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IN RE: PETITION FOR DETERMINATION OF NEED FOR THE ORLANDO/ST. CLOUD REGIONAL RESILIENCY CONNECTION 230 kV TRANSMISSION LINE PROJECT IN ORANGE AND OSCEOLA COUNTIES, BY ORLANDO UTILITIES COMMISSION, DOCKET NO. 20200107-EM

DIRECT TESTIMONY OF AARON STALEY, P.E.

ON BEHALF OF ORLANDO UTILITIES COMMISSION

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Aaron Staley, P.E., and my business address is Orlando Utilities Commission, 6003 Pershing Avenue, Orlando, Florida 32822.

Q. By whom and in what position are you employed?

A. I have been employed by the Orlando Utilities Commission ("OUC") as Manager of Transmission Planning and Reliability since 2006.

Q. Please summarize your duties and responsibilities in that position.

A. In 2006, I managed a staff of one full-time engineer and one-part-time engineer, and my group's responsibilities focused primarily on long-term transmission planning. Since then, OUC has grown and the complexity of OUC's transmission planning activities has increased, so that today, I am responsible for the preparation of operational and long-term transmission planning studies for OUC. In carrying out that responsibility, I manage a staff of five Transmission Planners and one coop student. I also provide real-time and procedural support for OUC's Transmission Operators, develop and deploy software systems that support OUC's transmission operations and planning, and participate in the development, administration, and deployment of OUC's Open Access Transmission Tariff ("OATT"). I represent OUC on and before regional and national reliability organizations, including the Florida Reliability Coordinating Council ("FRCC"). Finally, I train Transmission Planners at OUC, other utilities, and other industry entities. Exhibit ____ (AS-1) is my current résumé.

Q. Please summarize your educational background and professional experience.

A. In 1997, I received a Bachelor of Science degree in Electrical Engineering from the University of Florida, and in 2005, I received a Master's degree in Engineering Management, also from the University of Florida. I regularly participate as a student and as a speaker or presenter in continuing education seminars and events of the FRCC, the North American Electric Reliability Corporation ("NERC"), and the Institute of Electrical and Electronics Engineers ("IEEE").

I have held my present position at OUC since 2006. After graduating from the University of Florida in 1997, I first worked as an engineer for Florida Power Corporation, which is now Duke Energy Florida ("DEF"), in street lighting, distribution design, power quality, and transmission design. From 2000-2003, I worked as a Project Engineer for Siemens Westinghouse designing auxiliary systems for combustion turbine power plants. From 2003-2006, I worked as a Senior Transmission Planner for Progress Energy Florida, now DEF, and in 2006, I accepted my present position at OUC.

Q. Please describe your responsibilities and activities with respect to the FRCC.

A. I am a member of the FRCC Planning Committee, which is responsible for coordinating the long-term transmission planning by all transmission-owning utilities within the FRCC footprint. From 2009 through February 2020, I served as Chair on the FRCC's Transmission Technical Subcommittee, and I continue to be active as a technical leader in the group. I also organize and help instruct at the annual technical training for FRCC transmission and operations planners.

Q. Do you hold any professional licenses or certifications that are relevant to your testimony in this proceeding?

A. Yes, I am a registered Professional Engineer in Florida.

Q. Are you testifying as an expert in this proceeding? If so, please state the area or areas of your expertise relevant to your testimony.

A. Yes, I am testifying as an expert in transmission planning, including the overall design of the transmission system for reliability and resiliency as it relates to OUC's need for the proposed Orlando/St. Cloud Regional Resiliency Connection (the "Project"). I am also providing factual testimony regarding OUC's transmission system, the magnitudes and electrical characteristics of the loads that OUC's transmission system must serve, the conditions and other factors that demonstrate OUC's need for the proposed line, the physical and electrical characteristics of the proposed line, its starting and ending points, the Project's cost, impacts on OUC system economics and intra-system power transfer capability, the beneficial impacts of the Project on integrating new solar capacity in the region into the Florida grid, and the adverse consequences if the Project were to be delayed.

Q. Please summarize your duties and responsibilities with respect to the Project.

A. The transmission planning group at OUC, which I manage, is responsible for planning the St. Cloud system to operate reliably into the future taking into account anticipated load growth, generation interconnections and other possible changes that could impact St. Cloud. I am responsible for identifying the needs for the St. Cloud system as well as working with others inside OUC and our load forecasting personnel and consultants to identify and analyze alternatives for meeting the reliability needs of the St. Cloud system, and ultimately to develop the most effective means of achieving the desired reliability and resiliency for St. Cloud, which is the purpose of the Project.

Q. Are you sponsoring any exhibits with your testimony?

A. Yes. I am sponsoring the following exhibits:

Exhibit AS-1	Résumé of Aaron Staley, P.E.;
Exhibit AS-2	Map of Major Transmission Lines in the Project Area;
Exhibit AS-3	Diagram of St. Cloud Area Transmission Lines & Facilities;
Exhibit AS-4	Potential Routes within Study Area;
Exhibit AS-5	Typical Pole Design;
Exhibit AS-6	2020 Load Flow Study Results – Summary and Details; and
Exhibit AS-7	2020 Load Flow Study Solar Integration With and Without Project.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q. What is the purpose of your testimony in this docket?

A. Through OUC's petition for determination of need and our application for certification of a transmission corridor for the Project under the Florida Electric Transmission Line Siting Act ("TLSA"), OUC is seeking the omnibus permit of the State of Florida to construct and operate the

Orlando/St. Cloud Regional Resiliency Connection. My testimony presents the information required by the TLSA and the Florida Public Service Commission's ("PSC") rules for consideration by the PSC in making its decision on OUC's need petition. Specifically, my testimony:

- Describes OUC's transmission system, including our interconnections with other utilities in the Florida grid;
- Describes OUC's existing load and the electrical characteristics;
- Describes OUC's proposed Orlando/St. Cloud Regional Resiliency Connection 230 kV transmission line;
- Describes and explains the planning processes and analyses conducted by OUC and our team of OUC personnel, permitting consultants, and engineering consultants that led to the decision to construct the Project;
- Explains the specific conditions that establish the need for the Project;
- Summarizes the load flow studies that demonstrate the need for the Project;
- Describes the major alternative transmission lines, transmission improvements and other alternatives that were considered in OUC's planning processes that led to the decision to construct the Project; and
- Describes the adverse consequences to St. Cloud and our customers if the Project is delayed or OUC's petition were to be denied.

Q. Please summarize the main points of your testimony.

A. Because of continuing strong load growth, OUC needs additional transmission capacity in the area of OUC's service territory that includes St. Cloud, which we serve pursuant to an Interlocal Agreement, described later in my testimony . The transmission capacity available to serve the St. Cloud area (which I also call the "St. Cloud System") is limited to approximately 220 megawatts ("MW"), and without the Project, by 2025, there will be insufficient capacity to ensure reliable service to St. Cloud under normal weather and load conditions and with all transmission facilities in service. OUC considered many alternatives, including transmission lines between different transmission substations in the affected area, as well as other technical solutions, in our planning analyses that led to the decision to construct the Project. From OUC's perspective, the Project provides the best combination of reliability; overall system capability enhancement; support for the integration of new solar resources in the area immediately southeast of the affected area; and project economics. From the perspective of the State as a whole, it is my belief that the Project will achieve the best balance of minimizing impacts on the public and the environment while satisfying reliability needs.

III. OVERVIEW OF OUC SYSTEM & LOAD CHARACTERISTICS

Q. Please describe OUC and its governing structure.

A. OUC–The *Reliable* One is a municipal utility owned by the citizens of Orlando. It provides electricity and water services to customers in Orlando, St. Cloud, and parts of Orange and Osceola counties. OUC's heritage dates back to 1922 when the city of Orlando bought Orlando Water & Light Co., a privately held company that had been in operation since 1901.

In 1923, the Florida Legislature granted the City of Orlando a charter to establish the Orlando Utilities Commission to operate the City's electric and water system. OUC is governed by a five-member governing board, known as the OUC Commission. All members must be OUC customers, and at least one member must live outside the Orlando city limits. The Mayor of Orlando serves as an ex officio member of the OUC Commission; the other four members may serve up to two four-year terms. All members of the OUC Commission serve without compensation.

The OUC Commission sets the rates and establishes the policies governing OUC's service and operations. OUC's board meetings are open to the general public and customers are permitted to participate in OUC Commission meetings in accordance with Chapter 286, Florida Statutes ("F.S.").

Q. Please provide a summary description of OUC's service area and physical operations, including OUC's generation and other power supply resources, transmission system, and distribution facilities.

A. OUC's retail electric service area covers approximately 248 square miles and includes the City of Orlando, portions of unincorporated Orange County, and portions of Osceola County. In addition, OUC and the City of St. Cloud ("St. Cloud") have entered into an interlocal agreement under Chapter 163, F. S. (the "Interlocal Agreement"), pursuant to which OUC serves the entire electric service requirements of St. Cloud and operates its electric generation, transmission and distribution systems. While St. Cloud is a legally separate municipal electric utility, consistent with our obligations pursuant to the Interlocal Agreement, OUC treats the St. Cloud load and customers as part of OUC's retail obligations for planning and energy conservation purposes. OUC's generating facilities include owned interests in generating plants totaling approximately 197 MW of simple cycle combustion turbine ("CT") and 476 MW of combined cycle ("CC") capacity fueled by natural gas, 775 MW of capacity fueled by coal, and 60 MW of nuclear generating capacity.

Additionally, OUC has a firm power purchase agreement ("PPA") for approximately 340 megawatts ("MW") of the Stanton A gas-fired combined cycle unit; this capacity is actually owned by Stanton Clean Energy, LLC. The contract runs through December 2031. OUC also has two contracts to purchase solar power from existing facilities at the Stanton Energy Center, one for 6 MW and one for 13 MW. OUC has additional contracts in place to purchase 108.5 MW of additional solar power from three solar generating facilities that are under construction or development in Osceola County and Orange County. In addition, OUC has contracts in place to purchase 18 MW of landfill gas capacity and utilizes additional landfill gas to offset coal generation from Stanton Energy Center Units 1 and 2.

OUC's transmission system includes 31 substations interconnected through approximately 335 miles of 230 kV, 115 kV, and 69 kV transmission lines. Additionally, through the Interlocal Agreement, OUC is responsible for planning, operating and maintaining St. Cloud's four substations, 55 miles of transmission lines, and three interconnections.

OUC's distribution system includes approximately 2,055 circuit miles of distribution lines, excluding service laterals, and appurtenances including transformers, switchgear, capacitors, and protective devices to serve our customers.

OUC currently serves approximately 242,000 electric customer accounts, including all electric customers in the City of St. Cloud, consisting of approximately 211,000 electric residential customers, 25,000 electric commercial customers, 5,700 electric industrial customers, a small number of customers to whom OUC provides street and highway lighting service, and a similarly small number of other public authorities to which OUC provides service.

Q. Please describe OUC's interconnections with other utilities in the Florida electrical transmission grid.

A. OUC has a total of 22 interconnections with Florida Power & Light Company ("FPL"), Duke Energy Florida ("DEF"), Kissimmee Utility Authority ("KUA"), the Florida Municipal Power Agency ("FMPA"), Lakeland Electric, Tampa Electric ("TECO"), and TECO/Reedy Creek Improvement District. Additionally, through the Interlocal Agreement, OUC is responsible for planning, operating and maintaining St. Cloud's four substations, 55 miles of transmission lines, and three interconnections.

The transmission grid surrounding OUC's service area, including St. Cloud, is characterized by "backbone" transmission lines operating at 230 kV. As noted above, OUC has 22 interconnections with several utilities, including FPL, DEF, KUA, KUA/FMPA, Lakeland Electric, TECO, and TECO/Reedy Creek Improvement District. The St. Cloud transmission system consists of 69 kV lines, with interconnections to 230 kV lines at two substations, the St. Cloud South and St. Cloud East substations. Two FPL 500 kV lines, from Duval south to Poinsett, and from Poinsett south to Midway and Martin, are located east of OUC's service area and generally carry power from generation located north of the Orlando area south to FPL's load centers in southeast Florida. FPL and DEF have additional 230 kV lines in the area, with their major substations being Poinsett (FPL), Holopaw (DEF), Canoe Creek (DEF), and West Lake Wales (DEF).

My Exhibit No. ____ (AS-2) depicts the general location and configuration of the major existing transmission lines, major substations, and major generation sources in and surrounding the Orlando/St. Cloud area where the proposed Project will be located, including the proposed Orlando/St. Cloud Resiliency Connection. My Exhibit No. ____ (AS-3) is a diagram depicting the transmission substations and transmission lines serving the St. Cloud area.

Q. Please describe the existing load and electrical characteristics of the area where the proposed Orlando/St. Cloud Regional Resiliency Connection will be located.

A. I will begin by describing the load and electrical characteristics of OUC's service area, including St. Cloud. The level and timing of peak demands are the most critical factors determining the need for transmission resources. Relative to OUC's transmission need for the proposed Project, OUC is a summer-peaking utility. OUC's 2019 system peak demand (excluding St. Cloud) was 1,285 MW and occurred on June 25, 2019. OUC's 2019 total retail sales (consisting of sales to residential, commercial, and industrial customers) were approximately 6,081 Gigawatt-hours ("GWH"), and our Net Energy for Load ("NEL") was approximately 6,267 GWH. These values do not include St. Cloud.

On June 25, 2019, the St. Cloud area experienced summer peak demand of approximately 208 MW. In 2019, retail sales for the St. Cloud area totaled 742 GWH.

Q. What are the growth characteristics and projections for the overall OUC system, and for the St. Cloud service area specifically?

A. OUC's system peak demand, excluding St. Cloud, is projected to increase from 1,160 MW in 2020 to 1,349 MW in 2029, an annual increase of approximately 1.7% percent per year.

Growth in the St. Cloud area has been, and continues to be, greater than the overall growth rate in OUC's service area. Our current estimates indicate that the peak demand in the St. Cloud service area will increase from approximately 202 MW in 2020 to 231 MW by the summer of 2025, and to 259 MW in 2029, an annual increase of approximately 2.7% per year. (The 2020 projected value of 202 MW is less than the 208 MW actual value observed in 2019 because warmer than normal temperatures occurred in 2019, and our current forecasts are based on normal temperatures.)

These growth figures show that the St. Cloud load is already close to the maximum transmission capacity available to serve the area, and that growth will cause the St. Cloud load to exceed available transmission capacity by the summer of 2025, although unusually high demands driven by unusual weather or unexpectedly high growth could cause demand to exceed capacity before 2025.

Q. Please describe the transmission system that serves the St. Cloud area.

A. The St. Cloud area is served almost entirely through four substations, known as St. Cloud North, St. Cloud East, St. Cloud Central, and St. Cloud South. These are depicted conceptually on Exhibit ____ (AS-3). The transmission lines within the St. Cloud area operate at 69kV. There are existing 69kV interconnections between OUC's Magnolia Ranch substation and the St. Cloud North substation, and also between the Dom Toro substation and the St. Cloud Central substation. There is presently one direct 230kV/69kV interconnection to the St. Cloud System, from DEF's Holopaw substation to St. Cloud East. An OUC 230kV line connects St. Cloud East with St. Cloud South, where power is stepped down from 230kV to 69kV for transmission within the St. Cloud area. Under optimum conditions, the St. Cloud system meets strict reliability requirements up to 220 MW of load for a first contingency event.

IV. THE ORLANDO/ST. CLOUD REGIONAL RESILIENCY CONNECTION

Q. Please provide a summary description of the proposed Project.

A. The name of the Project is the Orlando/St. Cloud Regional Resiliency Connection. The starting point will be OUC's Magnolia Ranch substation located in Orange County, and the ending point will be the St. Cloud East substation in Osceola County. In its planning analyses, OUC and its engineering and permitting team established a 550-square-mile study area and studied approximately sixteen (16) different potential transmission line segments, and sixteen (16) different combinations of these segments, which we refined into three potential alternate routes for the corridor for which OUC will seek certification under the TLSA. These three potential alternative corridor routes are depicted on my Exhibit ____ (AS-4). As one would expect, these routes have different characteristics in terms of their length, impacts on existing customers, impacts on the public generally, impacts on wetlands and other environmental resources, and impacts on other social, cultural, and economic features of the area where the line would be located.

Regardless of the corridor route ultimately selected and permitted under the TLSA, the starting point will be OUC's Magnolia Ranch substation located in Orange County, and the ending point will be the St. Cloud East substation in Osceola County. The electrical impacts on the OUC system and on the FRCC grid of each route are indistinguishable from each other. At this time, OUC is continuing its evaluation of these proposed routes and will select the route that achieves the best balance of minimizing impacts on the public and the environment while satisfying reliability needs

The Project will operate at 230 kV.

Q. Please describe the design of the proposed Project.

A. My Exhibit No. ____ (AS-5) shows the design of a typical pole for the Project. The construction technology is referred to as steel monopole construction. As shown in Exhibit ____ (AS-5), where necessary, existing 69kV transmission conductors will be removed from their existing poles and mounted on the new poles, below the new 230 kV conductors. The typical 230kV conductor will be rated for at least 2,000 amps. OUC is evaluating the economics of constructing the poles to accommodate a second circuit at some future date, but no final decision has been made. Additionally, it is possible that a small portion of the Project would be installed underground in order to address specific local conditions such as population density or the need to traverse major roadways. If such construction were necessary, OUC would use industry standard construction techniques for the installation, operation, and maintenance of underground 230 kV facilities.

Q. What is the projected or estimated in-service date for the Project?

A. OUC is planning for the Project to be in full operation before the Summer of 2025. The actual in-service date may be earlier within this time horizon, depending on several factors and considerations, including capital budgeting and construction schedules, our continuing monitoring of load growth in the St. Cloud area, and the construction schedules of new solar capacity in the area.

Q. Please summarize the overall project development and construction schedule for the Project.

A. Actual development of the Project began following an extensive study of the transmission system serving the St. Cloud area started in 2016 and completed in 2017. That study confirmed the need for additional transmission capability to serve the St. Cloud area in the future. Starting in 2018, OUC and its engineering and environmental team identified the 550-square-mile study area for potential corridor routes and proceeded to identify potential line segments that could be combined to form different corridor routes. As noted above, OUC is presently in the final stages of identifying the corridor route that best serves the public interest.

OUC expects to file the application for certification of the selected preferred corridor pursuant to the TLSA later in 2020. We expect approval of a corridor during 2021. We expect to commence construction activity in 2022 and the Project to come into full operation by the Summer of 2025. Depending on other factors, particularly our monitoring of load growth in the St. Cloud area over the 2020-2021 time frame and the development schedules of between 150 MW and 375 MW of new solar generating capacity in the area, we may target an earlier in-service date.

Q. What is the approximate cost of the Project?

A. OUC estimates that the total cost of the Project will be between $107 million and $152 million, depending on which of the three routes is ultimately selected and on the final conditions of certification as they will directly affect the cost of the facilities installed.

Q. That is a fairly broad range of potential costs. Is it possible that OUC would select a corridor route other than the option with the lowest cost?

A. The TLSA sets forth the State's policy for siting transmission lines. The statute recognizes the primary need to ensure electric power system reliability and integrity and further declares the State's policy to produce minimal adverse effects on the environment and on the public health, safety, and welfare of Floridians. The TLSA also provides that it is the State's policy to produce a reasonable balance between the need for transmission lines as a means of providing reliable, economical, and efficient electric energy and the impact on the public and the environment that would result from the construction and operation of the lines.

In other words, the regulatory framework requires OUC to balance all aspects of any proposed line, including the need for the line from the perspectives of providing reliable and economical electric service, impacts on the environment, and impacts on the public. As noted above, each of the different potential corridors has different impacts on different factors and each has a different cost. OUC is charged by the TLSA to balance all of these considerations, and that balancing may lead us to choose a corridor route that effects the best balance of minimizing impacts on the public and the environment while satisfying reliability needs, even though the selected route may not be the lowest-cost alternative.

V. NEED FOR THE ORLANDO/ST. CLOUD REGIONAL RESILIENCY CONNECTION

Q. Please summarize the reasons that OUC believes it needs to add the Orlando/St. Cloud Regional Resiliency Connection to its transmission system.

A. In summary, load growth in the St. Cloud area is rapidly approaching the transmission capability of the grid to deliver power reliably to customers in that area. The rate of load growth had been expected to attenuate, but it has, in fact, remained significantly stronger than previously projected. The St. Cloud System is already exposed to overloads and under-voltage conditions for a single contingency event during maintenance and other stressed system conditions, e.g., unusually high peak demands that may result from unusually hot and dry (or cold) weather. But if OUC does not add the Project, the system serving the St. Cloud area will be at risk for overloads and under-voltage conditions beginning in 2023 for single contingency events under best case conditions. Because of the nature of the St. Cloud System, post contingency mitigation is often limited to manual or automatic load shedding.

Q. Please describe the planning processes and analyses that OUC conducted to analyze the need for additional capacity.

A. OUC continually monitors its peak demands and energy sales, and updates its load forecasts for internal planning and external reporting, e.g., in our Ten-Year Site Plans and in reports to the FRCC. Recognizing that load growth in the St. Cloud area was approaching the limits of transmission capacity serving St. Cloud, OUC in 2016 commissioned a study by an outside consultant of system conditions and potential alternatives to reinforce the transmission system in order to maintain system reliability and integrity on OUC's system and our ability to serve the St. Cloud area specifically. The outside consultant was brought in to provide a second perspective on the system conditions and alternatives, considering the magnitude of costs for any of the available options.

That study indicated that, under certain conditions, OUC might experience minor thermal over-loadings (102 to 108 percent of rated capacity) on certain transmission facilities in the 2020-2021 summer seasons. When sequential outages of two system elements were considered, the study indicated that adverse results would be observed as early as 2018. The study also found that voltage conditions were generally satisfactory until 2024 under single-contingency outage conditions, but under sequential outage conditions, unacceptable voltage drops were observed in the modeling as early as the summer of 2018. Keeping in mind that OUC, like the rest of FRCC, plans on a single-contingency basis, these sequential-outage results did not indicate a need for immediate addition of new facilities or other immediate action.

Q. Please summarize the load flow studies conducted by OUC that show the loading and voltage conditions on the grid with and without the Project.

A. OUC continually conducts load flow studies that analyze thermal loading conditions, voltage conditions, and other variables on the OUC system, including the St. Cloud System. These load flow studies and real time operating experience continue to show comparable results to the 2017 Burns and McDonnell study.

Over the past several months, as data for 2019 has become available and the 2020 Ten-Year Site Plan forecast developed, my group and I have prepared a new load flow study of the St. Cloud System with and without the Project. (The complete load flow study is based on the currently available FRCC data base and is provided as Exhibit A to OUC's Petition for determination of need for the Project. Key results are summarized in Exhibit ____ (AS-6) to my testimony. Both Exhibit A to OUC's Petition and Exhibit ____ (AS-6) are confidential because they contain critical energy infrastructure information.) This study shows that the St. Cloud System has a first contingency reliability limit of approximately 220 MW under ideal conditions, and a considerably lower limit at times under stressed conditions. We did not attempt to replicate the load flow analyses of the other alternatives that were evaluated in the 2017 Burns & McDonnell Study, because the underlying conditions have not changed in any ways that would materially affect the results.

Q. Please describe and explain the specific conditions that require OUC to add the Project.

A. The specific conditions that are of most concern are thermal overloads and low voltage conditions on certain elements of the system. My confidential Exhibit ____ (AS-6) shows the projected system limitations with and without the Project, under a variety of conditions.

From the perspective of maintaining system reliability and integrity, these are the primary specific conditions that require OUC to add the Orlando/St. Cloud Regional Resiliency Connection. Even though OUC plans its transmission system on a single-contingency basis, we also analyze the potential impacts of stressed system conditions, which includes maintenance outages, sequential outages, and unusual demand patterns, and under these conditions the impacts of not adding the Project are more significant.

Q. Please describe the major alternative transmission lines, transmission improvements, and any other alternatives that were considered in OUC's planning processes and analyses that led to the decision to construct the proposed Project.

A. OUC considered a significant number of potential solutions to the projected reliability issues affecting the St. Cloud area. These included:

- Adding a new capacitor bank at St. Cloud South with an expanded relaying scheme at Magnolia Ranch;
- Upgrading one of the 69kV lines connecting into St. Cloud;
- Constructing new 230kV lines from OUC's Magnolia Ranch Substation to St. Cloud East, St. Cloud North, and St. Cloud Central;
- Constructing an additional 69kV circuit from Magnolia Ranch to St. Cloud North;
- Several 230kV alternatives with connections to St. Cloud South; and
- Installation of fossil fuel generation or energy storage within the St. Cloud area.

Q. After identifying the range of potential alternative solutions, what further analyses did OUC conduct?

A. From these, OUC further analyzed five options that appeared to offer the most promise:

- Capacitor bank with Expanded Relaying Schemes;

- Upgrading the KUA Carl Wall-Dom Toro 69kV line;
- St. Cloud Central-Magnolia Ranch line;
- St. Cloud East-Magnolia Ranch 230kV line; and
- St. Cloud South-Taft 230kV line.

These options were evaluated on the basis of thermal and voltage performance, contribution to the transfer capability for serving the St. Cloud area, and total system cost of pursuing each option.

Of these five alternatives, the St. Cloud Central-Magnolia Ranch 230kV line, the St. Cloud South to OUC Taft 230 kV line, and the St. Cloud East-Magnolia Ranch 230 kV line offered the most promise in terms of maximizing transfer capability for the St. Cloud area. The total system cost of the St. Cloud East-Magnolia Ranch option was projected to be lower than the other transmission lines.

The OUC team further considered additional factors, including whether the options would provide diverse supply sources, whether the options entailed more or less congested routes, short-term and long-term considerations and upgrade opportunities, and the degree to which each option would support the integration of the significant amount of solar generating capacity that is projected to be added to the Florida grid in the area immediately southeast of Orlando and St. Cloud.

Q. What did OUC conclude?

A. OUC concluded that, considering all factors – particularly reliability, cost, feasibility of routing vs. congestion, and the ability to support integration of new solar resources, the St. Cloud East-Magnolia Ranch 230kV line is the best choice for OUC, the citizens and customers in Orlando and St. Cloud, and the grid as a whole.

Q. Do you have an opinion regarding OUC's decision to construct the Project?

A. Yes. As a Registered Professional Engineer and in my capacity as OUC's Manager of Transmission Planning and Reliability, it is my opinion that this is the best decision for OUC and for the Florida grid.

Q. Please summarize the impacts of the Project on system reliability and integrity on the OUC system, including St. Cloud, and on the Peninsular Florida grid.

A. The Project will specifically improve system reliability and integrity on OUC's system and on the St. Cloud System by avoiding thermal overloading conditions and low-voltage conditions that would occur if OUC does not add the Project. The Project will contribute to diversity of source supply and total power transfer capability of the OUC system and the Florida grid, thereby enhancing reliability.

Q. What impacts will the Project have on intra-system or inter-system power transfer capabilities?

A. Currently, only the 230 kV line from the St. Cloud East Substation to Holopaw can carry the entire St. Cloud load at peak by itself; if the St. Cloud East-Holopaw line is out of service for any reason, the remaining ties (KUA and Magnolia Ranch) must work in conjunction to carry the full load. The Project provides a new tie that can carry the entire load at peak by itself, thus providing two ties into St. Cloud that can each carry the full load. Compared to a first contingency limit of 220 MW today, the new tie will increase that limit to at least 325 MW. Thus, the new tie will increase the transfer capability into St. Cloud by approximately 50 percent (from 220 MW to 325 MW) and will also create an additional layer of contingency protection, moving what were first contingency risks to second contingency risks. The Project is not designed to address inter-system power transfer capabilities; given its points of interconnection it will not impair or limit inter-system power transfer capability, but it will not substantially improve it either since it will not bridge any existing inter-system constraints.

Q. What impacts will the Project have on OUC's and the Florida grid's capabilities to integrate new power supply sources planned for the area?

A. Presently, there is one 74.5 MW solar generating facility actually under construction in the St. Cloud area. OUC has granted network resource designation for the full capacity of this unit. Additionally, the developers of more than 300 MW of additional new solar capacity have requested, or are expected to request, interconnection evaluation in the same area. Currently under optimum conditions, the St. Cloud System can support only 300 MW of solar generation, with that solar having to be curtailed down to 150 MW under a range of maintenance and contingency conditions. The Project will provide a significant enhancement to the 230kV backbone transmission system in this area and facilitate the integration of at least 375 MW of new solar under optimum conditions and under most maintenance and contingency conditions.

Q. Will the Project improve OUC's system economics? If so, please explain.

A. Yes. The Project will improve OUC's system economics as compared to all available alternatives. The overall cost to OUC, taking into consideration all construction and operation costs of the Project and potential future upgrades to the St. Cloud area system facilitated by the Project, as well as the costs of all other options available to OUC to meet the reliability needs of St. Cloud and the customers whom we serve there, is less with the Project than it would be with other alternatives.

Q. Would OUC and its customers in Orlando and St. Cloud experience any adverse consequences if the Project were delayed or if OUC's petition for determination of need were to be denied?

A. Yes. Most significantly, without the Project in full operation by the Summer of 2025, and assuming peak demands based on our reasonable planning assumptions regarding growth and weather, the transmission system serving the St. Cloud area would be unable to ensure reliable service to the customers in St. Cloud. Following a first contingency, both thermal overloads and low-voltage conditions would likely occur forcing post contingency load shedding. Given that the Project represents the lowest-cost alternative of the feasible alternatives considered, OUC's system economics would also be impaired, in that OUC would incur higher costs to provide stopgap measures to address these reliability issues. Additionally, the grid in the Orlando/St. Cloud area would have difficulty accommodating the delivery of power from the substantial amount of new solar generating capacity that is either being constructed or under development in the area, and which is expected to come on-line between 2023 and 2025.

Q. If the Project were delayed beyond the planned in-service date, what steps could or would OUC take to maintain reliable service if St. Cloud peak demands exceeded available capacity or in contingency-outage conditions?

A: If the Project were delayed beyond the planned in-service date, and not replaced by an alternate capital project, OUC would still be able to serve all of St. Cloud's load at the forecasted demand under normal conditions, and with all facilities in service, but it would not be considered reliable because a first contingency outage could not be resolved without load-shedding. To reduce the chance of a first-contingency outage, OUC would step up the physical monitoring of the key circuits when demand was forecasted to exceed the first contingency limit and would not allow any work on the affected facilities that could, if an error or accident occurred, cause an outage. To further prepare the system to respond to the first contingency, OUC would consider the deployment of additional automated systems that would split the system between the remaining ties to reduce line overloading and shed load to prevent overloads and extended low voltages. Following that first contingency and automated action, load that was initially shed by automated or immediate operator action would be restored as quickly as possible to the limit of the on-line transmission system equipment and the ability of the distribution system at Lake Nona to pick up the load. Solar integrations would have to be limited to approximately 300 MW and all parties advised that under certain operating conditions the delivery of solar generation into the system may have to be curtailed to less than 300 MW.

Q. Does this conclude your direct testimony?

A. Yes, it does.

AARON STALEY, PE

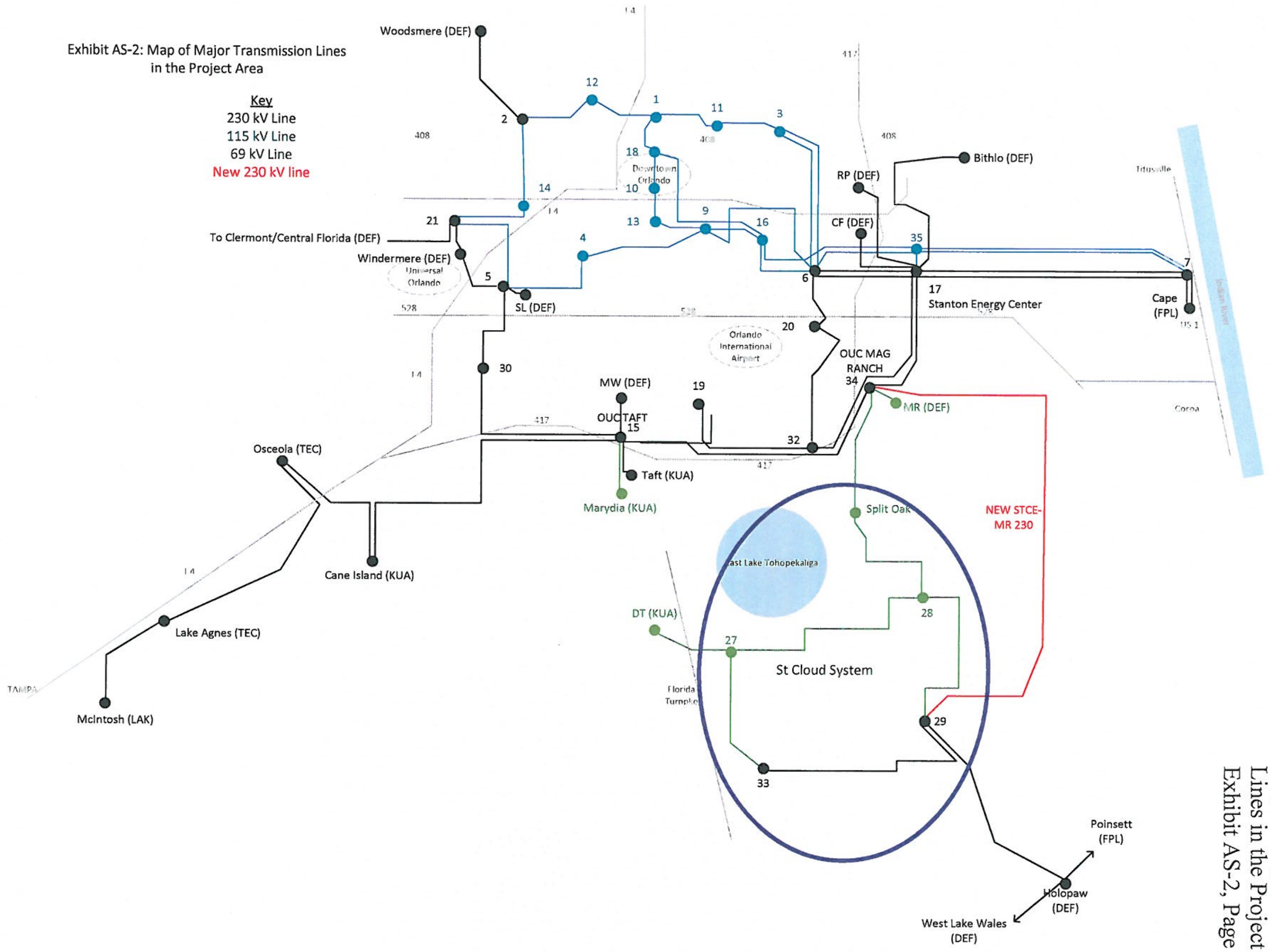
217 Southern Magnolia Lane, Sanford FL 32771: (407) 832-0779: Astaley@ouc.com

OBJECTIVE	
WORK HISTORY	
2006 - Current	Manager of Transmission Planning and Reliability, *Orlando Utilities Commission (OUC)*
	· Manage five Transmission Planners and one CoOp student · Operational and Long Term Transmission Planning studies · OATT Development, administration and supporting deployment · Real time and procedural support for Transmission Operators · Represent OUC at regional and national organizations · Development of new tools and techniques locally and at a regional level · Specification, development and deployment of software systems · Train and Develop Transmission Planners at OUC and other entities
2003 - 2006	Senior Transmission Planner, *Progress Energy Florida (now Duke Energy)*
2000 - 2003	Project Engineer, *Siemens Westinghouse Power Corporation (now Siemens)* · Designed auxiliary systems for combustion turbine plants
1997 - 2000	Engineer, *Florida Power Corporation (now Duke Energy)* · Street Lighting, Distribution Design, Power Quality and Transmission design
EDUCATION	
1997	BSEE, University of Florida
2005	Masters in Engineering Management, University of Florida
Ongoing	IEEE, NERC, FRCC and vendor educational events
LEADERSHIP	
	Florida Regional Coordinating Council (FRCC) · Planning Committee Member · Transmission Technical Subcommittee, Chair and Technical Lead 2009-2020 · Organize annual technical trainings for FRCC members · Participation and leadership roles in other subgroups
	Florida Transmission Capacity Determination Group (FTCDG): · Founding Member and Chair since 2008

	· A designer of the robust transmission transfer calculation tool used by FTCDG
	Institute of Electrical and Electronic Engineers (IEEE) – Power & Energy Society (PES)
	· Excom member or executive officer since 1998 of local PES chapter · CoChair (representing OUC) for the 2012 IEEE PES T&D Expo
	Florida Municipal Power Pool (FMPP) · Formal and informal leadership roles in Transmission Planner working groups
ACHIEVEMENTS	
	· Expanded the OUC Planning group to meet the needs of OUC from one part time planner to five planners + CoOp student with 24/7 support · Established OUC's first EMS State Estimator on time and on budget · Actively work with OUC IT to develop and test technology to provide for more secure but also user friendly environment at OUC · Deployment of PowerGEM TARA software throughout the FRCC · Developed procedures to meet several generations NERC standards for OUC and in a leadership role at the FRCC · Represented OUC's on NERC audits, served as an FRCC auditor or entity subject matter expert on multiple non OUC audits · Organized annual training classes for all Transmission Planners in FRCC using staff at the FRCC and member utilities · Chairman of a NERC drafting team, and a voting member on two additional teams that all worked on substantial changes to existing standards · Developed a method of predicting operational limits for the FMPP using existing unconnected information sources without additional software cost
CURRENT ACTIVITIES	
	· Working with Energy Control Center and various vendors to develop OUC's next outage, tagging and switching order software solution · Leading the FTCDG to develop the next generation transfer capability calculation engine to incorporate more real time information, including solar · Working with the FRCC TTS and the PC to develop a revised new transmission service study process that is reliable – but more efficient

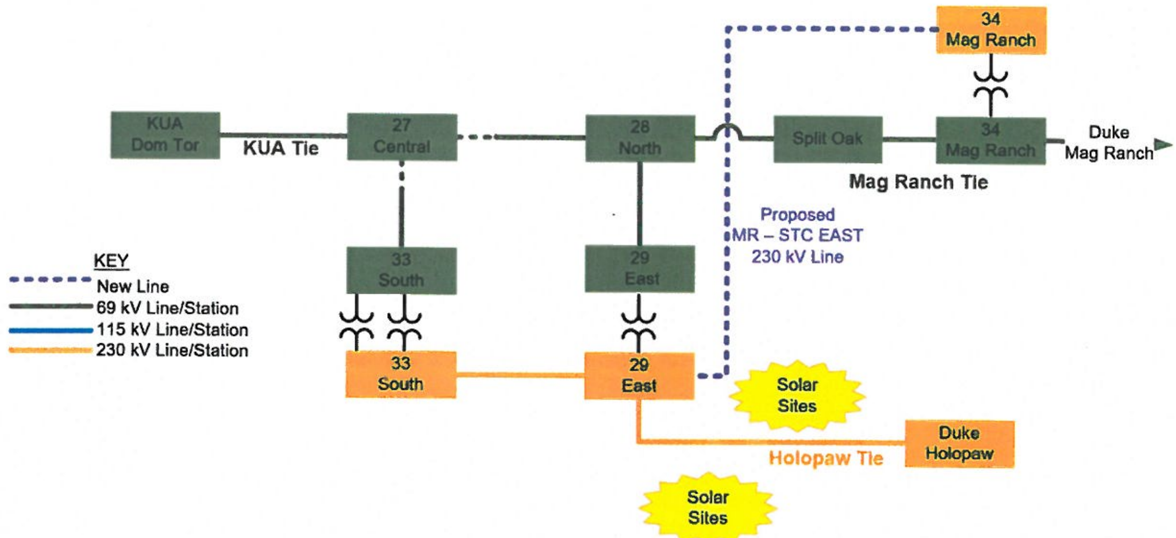
	· Working with OUC Data and Analytics group to build Qlik Dashboards that will allow fast access to data in HISPRD that was impractical to use before · Working with OUC Data and Analytics group to build Qlik Dashboards that will allow instant calculation of FMPP operational limits and allow real time benchmarking and adjustment of those limits

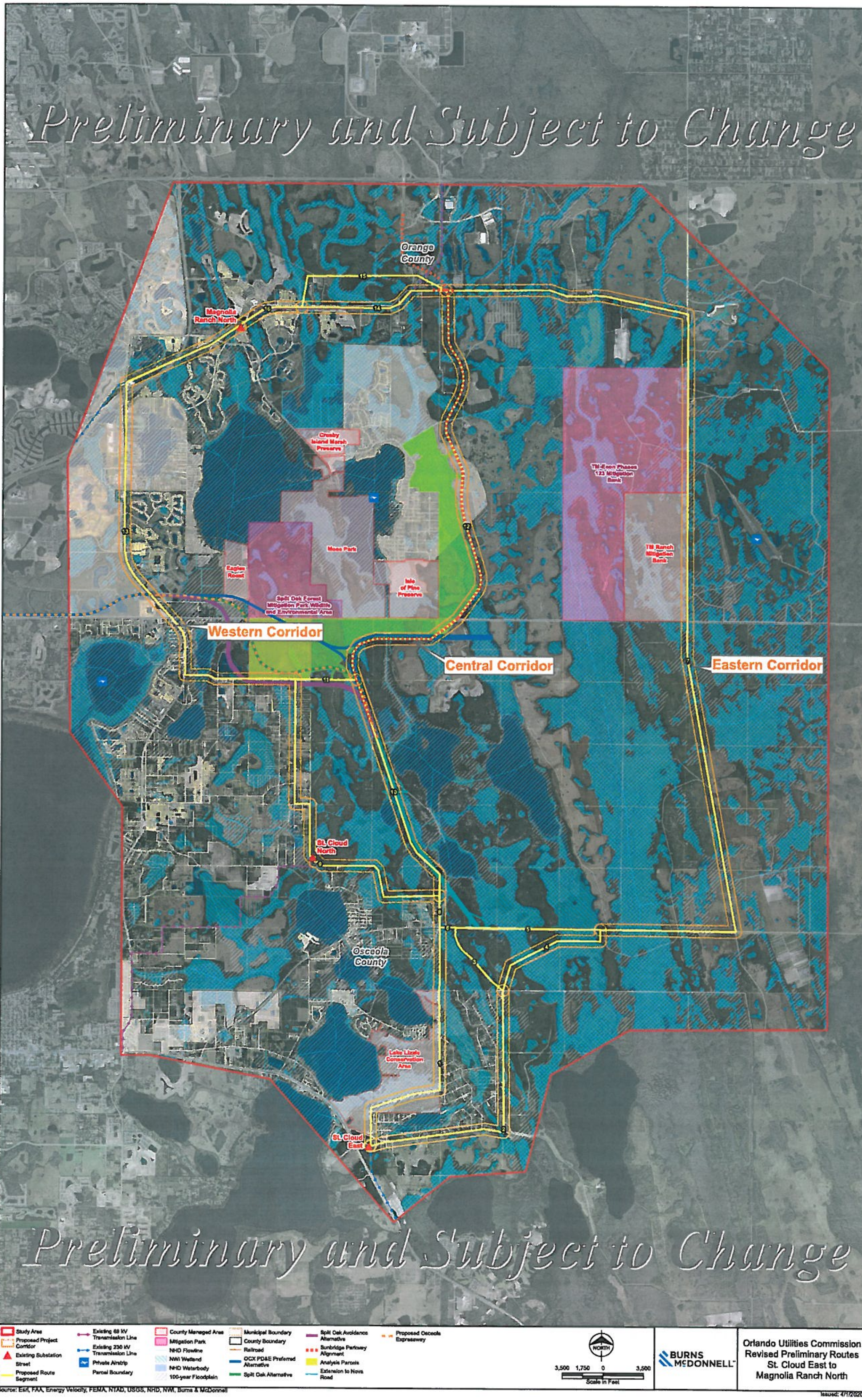
Docket No. 20200107-EM
Map of Major Transmission
Lines in the Project Area
Exhibit AS-2, Page 1 of 1



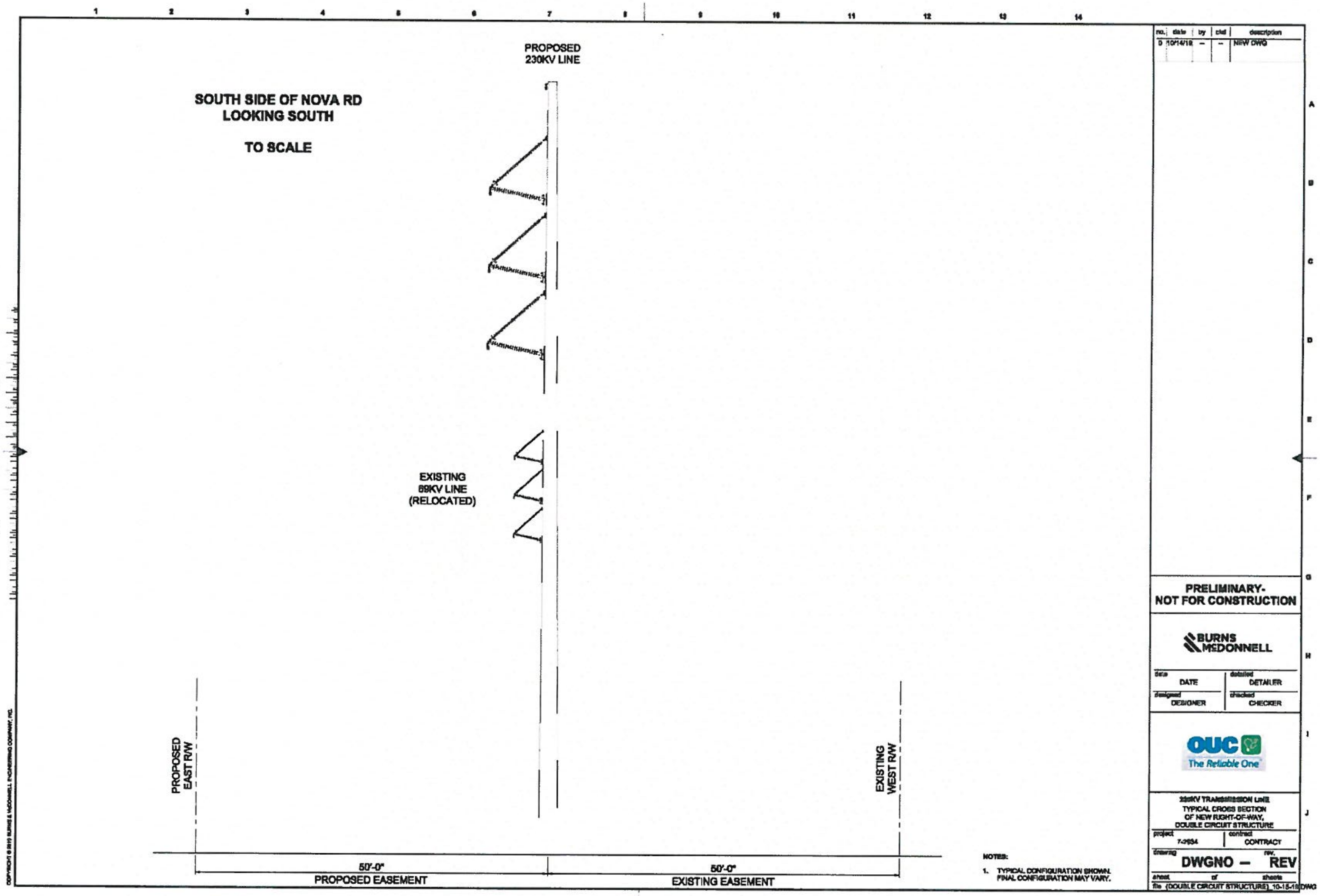
Docket No. 20200107-EM
Map of Major Transmission
Lines in the Project Area
Exhibit AS-2, Page 1 of 1

Exhibit AS-3: Diagram of St. Cloud Area Transmission Lines and Facilities.




Preliminary and Subject to Change
Orange County
Magnolia Ranch North
Crosby Island Marsh Preserve
Moss Park
Eagles Roost
Split Oak Forest Mitigation Park Wildlife and Environmental Area
Isle of Pine Preserve
TM-Econ Phases 1&2 Mitigation Bank
TM Ranch Mitigation Bank
Western Corridor
Central Corridor
Eastern Corridor
St. Cloud North
Osceola County
Lake Lizzie Conservation Area
St. Cloud East
Preliminary and Subject to Change
Study Area
Proposed Project Corridor
Existing Substation
Street
Proposed Route Segment
Existing 69 kV Transmission Line
Existing 230 kV Transmission Line
Private Airstrip
Parcel Boundary
County Managed Area
Mitigation Park
NHD Flowline
NWI Wetland
NHD Waterbody
100-year Floodplain
Municipal Boundary
County Boundary
Railroad
OCX PD&E Preferred Alternative
Split Oak Alternative
Split Oak Avoidance Alternative
Sunbridge Parkway Alignment
Analysis Parcels
Extension to Nova Road
Proposed Osceola Expressway
NORTH
3,500 1,750 0 3,500
Scale in Feet
BURNS McDONNELL
Orlando Utilities Commission
Revised Preliminary Routes
St. Cloud East to
Magnolia Ranch North
Source: Esri, FAA, Energy Velocity, FEMA, NTAD, USGS, NHD, NWI, Burns & McDonnell
Issued: 4/1/2020

Typical Structure Designs



OUC
The Reliable One

Docket No. 20200107-EM
Typical Pole Design
Exhibit AS-5, Page 1 of 1

Exhibit AS-6: Load Flow Study Results - Details

				Base Case							With Project	
		Year ->		2023	2023	2023	2023	2024	2025	2026	2025	Future
		St Cloud Load (MW) ->		117 MW	170 MW	200 MW	219 MW	225 MW	231 MW	237 MW	231 MW	325 MW
Condition	Most Limiting Constraints	Criteria	Rating	off peak	off peak	Peak	Peak	Peak	Peak	Peak	Peak	Future

REDACTED

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Docket No. 20200107-EM
2020 Load Flow Study With
and Without Project
Exhibit AS-6, Page 1 of 2

CONFIDENTIAL

Exhibit AS-6 Continued - Load Flow Study Results - Summary

Condition	[illegible]	[illegible]	[illegible]	[illegible]
Seasonal Maintenance Outages + Forced Outage	REDACTED			
Forced Outage of St Cloud East - Holopaw				

Exhibit AS-7: 2020 Load Flow Study Solar Integration With and Without Project

Condition / Outage	Before Project Full Integration	Before Project Occasional Curtailment	Project Full Integration
Normal Operation – All Times	225 MW	300 MW	375 MW
During Forced/Maintenance Outage	150 MW	225 MW	375 MW

Full Integration means that outside of extraordinary circumstances there should be no curtailment of the site

Occasional Curtailment means that under the most common stressed conditions the combined solar site outputs should be able to maintain this level.