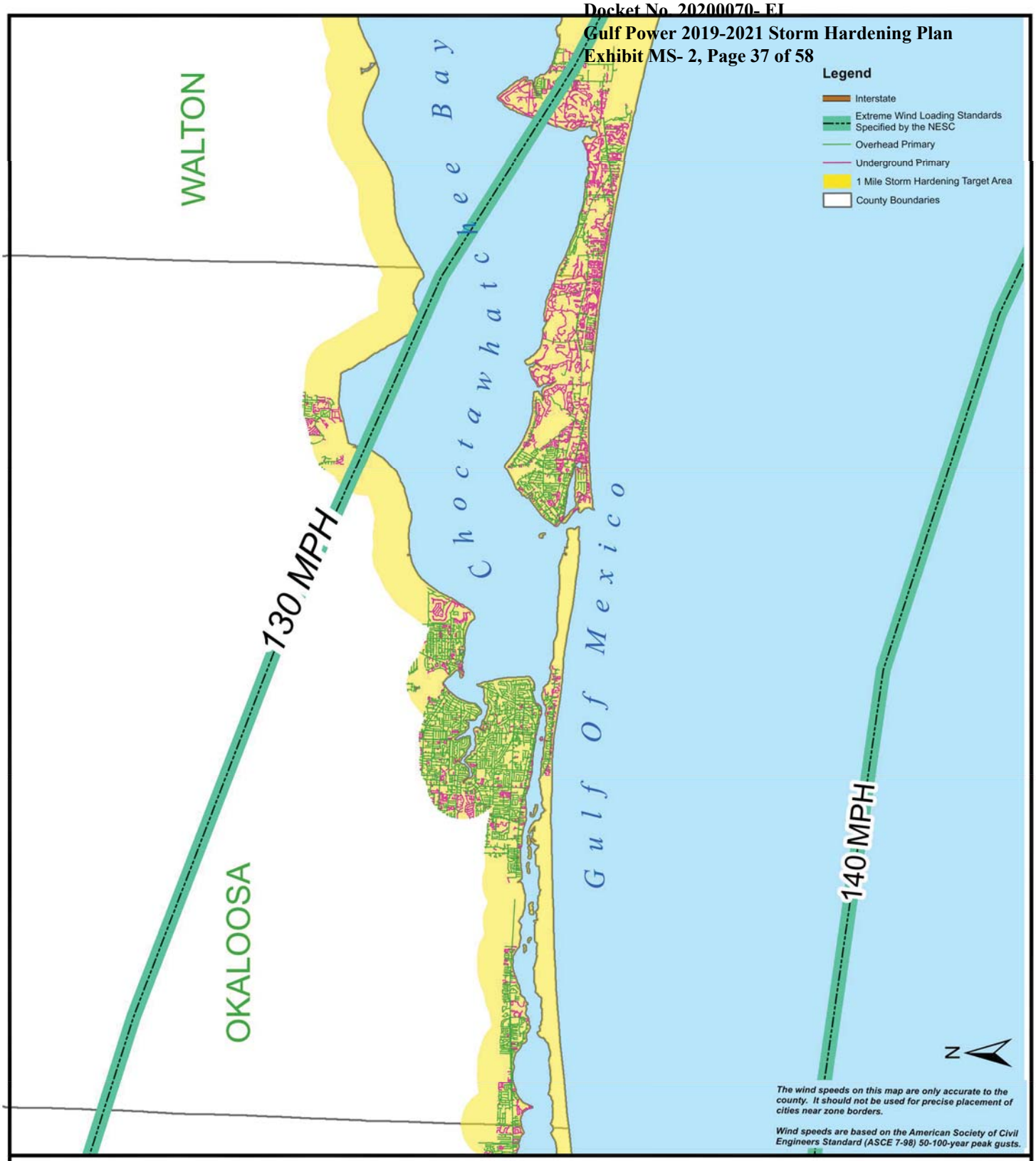
Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-6



SUBJECT OVERHEAD DISTRIBUTION

DETAIL WESTERN STORM HARDENING AREAS

Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-7



SUBJECT OVERHEAD DISTRIBUTION

DETAIL CENTRAL STORM HARDENING AREAS

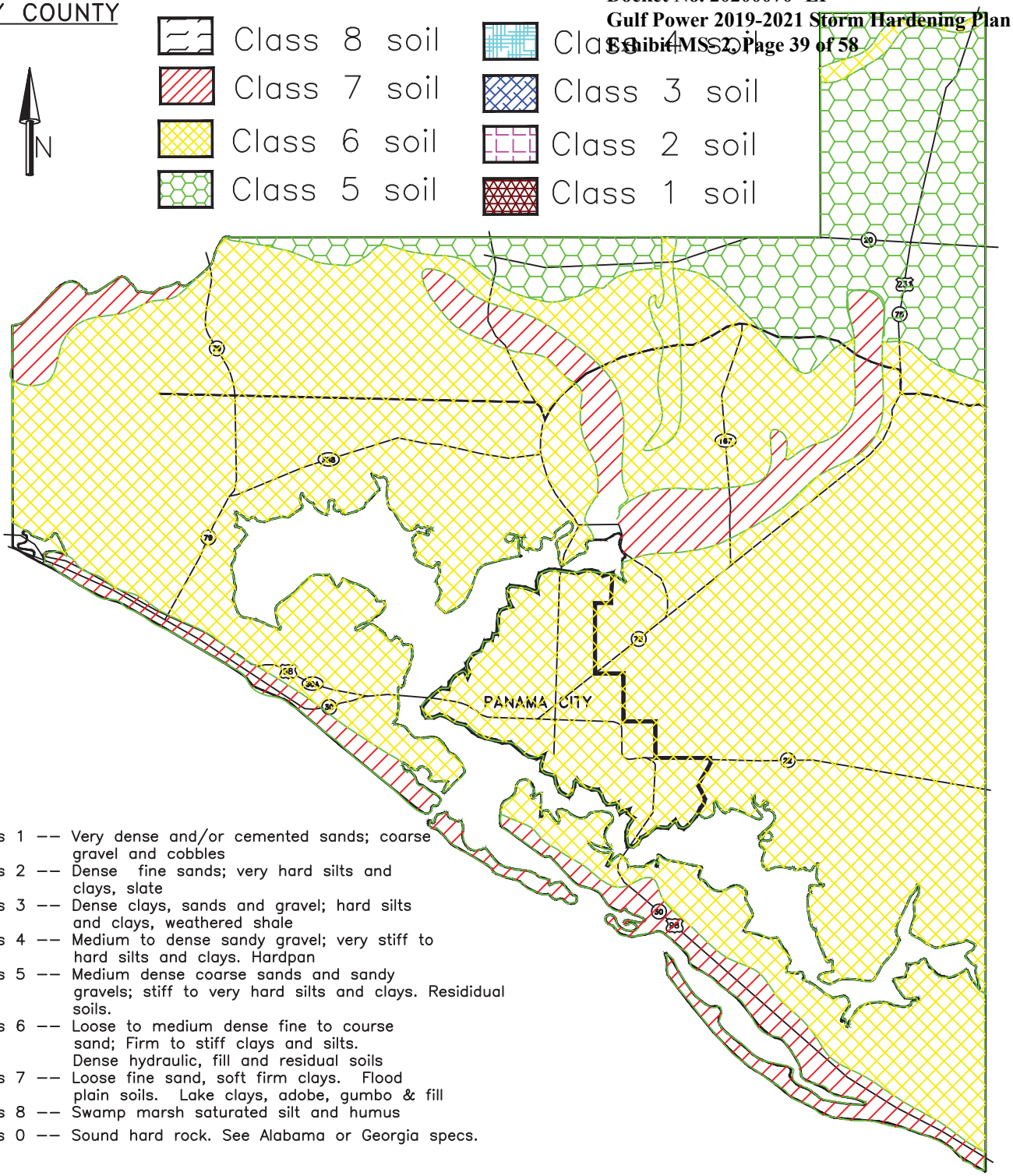
Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-8

SUBJECT OVERHEAD DISTRIBUTION

DETAIL EASTERN STORM HARDENING AREAS

Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-9

BAY COUNTY



Key:

Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
Class 2 -- Dense fine sands; very hard silts and clays, slate
Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Resididual soils.
Class 6 -- Loose to medium dense fine to course sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
Class 8 -- Swamp marsh saturated silt and humus
*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

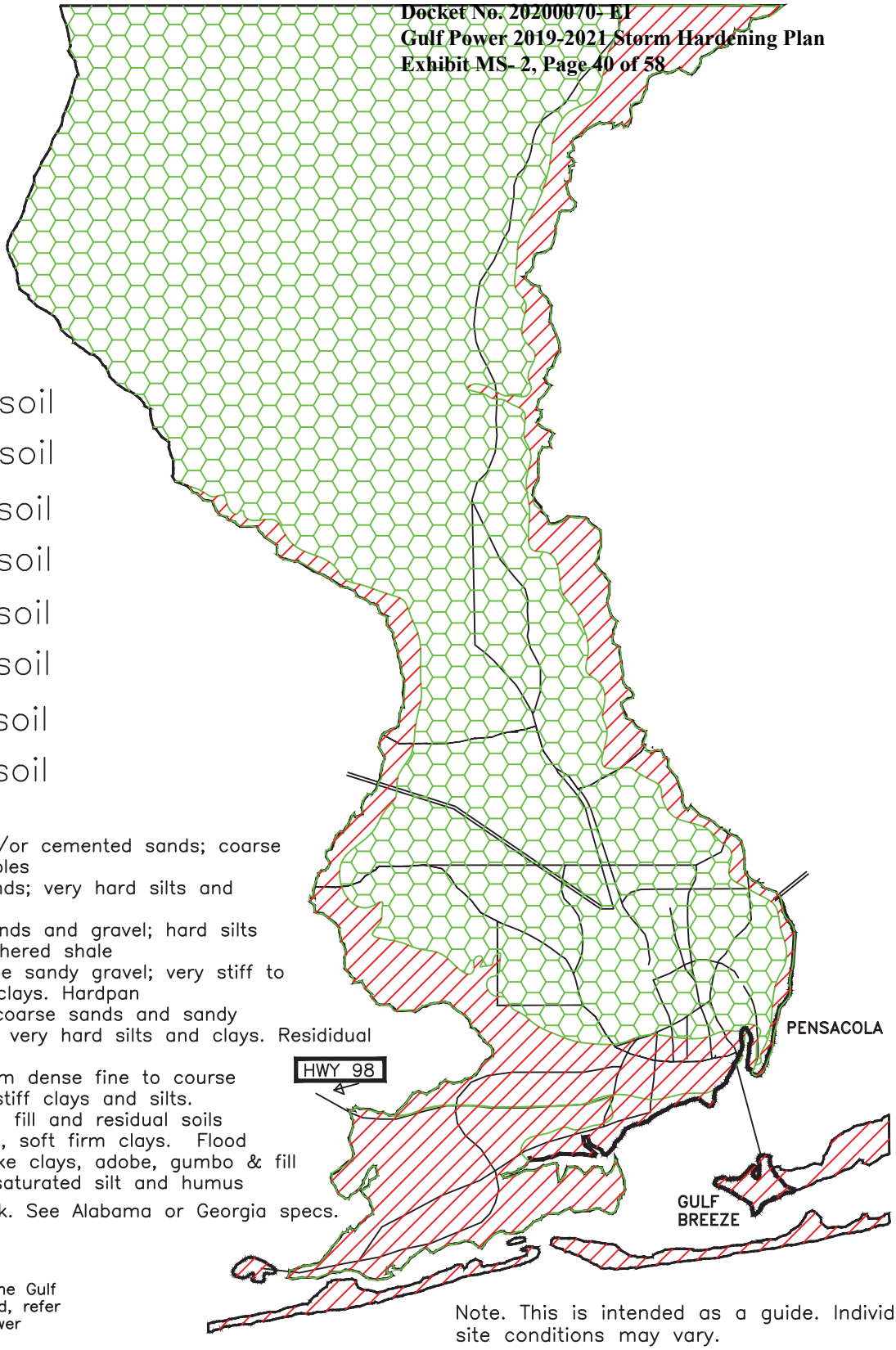
Note: This is a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-09-07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-10 A

ESCAMBIA COUNTY



Legend

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil

Key:

Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles
Class 2 -- Dense fine sands; very hard silts and clays, slate
Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan
Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Resididual soils.
Class 6 -- Loose to medium dense fine to course sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils
Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill
Class 8 -- Swamp marsh saturated silt and humus
*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 10/19/2007	SUPERSEDES DATE 10/19/2007	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-11 A

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-27-2007

SUPERSEDES DATE

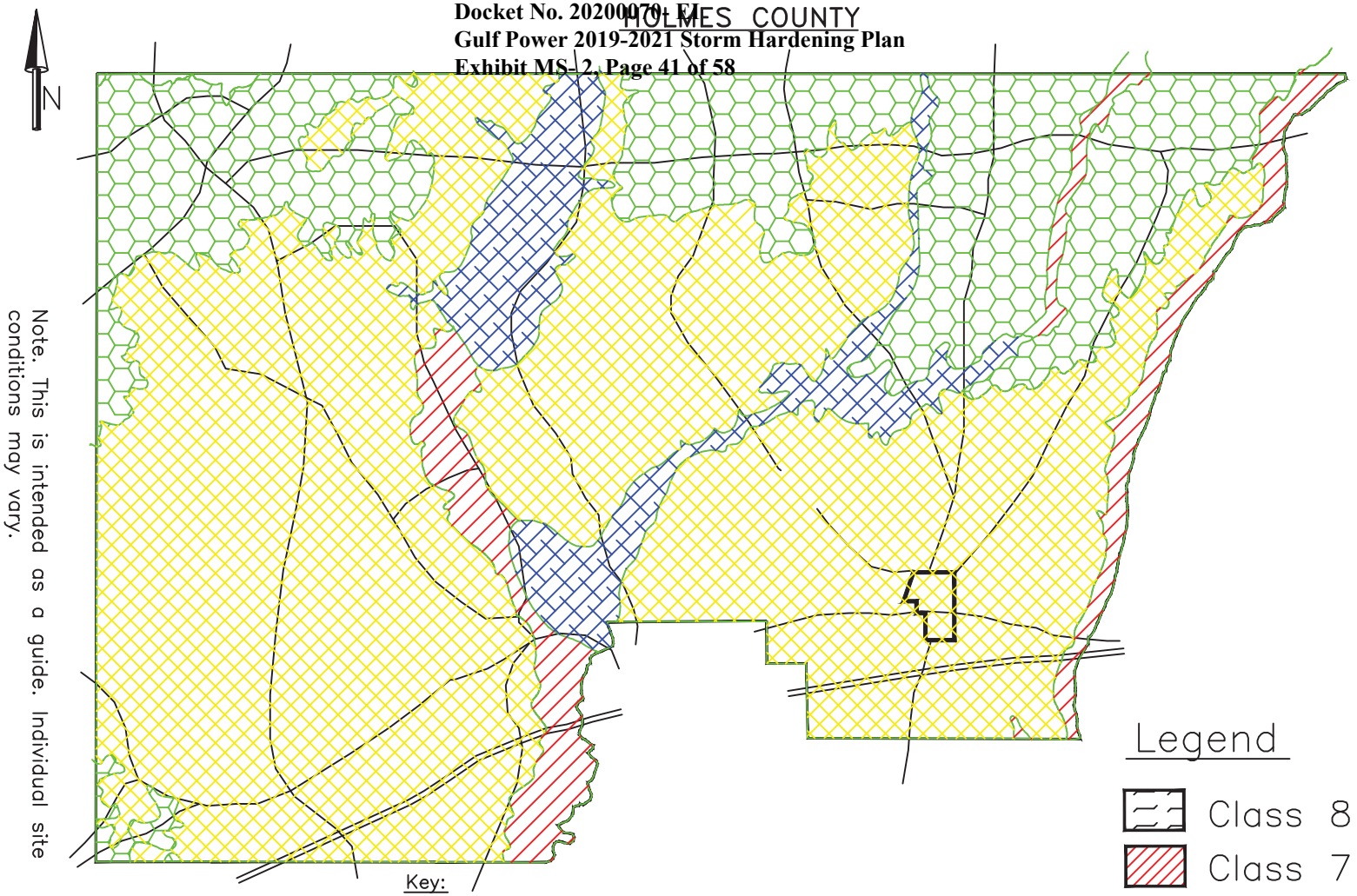
SHEET 1 OF 1 SHEETS

Gulf Power

A- OZZ-12

A

OZZ-12



Note. This is intended as a guide. Individual site conditions may vary.

Key:

Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles

Class 2 -- Dense fine sands; very hard silts and clays, slate

Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale

Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays. Hardpan

Class 5 -- Medium dense coarse sands and sandy gravels; stiff to very hard silts and clays. Resididual soils.

Class 6 -- Loose to medium dense fine to course sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils

Class 7 -- Loose fine sand, soft firm clays. Flood plain soils. Lake clays, adobe, gumbo & fill

Class 8 -- Swamp marsh saturated silt and humus

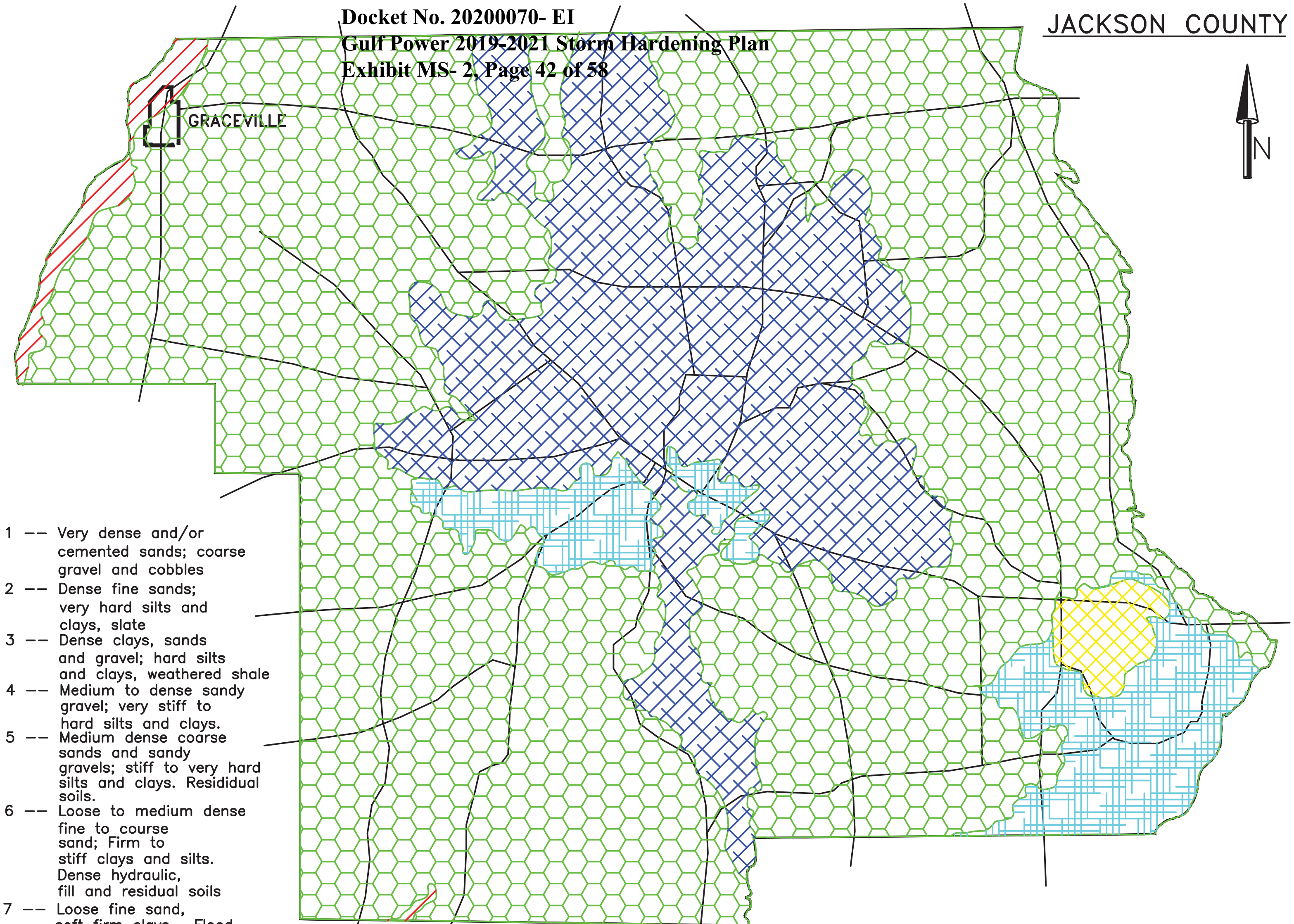
*Class 0 -- Sound hard rock. See Alabama or Georgia specs.

*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Legend

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil

JACKSON COUNTY



Note. This is intended as a guide. Individual site conditions may vary.

Key:

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Class 2 -- Dense fine sands; very hard silts and clays, slate

Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale

Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays.

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Class 6 -- Loose to medium dense fine to course sand; Firm to stiff clays and silts. Dense hydraulic, fill and residual soils

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Legend

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-16-2007

SUPERSEDES DATE

SHEET 1 OF 1 SHEETS

Gulf Power

A- OZZ-13

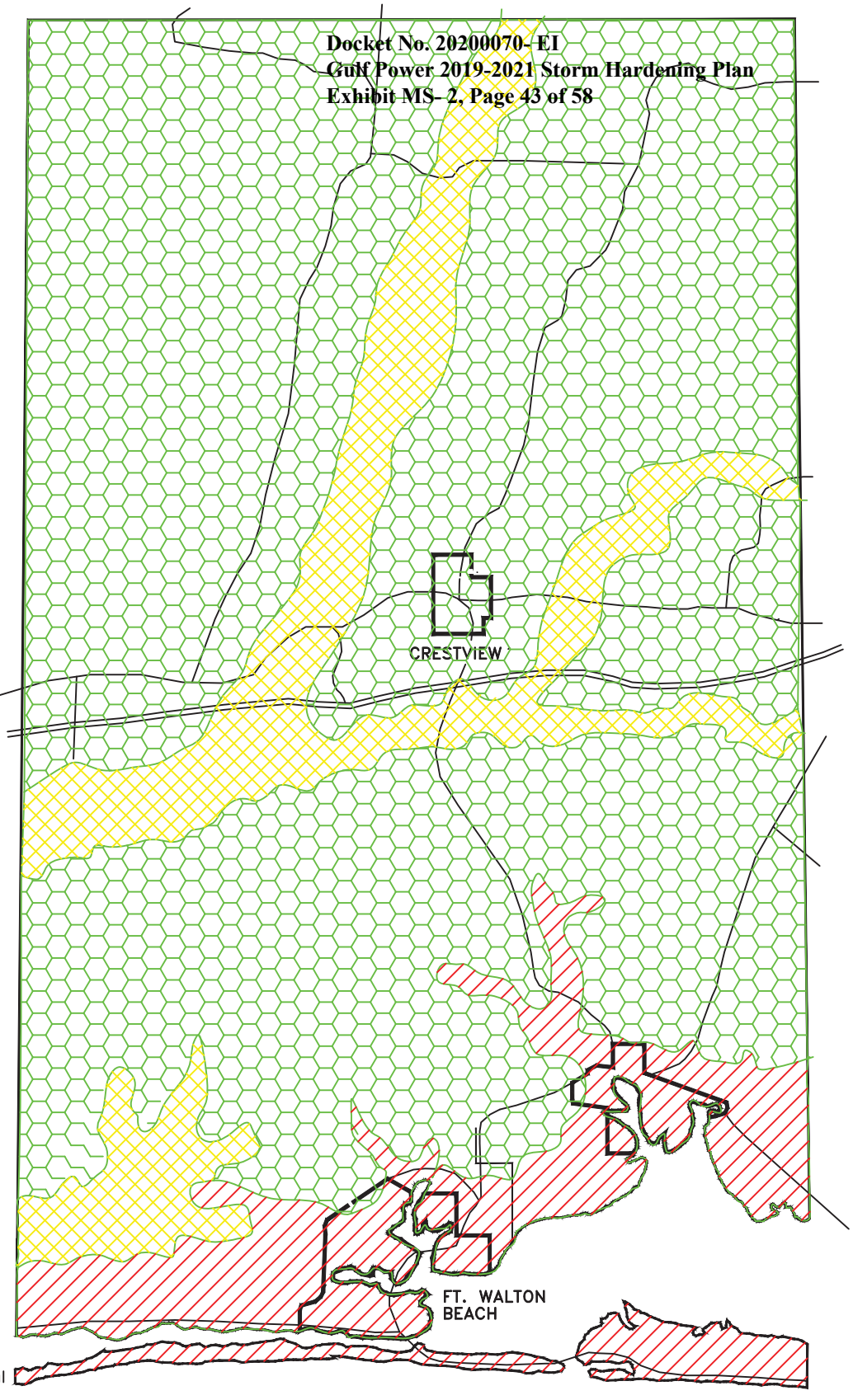
OZZ-13

OKALOOSA COUNTY

Legend

N

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil



Key:

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Class 2 -- Dense fine sands; very hard silts and clays, slate

Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale

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Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

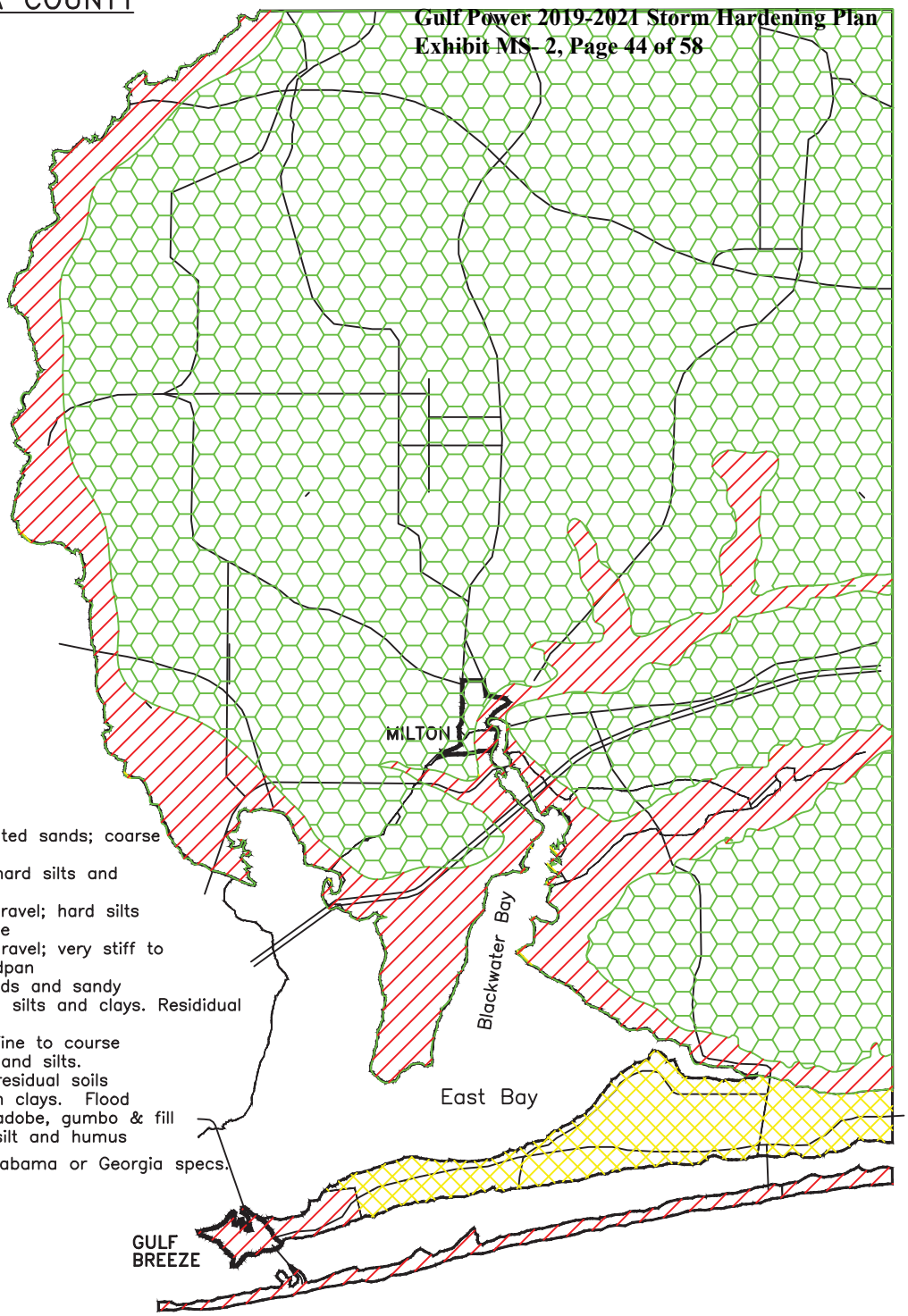
Date 10-30-07	SUPERSEDES DATE 10-30-07	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-14 A

SANTA ROSA COUNTY

N

Legend

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil



Key:

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Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale
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SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 10-26-07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-15 A

WALTON COUNTY

Key:

Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles

Class 2 -- Dense fine sands; very hard silts and clays, slate

Class 3 -- Dense clays, sands and gravel; hard silts and clays, weathered shale

Class 4 -- Medium to dense sandy gravel; very stiff to hard silts and clays.

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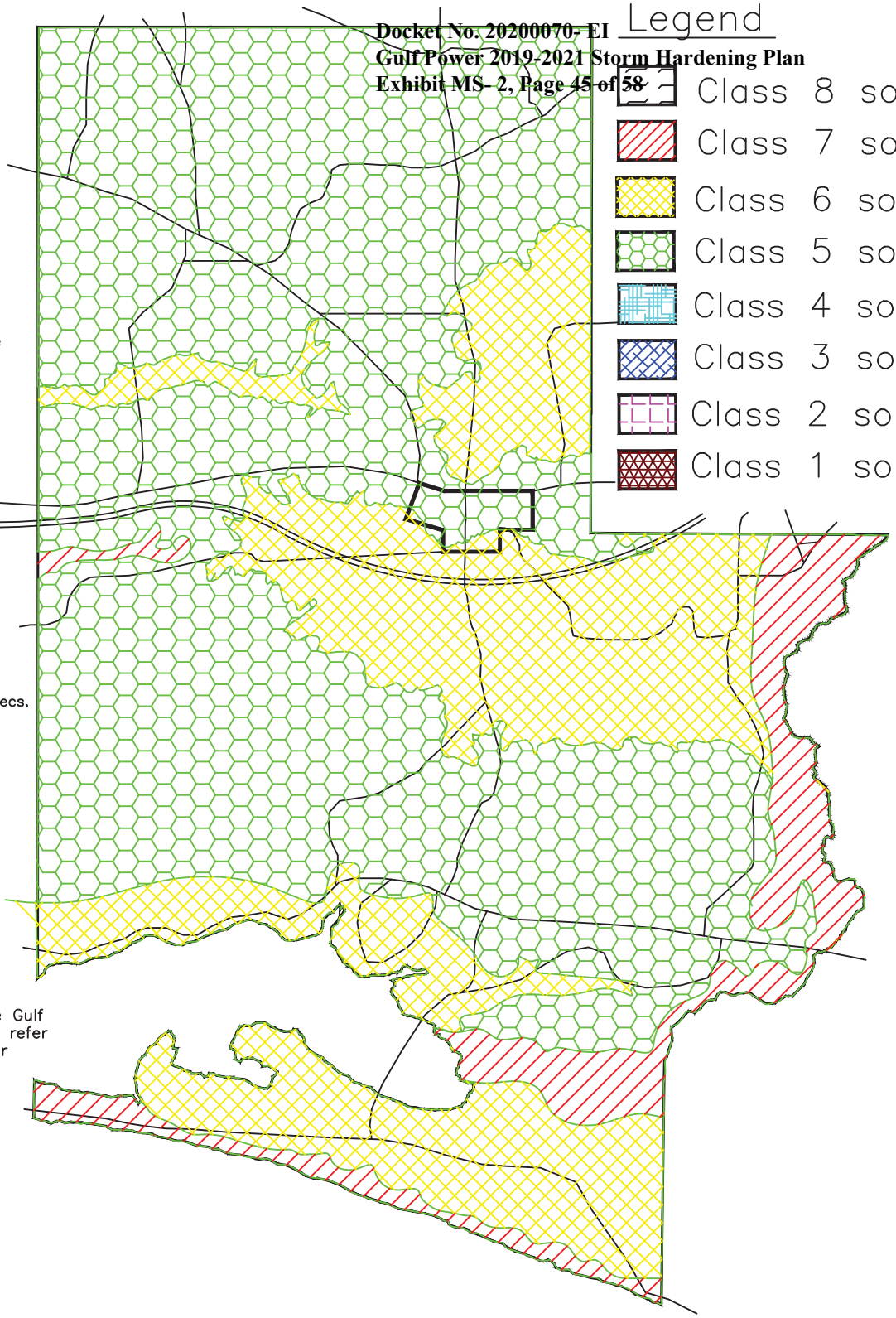

*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Note. This is intended as a guide. Individual site conditions may vary.

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-02-2007	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- OZZ-16 A

SUBJECT OVERHEAD DISTRIBUTION

DETAIL SOIL CLASS ACCORDING TO HOLDING STRENGTH. DATA OBTAINED FROM THE FLORIDA GEOLOGICAL SURVEY.

Date 11-20-2007

SUPERSEDES DATE

SHEET 1 OF 1 SHEETS

Gulf Power

A- OZZ-17 A

OZZ-17

Legend

- Class 8 soil
- Class 7 soil
- Class 6 soil
- Class 5 soil
- Class 4 soil
- Class 3 soil
- Class 2 soil
- Class 1 soil

Key:

Class 1 -- Very dense and/or cemented sands; coarse gravel and cobbles

Class 2 -- Dense fine sands; very hard silts and clays, slate

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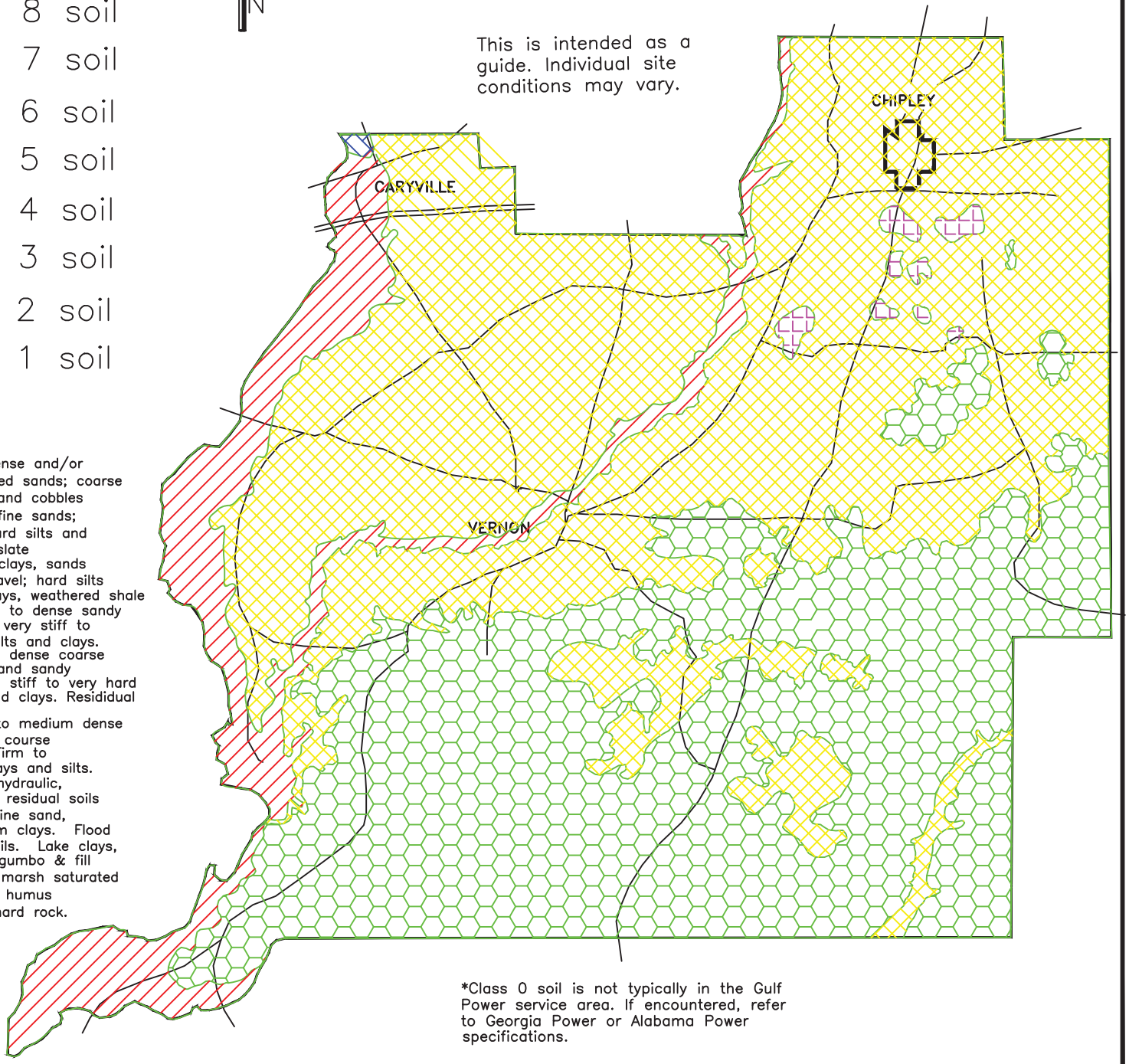
Class 8 -- Swamp marsh saturated silt and humus

*Class 0 -- Sound hard rock.

WASHINGTON COUNTY

N

This is intended as a guide. Individual site conditions may vary.



*Class 0 soil is not typically in the Gulf Power service area. If encountered, refer to Georgia Power or Alabama Power specifications.

Appendix 3

Underground Storm Hardening

Gulf Power's Underground Distribution Facilities shall, where practical, be storm hardened to the extent practical using the methods described in this section if they are to be installed within One Mile of the Gulf of Mexico or any other large body of salt water (Pensacola Bay, Escambia Bay, Intercoastal Waterway, Choctawhatchee Bay, St Andrew Bay, etc). See Plates UZZ-2, UZZ-3, UZZ-4, and UZZ-5.

Underground circuits and feeders shall, where practical, be designed and built in the road right-of-way. In a flood/storm surge prone area, customers must install meters and metering equipment above the expected maximum flood level. Where this results in meters or metering equipment being above the standard specified heights above the ground, the customer will need to build permanent platforms and stairs to allow reading and servicing of the meters and equipment, unless the location of the equipment coincides with existing porches or platforms with ready access by Gulf Power employees. The platform must extend at least three feet out from the wall and at least 18" to either side of the metering equipment. Refer the customer to the local building inspector for other requirements for the platform and stairs.

Under normal circumstances, rear lot line construction shall be avoided and metering equipment shall not be placed on the rear of buildings.

Padmounted equipment that utilize (primary) live front connections and/or air break switches shall not be used in areas prone to flooding.

Consideration should be given to anchoring below grade boxes or vaults with pilings. See Plate UZZ-8.

Consideration should also be given to using transformer box pad in sandy or in storm surge areas. See Plate UZZ-9.

Underground feeders, especially those with large conductors (600 amp or 900 amp systems), utilizing a duct system, should be concrete encased and should be installed as far as practical from seacoasts, lakes, rivers, bays and other low lying areas to protect them from washouts and flooding. If possible the feeder should be built several blocks from these areas and the use of laterals, from the main feeder, should be used to serve the seacoast.

Padmounted equipment (such as transformers, pedestals, feed-thru cabinets, etc) should be located in places that naturally provide storm surge protection. Examples include: behind buildings, behind trees, high areas, etc.

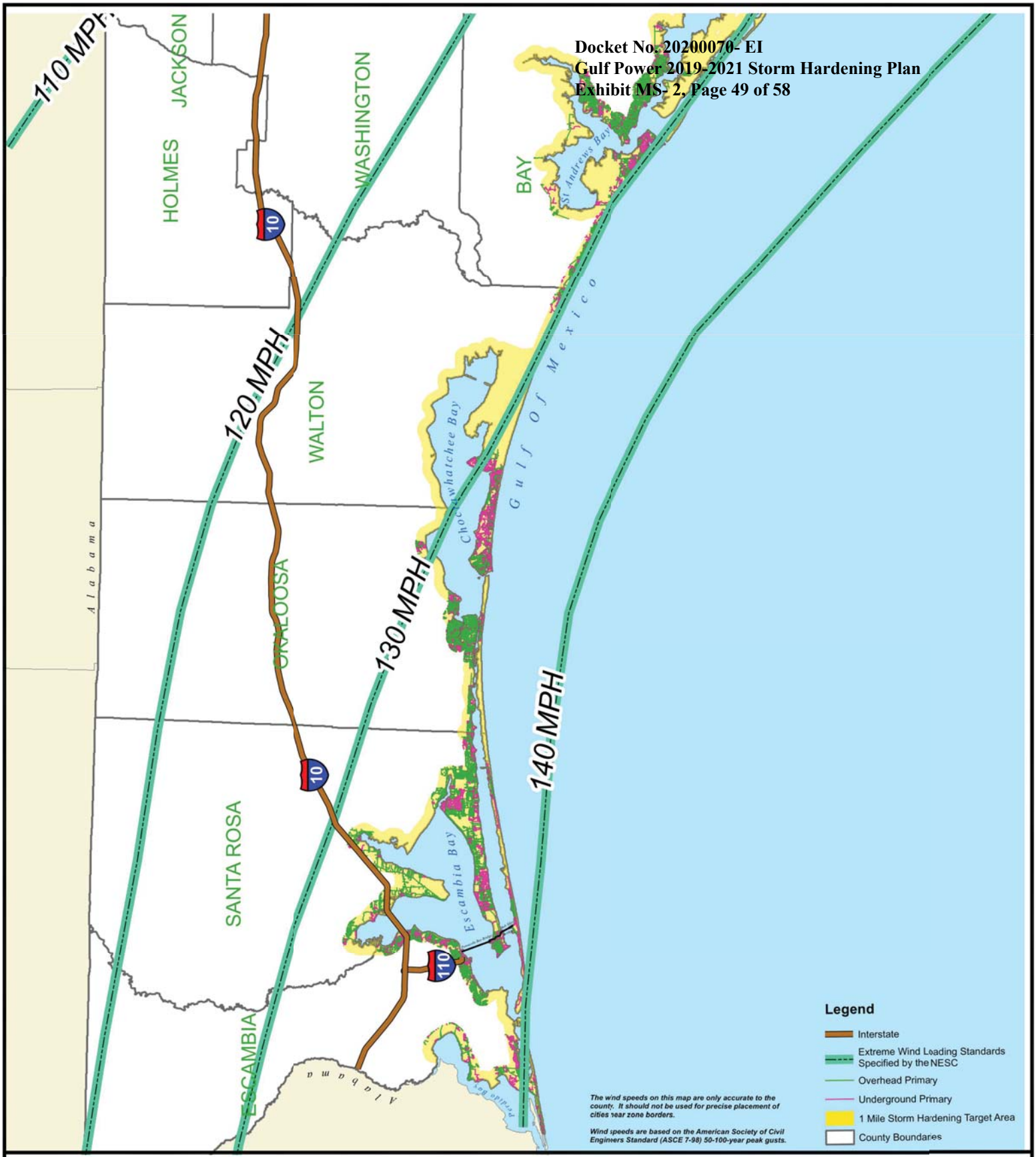
3Ø transformers serving Gulf Front condo's, motels, restaurants, etc., shall, where practical, be installed on the opposite side of the building to the Gulf and as close to the center of the building as practical. The transformer should never be installed between two buildings, due to the extreme erosion of sand during a storm surge.

Where practical, underground circuits should be looped.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL GENERAL STATEMENTS

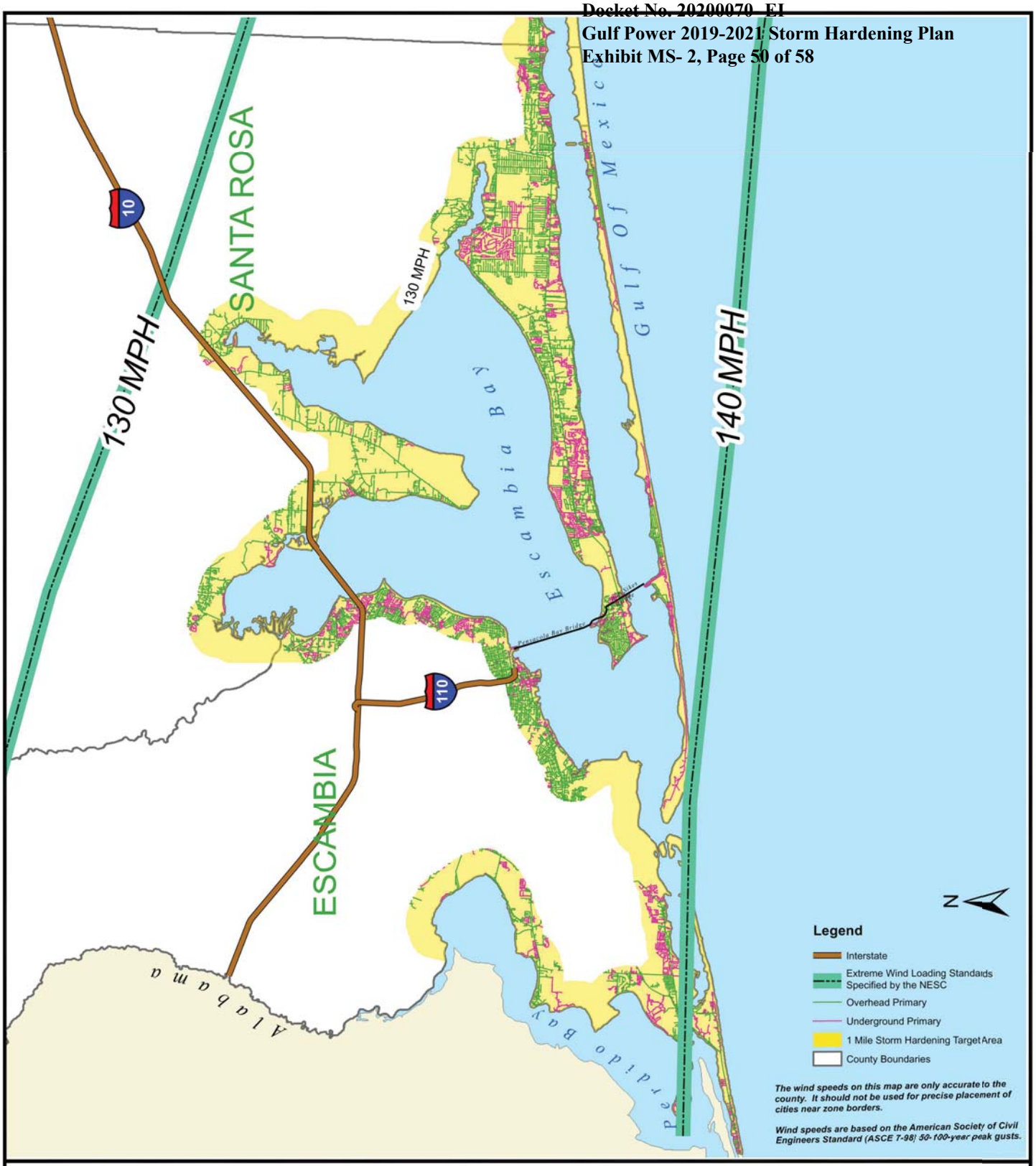
Date 12-16-08	SUPERSEDES 03-14-07 DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-1 A



SUBJECT UNDERGROUND DISTRIBUTION

DETAIL STORM HARDENING AREAS

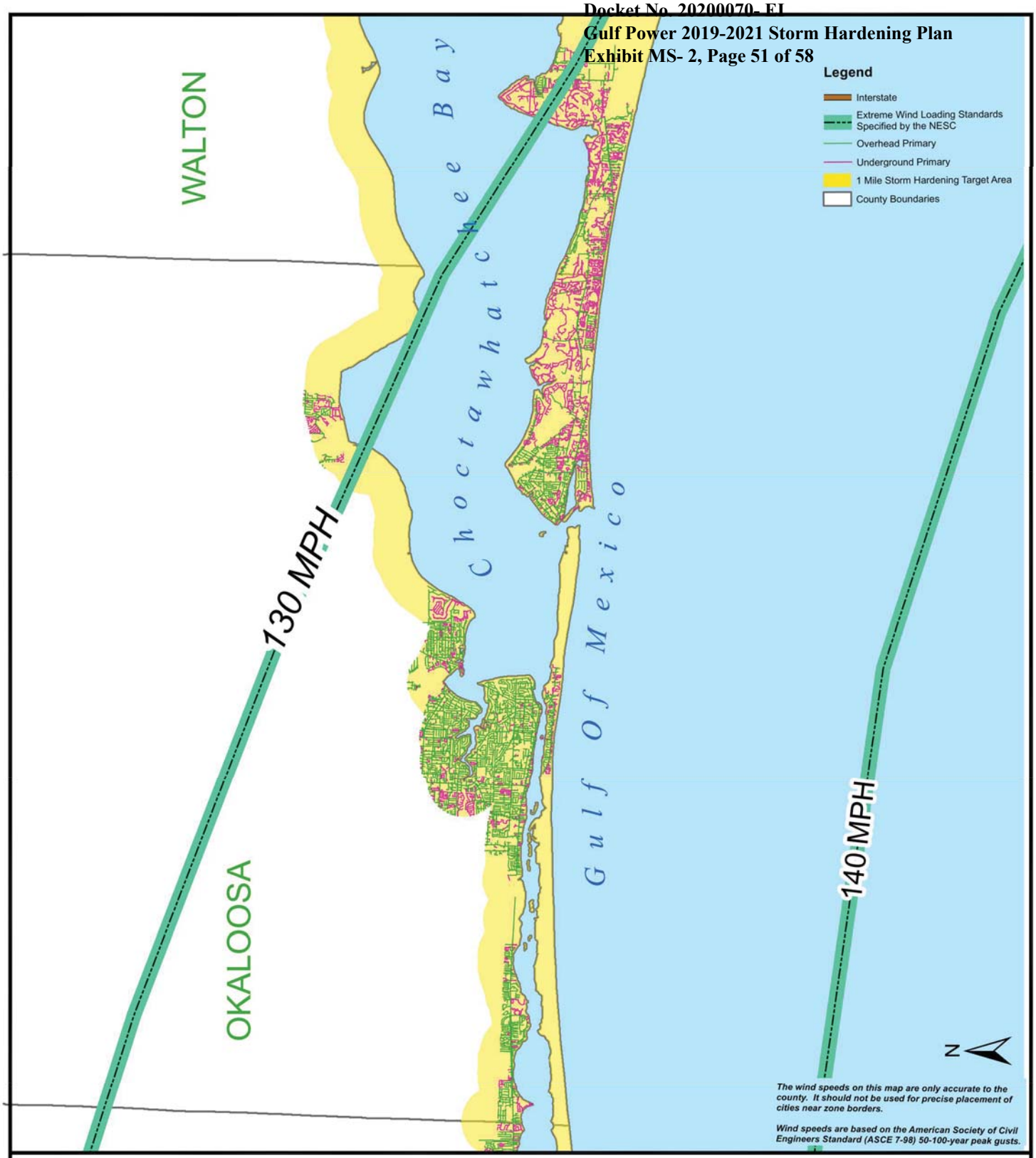
Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-2



SUBJECT UNDERGROUND DISTRIBUTION

DETAIL WESTERN STORM HARDENING AREAS

Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-3



SUBJECT UNDERGROUND DISTRIBUTION

DETAIL CENTRAL STORM HARDENING AREAS

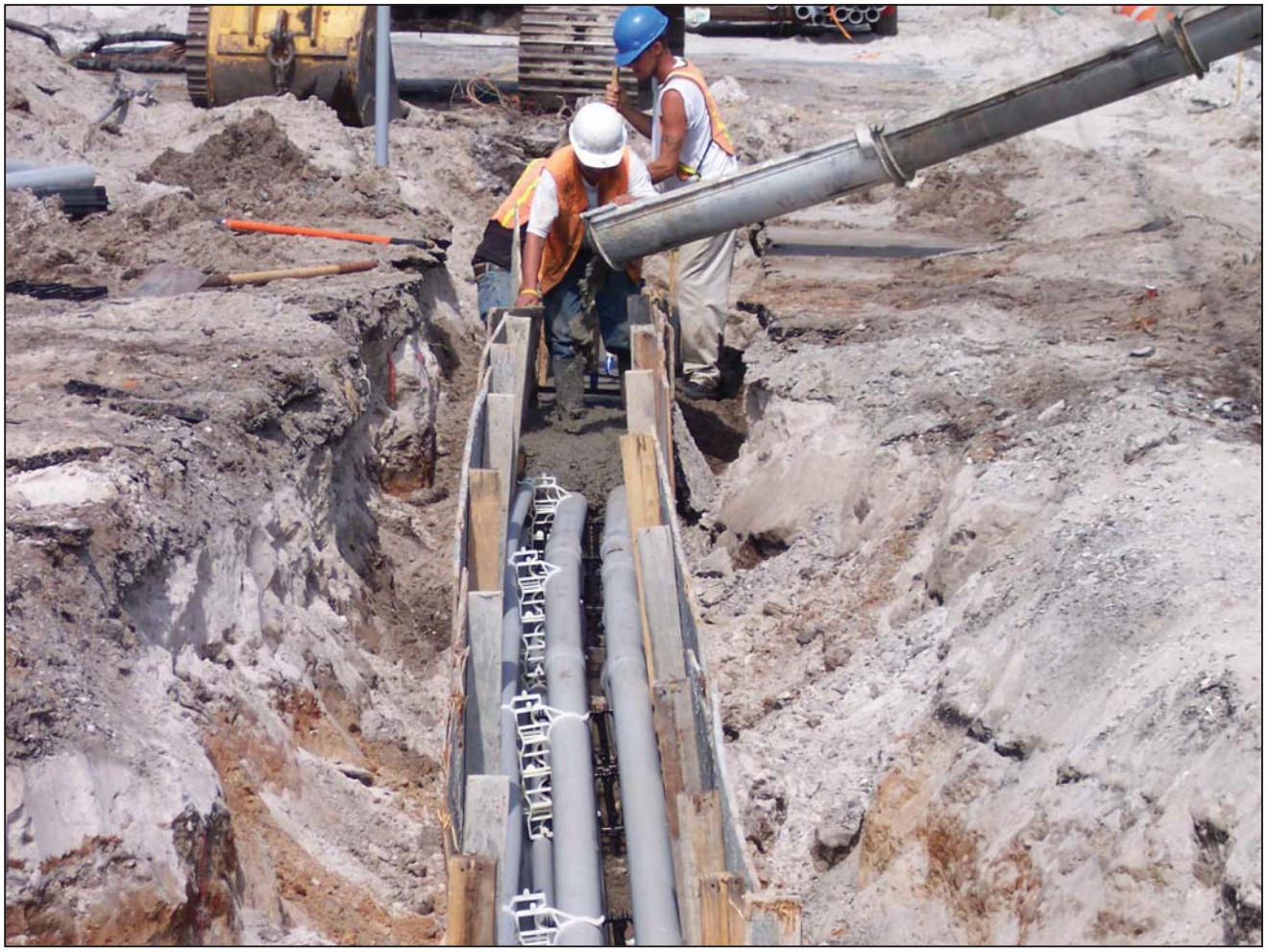
Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-4

SUBJECT UNDERGROUND DISTRIBUTION

DETAIL EASTERN STORM HARDENING AREAS

Date 3/23/07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-5

Concrete Duct Banks



600/900 amp circuits shall be designed with concrete encased duct banks to protect against dig-ins and storm surges.

The concrete used should be 1:3:5 mix with 1/2 inch or smaller gravel or crushed stone aggregate. This mix should have a nominal compressive strength of 3000 psi. All concrete should be poured within 1-1/2 hours of mixing.

When placing concrete around the conduit adjust the delivery chute so that the fall of the concrete into the trench is as short as possible. Use a splash board to divert the flow of the concrete away from the trench sides to avoid dislodging soil.

(Con't on next sheet)

SUBJECT UNDERGROUND STORM HARDENING

DETAIL CONCRETE DUCT BANKS

Date 11-18-2015	SUPERSEDES 03-14-2007 DATE	SHEET 1 OF 2 SHEETS	Gulf Power	A- UZZ-6 A

Concrete Duct Banks (con't)

Use a vibrator (one inch maximum), slicing bar or equivalent to work the concrete down the sides of the conduit bank and between the conduits. It should be possible to see the concrete flowing along the bottom of the trench just ahead of the point where the concrete falls from the chute.

The trench can be back filled any time after the oncrete has been poured and leveled. The concrete should be covered with a minimum of four inches of selected backfill. Spoils from the trench can be used for the remaining backfill.

On warm sunny days, if the concrete can not be covered immediately after leveling, one or two inches of fine soil or sand should be placed over the concrete. This cover prevents rapid evaporation of water from the surface of the conrete.

When necessary to stop construction, plastic plugs should be used to temporarily seal the conduit end against mud, dirt, and debris. If conduit is to be left uncovered over night, tie down only at one end.

Duct banks should be inspected by a Gulf Power representative before being covered with backfill or encased in concrete.

SUBJECT: UNDERGROUND STORM HARDENING				
DETAIL: CONCRETE DUCT BANKS				
Date 11-18-2015	SUPERSEDES 03-14-07 DATE	SHEET 2 OF 2 SHEETS	Gulf Power	A- UZZ-7 A

Anchoring Vaults

Consideration should be given to anchoring vaults/boxes with two 10' pilings.

These pilings should be installed on the front left and back right corners of the vault/box.

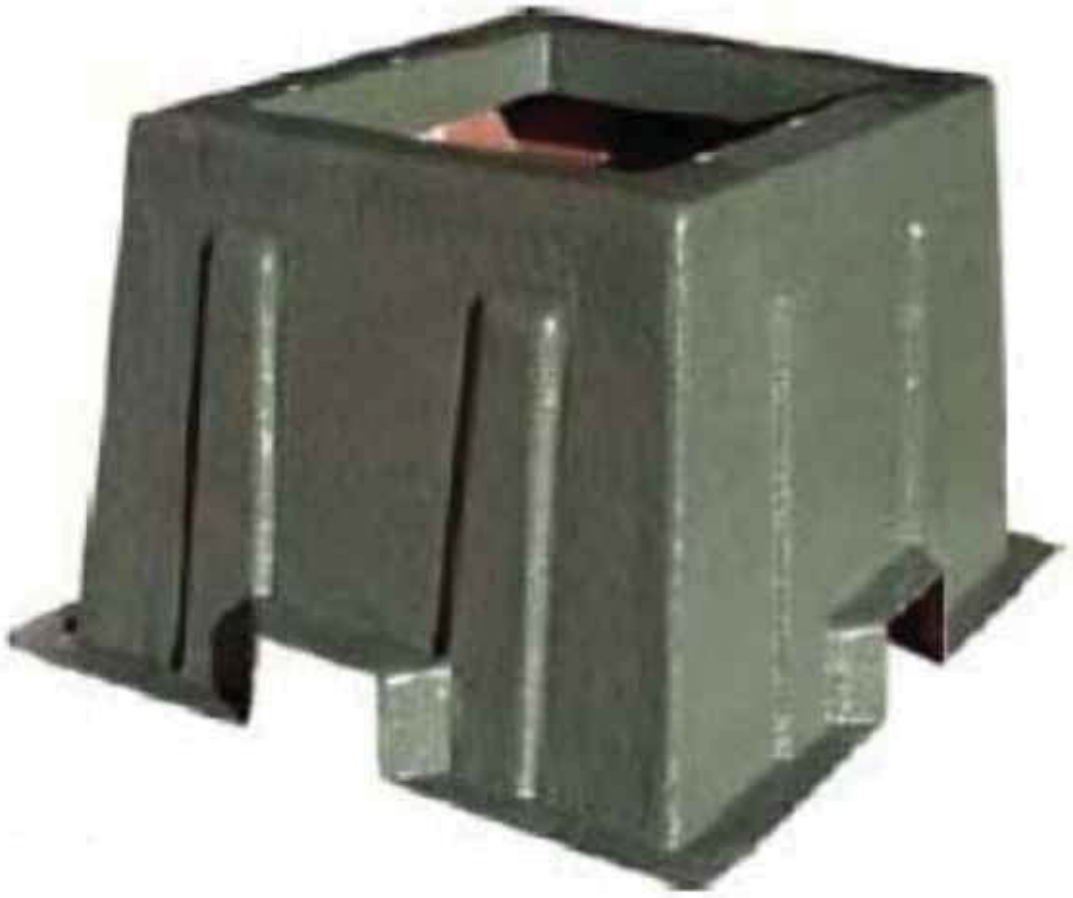
Pilings shall be 10' long and can be made out of 10" conduit filled with concrete or any preformed circular or square concrete at least 10" in diameter or square. After piling has been installed the area around the piling shall be filled with concrete to unitize the structure and vault/box.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL ANCHORING VAULTS/BOXES

Date 03-14-07	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-8 A

1Ø Transformer Box Pad



The use of a transformer box pad instead of the traditional transformer pad should be considered in loose sandy soils that are subject to storm surges or flooding.

The use of these in subdivisions automatically makes the subdivision a 'Non–Typical Subdivision' and an Overhead to Underground Differential must be calculated.

SUBJECT UNDERGROUND STORM HARDENING

DETAIL 1Ø TRANSFORMER BOX PAD

Date 12-08-08	SUPERSEDES DATE	SHEET 1 OF 1 SHEETS	Gulf Power	A- UZZ-9 A

Appendix 4

Rule 25-6.0342 - Gulf Power Company Storm Hardening Plan

	Activity	Docket No.	Actual/Estimated Utility Costs 2016	2017	2018	2019	2020	2021
Wooden Pole Inspections.		060078-EI	$2,188,527	$2,459,684	$2,193,078	$2,792,853	$2,792,853	$2,792,853
Ten Storm Hardening Initiatives.		060198-EI						
1	A Three-Year Vegetation Management Cycle for Distribution Circuits		$4,640,546	$6,738,384	$8,252,564	$5M - $6M	$5M - $6M	$5M - $6M
2	An Audit of Joint-Use Attachment Agreements		$495,818	$0	$0	$0	$0	$0
3	A Six-Year Transmission Structure Inspection Program		$206,177	$323,098	$239,644	$300,000	$300,000	$300,000
4	Hardening of Existing Transmission Structures		$4,772,893	$2,089,413	$0	$6M - $13M	$8M - $21M	$8M - $21M
5	Transmission and Distribution GIS		$0	$0	$0	$0	$0	$0
6	Post-Storm Data Collection and Forensic Analysis		$0	$0	$0	$0	$0	$0
7	Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems		$0	$0	$0	$0	$0	$0
8	Increased Utility Coordination with Local Governments		$0	$0	$0	$0	$0	$0
9	Collaborative Research on Effects of Hurricane Winds and Storm Surge		$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
10	A Natural Disaster Preparedness and Recovery Program		$0	$0	$0	$0	$0	$0
Compliance with National Electric Safety Code's adoption of Extreme Wind Loading Standards.								
1	New Distribution Facilities - incremental (Exc Lighting, Meters, Transformers & Underground)		$151,161	$170,847	$156,978	$182,393	$182,393	$182,393
	Base amount		$5,895,277	$6,663,040	$6,122,151	$7,113,309	$7,113,309	$7,113,309
2	Major Planned expansion, rebuild, or relocation of distribution facilities - incremental		$227,964	$225,275	$480,734	$499,230	$499,230	$499,230
	Base amount		$8,890,583	$8,785,712	$18,748,621	$19,469,982	$19,469,982	$19,469,982
3	Critical infrastructure and major thoroughfares		$1,381,202	$1,556,144	$1,645,118	$5M - $12M	$7M - $20M	$7M - $20M
Mitigating flood and storm surge damage to underground and supporting overhead facilities.								
1	Transmission							
2	Distribution - Piloted Project costs		$987,592	$578,057	$736,006	$1,447,267	$1,447,267	$1,447,267
3	Distribution - Use of Stainless Steel equipment		$1,105,315	$2,246,864	$4,291,459	$4,000,000	$4,000,000	$4,000,000
4	Distribution - Underground Network improvements		$315,836	$337,685	$14,913,571	$19,568,000	$19,568,000	$19,568,000
Placement of new and replacement distribution facilities to facilitate safe and efficient access for installation and maintenance.								
Other Key Elements								
1	Feeder Patrols prior to the start of storm season		$133,111	$248,620	$264,106	$215,279	$215,279	$215,279
2	Infrared Patrols prior to the start of storm season		$67,093	$70,320	$115,512	$84,308	$84,308	$84,308
3	Wind Monitors to provide needed wind data		$0	$0	$0	$0	$0	$0
Additional Proposed Storm Hardening Initiatives								
1	Conversion of 4kV Distribution Feeders		$0	$0	$0	$0	$0	$0
2	Distribution Automation		$5,237,543	$2,484,367	$2,982,911	$10M - $14M	$12M - $16M	$12M - $16M
3	Automated Overhead Faulted Circuit Indicators		$171,308	$2,287	$12,671	$62,089	$62,089	$62,089
4	Distribution Supervisory Control and Data Acquisition		$594,742	$212,556	$43,510	$442,000	$442,000	$442,000
	TOTALS		$22,696,829	$19,763,602	$36,347,862	$56M - $75M	$64M - $95M	$64M - $95M
			2016 - 2018 = $78,808,293			2019 - 2021 = $184M - $265M		

Post Storm Analysis of Gulf Transmission Facilities

Hurricane Michael

October 2018

Gulf Power Company

INTRODUCTION

Hurricane Michael made landfall as a high Category 4 storm just east of Panama City, Florida with maximum measured sustained winds of 155 MPH winds. It traversed Gulf Power's entire eastern service area and entered Georgia as a Category 3 storm leaving widespread destruction in its path.

The damage to the transmission system was significant and required the efforts of many to remove broken trees and repair what the storm had destroyed. In total, 59 line sections were out of service during the storm causing outages at 45 transmission and distribution substations. Transmission storm damage to structures is summarized below:

Failed Transmission Structures

Broken Transmission Structures: 194

Structure	Wood 3 Pole	Wood Single Pole	Wood H-frame	Concrete 3 Pole	Concrete Single Pole	Concrete H-frame	Steel Tower
46kV	0	1	18	0	0	0	0
115kV	3	10	140	0	5	2	10
230kV	0	0	0	0	0	0	5
Total	**3**	**11**	**158**	**0**	**5**	**2**	**15**

Note: 194 broken structures equates to 355 poles / towers.

Additional Structures with Damaged Hardware: 104

Additional Leaning or Twisted Structures: 108

Hurricane Michael's track over Gulf Power's eastern transmission system is shown in Figure 1.

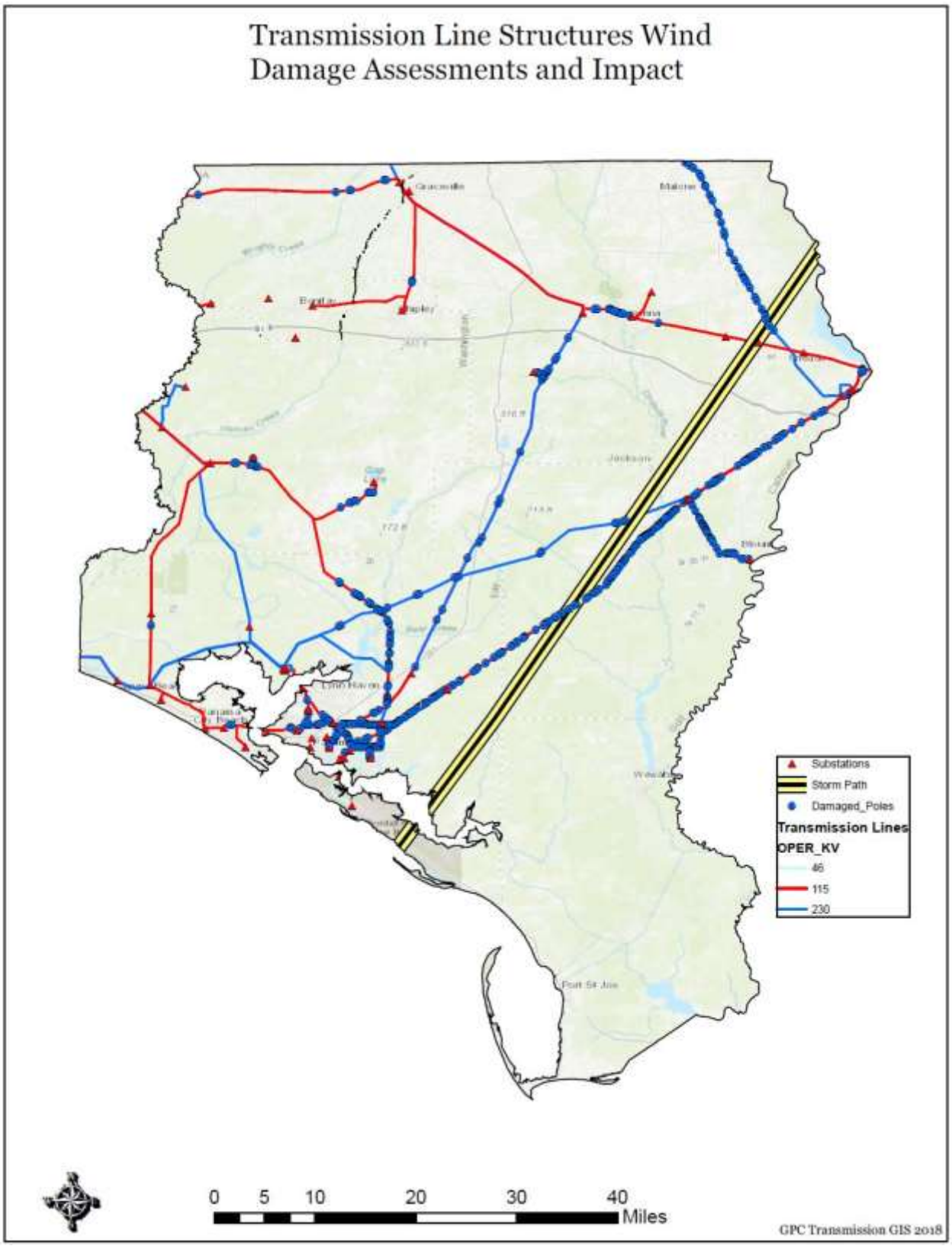


FIGURE 1 – STORM TRACK WITH DAMAGE

NATURE OF THE DAMAGE

The intense winds from the storm caused catastrophic damage to the timber surrounding transmission corridors and road right-of-ways. This damaged timber, in turn, significantly impacted Gulf's transmission lines. Approximately 40% of the transmission line damage documented during aerial patrols of the system following landfall reported trees on conductors, shield wire or structures.

Structure failures due to wind overloading were prevalent as well. An analysis of the impacted lines was performed by Gulf Power's Transmission Line Department to compare their designed wind load rating to the estimated wind loads experienced during Hurricane Michael. This analysis revealed that for all lines and structures damaged, the estimated wind speeds were at or above the design criteria of the transmission lines at the time of construction. As vegetation impacted these fully wind loaded or overloaded structures and wires, widespread failures occurred. Gulf was not able to document any examples where deterioration caused structural failures. Instead, textbook examples of structural wind overloading were found across the transmission system.

STORM PERFORMANCE BY CONSTRUCTION TYPE

Concrete

Analysis of the damage revealed that concrete poles fared much better than wood poles. The primary failure mode of concrete structures was foundation related. In most cases, the soils surrounding the pole failed allowing the pole to lean or fall to the ground. Figure 2 shows this failure mode.

FIGURE 2 – SOIL FAILURE

Concrete structures with storm guys and/or engineered foundations experienced fewer impacts from Hurricane Michael.

Gulf Power's line design philosophy has evolved over the years. Most recent concrete pole installations utilized engineered foundations and/or storm guys. Older concrete pole installations generally utilized an industry standard "10% plus 2" methodology meaning that the depth of embedment was set at 10% of the length of the pole plus an additional two feet. These poles would have been backfilled with native soil or in some cases concrete or stone. During Hurricane Michael the "10% plus 2" embedment has shown itself to be inadequate when structures are placed in marsh type environments or after receiving excess amounts of rain and Category 5 winds.

Figure 3 shows a leaning un-guyed concrete pole line in the center of the photo with two newer guyed concrete pole lines on the right side of the photo. These three transmission lines experienced identical wind loading in identical soils, but performed quite differently through the storm. As evidenced in the photo, newer engineering approaches resulted in stronger installations.

FIGURE 3 – CONCRETE WITH AND WITHOUT STORM GUYS

Wood

Storm guys proved effective on concrete poles in keeping the structures in position. On wooden poles, however, the addition of storm guys didn't prevent pole failure – the point of failure was typically moved up to the guy attachment location. Many wood poles with storm guys failed in the manner shown in Figures 4 and 5.

FIGURE 4 – WOOD POLE FAILURE AT STORM GUYS

FIGURE 5 – WOOD POLE FAILURE AT STORM GUYS

The fundamental limitation of wood pole construction of transmission lines was made apparent by Hurricane Michael. Widespread wood pole failures were experienced through the highest wind zones.

Steel and Aluminum Alloy

Gulf Power's steel lattice towers also failed during Hurricane Michael in the strongest wind corridor. Like other transmission construction types, they were wind loaded during the storm beyond their design strength. Figures 6 and 7 show typical outcomes.

FIGURE 6 – STEEL LATTICE TOWER FAILURE

FIGURE 7 – STEEL LATTICE TOWER FAILURE

Gulf Power has an aluminum alloy tower, referred to as the Guyed Y, which is an open lattice style that is supported entirely by eight tensioned guy wires. To remain upright, this tower requires all eight guys to maintain tension. Interestingly, no failures of this type tower were experienced during Hurricane Michael. Figure 8 shows a Guyed Y tower on the right side of the photo.

FIGURE 8 – GUYED Y TOWER

VEGETATION

Transmission systems are at risk during any major storm due to falling vegetation – effects range from hindering access to lines and equipment to causing widespread line and structure damage as both were experienced during Hurricane Michael. The areas in the path of Hurricane Michael had not seen winds anywhere near this magnitude in many years. The tree canopy, not having been thinned by recent storms, released a large volume of debris falling on and around Gulf Power's transmission system.

Gulf Power maintains its transmission corridors with vegetation management cycles in compliance with Federal and NESC requirements and in alignment with good utility practices. The trees that impacted Gulf Power's transmission system were not those that would have normally been removed during the annual inspection process. During the storm, green trees fell in from outside the established right-of-ways and clearing zones and impacted the system. Gulf often has the right to remove adjacent "danger trees," but these would not have qualified as they were healthy before the storm.

CONCLUSION

Hurricane Michael caused loss of life and catastrophic damage to the communities in its path through the Florida Panhandle and many south-eastern states. Its impact to Gulf Power's Transmission system and other assets was equally devastating.

Hurricane Michael also provided a rare opportunity from an engineering perspective. It produced winds which loaded thousands of transmission structures up to, and beyond, their design strengths. Each of Gulf Power's transmission structure types were tested in environments ranging from coastal areas to interior timberland, wetlands and residential streets. The resulting damage highlighted the critical importance of choosing the strongest materials for construction, the value of engineered foundations in poor soils, and the selective value of storm guys. Lastly, the value of widening Gulf Power's vegetation removal rights will be assessed.