Procurement Department Bid Section
Customer Center 1st Floor, Room 002
21 W. Church Street
Jacksonville, Florida 32202

September 16, 2019

ADDENDUM NUMBER: Four (4)

TITLE: **ITN – 127-19 Strategic Alternatives**

BID DUE DATE: October 7, 2019

TIME OF RECEIPT: 12:00 PM EST

THIS ADDENDUM IS FOR THE PURPOSE OF MAKING THE FOLLOWING CHANGES OR CLARIFICATIONS:

1. **Can you give me an estimate of what total JEA debt defeasance costs are?**

   Answer: See Addendum 4 - Attachment 1 - JEA Defeasance Summary

2. **Please provide the gross revenues collected from the sale of electric energy to all customers within the corporate limits of the City of Atlantic Beach for the past 10 fiscal years. In addition, please provide the total annual payment of franchise fees to the City of Atlantic Beach for the past 10 years. Include Mayport in this request as well.**

   Answer: See Addendum 4 - Attachment 2 – Gross Revenue and Franchise fees for Atlantic Beach and Mayport

3. **How open is JEA to hearing from vendors in this solicitation for voluntary customer programs that further JEA's environmental goals? The offering would include comprehensive services from program management, design, strategy and marketing. If so, which renewable programs does JEA consider most important to offer to customers interested in clean power options? Programs could include: Green Power, Community Solar, EV, or Renewable Natural Gas.**

   Answer: As discussed on page 19 of the ITN, JEA welcomes Replies contemplating strategic alternatives that build upon JEA's strengths and seek to eliminate business constraints, specifically targeting the minimum requirements in the table on page 19.

4. **JEA currently pays a $90 Million Public Service Tax annually to the City of Jacksonville in addition to a ~$116 Million contribution to the City's General Fund and ~$71 Million of State Utility and Franchise Taxes. We are unable to locate the $90 Million Public Service payment in JEA's financials. Is this payment considered a pass-through and is not booked, or is it booked somewhere else?**

   Answer: The Public Service Tax Payment is a pass through and is not reflected on JEA's GAAP Income Statement. It is remitted monthly and the payable is reflected on JEA's balance sheet.

5. **Regarding the current JEA budget and 5-year capital plan, does JEA intend on continuing as budgeted or holding on principal debt repayment and capital expenditures until a potential contract is awarded (especially in reference to the upcoming budget year)?**

   Answer: JEA is continuing to operate in the ordinary course while it evaluates proposals and considers strategic alternatives.

6. **On Page 27, Table 2 of the ITN, Tab 4 (Organizational Overview) lists "financial details" as a requirement for the Respondent to "provide a description of their business". Can you provide more insight into what exactly is meant by "financial details"?**

Answer: The Respondents should provide an overview of their financial strength, including capital structure and available liquidity and anything else they believe would be helpful to help JEA assess the Respondent's financial condition.

7. **Please provide the total fiber route miles and fiber strands miles of the network broken out by owned and leased fiber.**

   Answer: JEA today has 650 route miles of fiber with current projects underway that will extend that further. JEA owns 97% of all fiber it uses. JEA shares approximately 20 miles of fiber with Comcast per a project agreement. JEA does not have leased circuits.

8. **Please provide the number of available fiber strands for all segments of the network including access points. Our goal is to understand our ability to access the fiber and understand how many fibers are available.**

   Answer: All of JEA fiber is to support utility operations. Smaller strand counts of 48, 24, 12, and 8 are solely used for operational purposes. Higher counts of 72 and 144 do have some capacity available, upwards of 50% in some areas. Every request for fiber requires looking into the specific run to determine what capacity is available.

9. **Please provide a KMZ file of the network depicting aerial fiber, underground, OPGW, ADSS, etc.**

   Answer: KMZ files will be available during the Negotiating Phase. JEA only has ADSS fiber.

10. **Please provide the list with On-Net buildings (and number of entrance cables and access rights).**

    Answer: JEA has no On-Net buildings/entrance cables.

11. **Please provide a break out of the operating expenses associated with the communications infrastructure. Our goal is to understand the Free Cash Flow generated by the assets (in additional to the already provided revenue numbers).**

    Answer: Annual values are below:

    $150,000 – Fiber Maintenance (Fiber Cable, Power, Cabling)
    $60,000 – Fiber Splicing
    $150,000 – Relocates
    $800,000 – Resources

12. **Please provide the contract waterfall for the 8 revenue generating fiber leases (we completely understand if at this stage of the process you have to provide this on a no-names basis).**

    Answer: See Addendum 4 - Attachment 3 - Telecom Information

13. **Please provide a breakout of the Combined Collocation Revenue including contract renewals (we completely understand if at this stage of the process you have to provide this on a no-names basis).**

    Answer: See Addendum 4 - Attachment 3 - Telecom Information

14. **Please provide an organizational chart for the communications infrastructure segment.**

    Answer: See Addendum 4 - Attachment 3 - Telecom Information

15. **Is the current backlog (e.g. towers under construction, ~60 small cell sites) reflected in the Financial Metrics on page 63 of the ITN?**

    Answer: The financials on page 63 represent the existing revenue streams in place today. It does not reflect any potential revenue from building out a backlog.

16. **With regards to the 40 standalone communication towers, could you please provide the following?**

    a. **Exact location**

b. Tower height
c. Load baring capacity (we would like to understand how many additional carriers could be placed on the towers)
d. Current rent roll
e. Current Tower Cash Flow
f. Ground rent today and post deal

Answer: See Addendum 4 - Attachment 4 - MasterTowerData. Note, additional information forthcoming in the Negotiation Phase.

17. Would there be an expense associated with utilizing the 200,000 electric and street light poles for small cells to the buyer of the communications infrastructure?

Answer: JEA has the right to put attachments on the poles itself. Existing pole attachment agreements do not limit our ability to add future attachments.

18. The ITN's answer to FAQ 19 "What are the minimum requirements?" States in part that "JEA has a current plan to achieve the 2035 goal..." of 40 MGD of alternative water capacity by 2035. What is that plan?

Answer: See Addendum 4 - Attachment 5 IWRP

19. Process Goals – Financial
a. JEA refers to a pension liability currently with respect to its portion of the City of Jacksonville General Employees Pension Plan ("GEPP"). Please confirm that all pension obligations prior to close of any transaction are the responsibility of the City but not that of the buyer. If that is not the intent, please explain in detail all of the employee related obligations that are the responsibility of the buyer post close of any transaction.

Answer: In the event of a transaction, the buyer will bear no post-closing obligations with respect to the GEPP.

The buyer will assume the assets and liabilities of the SJRPP Plan and OPEB Plan, which are currently not ERISA qualified but will be subject to ERISA guidelines post-closing. At October 1, 2018, the SJRPP Plan had an actuarial accrued liability of approximately $174.7 million and market value of plan assets of $170.7 million. JEA intends to make a required minimum cash contribution of approximately $4.6 million on or after October 1, 2019.

The most recent actuarially determined net OPEB liability is $18.8 million, as described in Note 13 to JEA's most recent audited financial statements.

20. Process Goals - Customers
a. On page 19 of the Invitation to Negotiate ("ITN"), JEA indicates a minimum requirement of "[a]t least three years of contractually guaranteed base rate stability for customers." By "base rate stability" does JEA refer to the rates paid by customers excluding fuel and purchase power agreement expenses? Effectively the "base rate revenues" line item in JEA's operating budget?

Answer: Confirmed. Base rate revenues from JEA's operating budget.

21. Process Goals – Community Impact and Employees
a. ITN refers to "Retention payments to all full-time employees of 100% of current base compensation" on page 19 of the ITN.
i. Can JEA confirm whether buyers are expected to fund these retention payments? Or would the retention payments be funded from JEA's >$3 billion proceeds?

Answer: The net proceeds to the City will be after all other transaction costs and minimum requirements are met. The total enterprise value of the transaction, including any net working capital that is released as part of the transaction, will need to be sufficient to pay for customer rebates of at least $400 million, employee retention payments estimated to be $165 million, employee pension protection estimated to be $132 million, all legal and advisory transaction costs incurred by JEA and pay off all of JEA's debt obligations and any other liabilities that are not assignable (these would include things like interest rate and commodity hedges). A total defeasance cost for these liabilities is estimated to be $3.5 to $4.0 billion as of 12/31/2020.

22. Please provide the most recent cost of service study for JEA (for electric, water, and wastewater). If the most recent is dated 2013, please explain why an updated study has not been performed.

Answer: The 2019 Water/Wastewater Cost of Service Study and 2013 Electric recent cost of service studies will be provided during the Negotiating Phase.

In 2016, Black & Veatch, an international consulting firm, conducted a review of JEA's Electric Cost of Service (COS) Model and the Revenue Model for functionality, accuracy and methodology and reviewed specific rate recommendations for each class. They concluded JEA followed standard industry practice and the new Revenue and Cost of Service models developed by JEA were acceptable and suitable for internal decision making. JEA anticipates having the next Electric System Cost of Service completed its next fiscal year 2020.

23. Please provide the most recent depreciation study for JEA (for electric, water, and wastewater assets).

Answer: See Addendum 4 - Attachment 6 - 2019 JEA Depreciation Study Report

24. What portion of the water and wastewater utilities' net plant is related to St. Johns and Nassau service areas, pursuant to the Interlocutory Agreements signed with both counties?

Answer: St. Johns Net Investment per Interlocal Agreement is $291M. Nassau Net Investment per Interlocal Agreement is $69M.

25. Does the City/JEA intend for the St. Johns River Power Park ("SJRPP") site to be conveyed in a possible sale transaction to a 3rd party buyer?

Answer: JEA is continuing to explore options for a conveyance of the site and will provide more information in due course.

26. Water and Wastewater Rate Base – Contribution in Aid of Construction ("CIAC") and Used and Useful Estimate for Water Utilities

a. In 2018, the Public Utility Research Center issued a report entitled "Valuing Municipal Utilities – The Case of the Potential Sale of JEA in Jacksonville." The authors indicated that rate base for rate making purposes would adjust the fiscal year ("FY") 2017 net property and plant value of $2.6 B by (a) amounts not deemed "used and useful" and (b) CIAC. See pages 41-44 of that report.

A	Net Plant	$2,615,950	FY 2017 financials
B	X Used and Useful Assumed Rate	90%	Public Utility Research Center Assumption
C	**Used and Useful Net Plant**	**$2,354,355**	**A x B**
D	CIAC Rate	38.5% of Book Value	Public Utility Research Center Assumption, based on CIAC as a proportion of FY11-17 capital additions
E	CIAC	$906,427	C x D
F	Rate Base	$1,447,928	C - E

b. Please provide the account and amount of CIAC on JEA's books and records as of December 31, 2018 and YTD June 30th, 2019 as it relates to the water and wastewater assets. Please provide the amount of the contra depreciation expense in the aggregate at both dates related to the amortization of CIAC. Please provide a written explanation of the JEA accounting for CIAC.

c. For the water and wastewater assets, can JEA provide an estimate for that portion of the net asset base which may be deemed "used and useful" for regulatory purposes, based on the ~$2.7 billion of net capital plant provided on page 6 of the ITN and consistent with the requirements of the Florida Public Service Commission rules? Please also provide an explanation with the result showing the calculation of that amount of rate base deemed used and useful under FPSC rules.

Answer:
A) Respondents are cautioned not to rely upon 3rd party, media or consultant reports which are, or were, produced without JEA's input, review and approval. Such reports may contain inaccurate or misleading statements that may adversely impact Respondent.

B) Through FY2015, Contributions in Aid of Construction (CIAC) amounts were reported in JEA's plant assets. Beginning in FY2015 JEA adopted regulatory/utility accounting. Following utility accounting guidelines, CIAC assets are valued at $0 and are excluded from the fixed asset subledger. Therefore, CIAC for fiscal years 2016 through 2018 are not included in JEA's plant assets. The amount of CIAC included in JEA's plant assets is $360M. The amount of contra depreciation expense as of 12/31/2018 and 06/30/2019 is $83M and $88M respectfully. Of the $2.6B net capital assets, $272M or 10.5% is Contributions in Aid of Construction. The remaining $2.3B consists of capital assets constructed or purchased through JEA funding. On the Statement of Net Position, property contributions through FY2015 are recorded in the "Net Capital Assets" section. In the subledger, these contributions are recorded in multiple plant asset accounts in accordance with the National Association of Utility Commissioners (NARUC) Uniform System of Accounts for Water and Wastewater Utilities. On the Statement of Revenues, Expenses, and Change in Net Position, CIAC is recorded in the "Developer and Others" section with an offset in "Reduction of plant cost through contributions".

C) JEA is currently an exempt water and wastewater utility not regulated by the FPSC and therefore does not prepare or file Forms PSC/AFD 19-W or 20-W with the FPSC which are required in order to do the calculations requested. At this point in time JEA has no reason to believe any of its water, wastewater or storage assets are not used and useful.

27. **Can you provide .kmz maps for all fiber routes, including fiber counts, available fiber (i.e., fibers for use by others per route), empty conduit, and access points?**

    Answer: KMZ files will be available during the Negotiating Phase.

28. **With respect to the buried fiber plant, does the fiber share space with the el26ectrical plant or is the fiber run through separate conduit?**

    Answer: Nearly all underground fiber downtown shares electric manhole space with designated conduit and interduct. Nearly all underground fiber outside of downtown uses its own conduit.

29. **With respect to the aerial fiber plant, is the fiber installed above the neutral in the electrical space? If the fiber is installed below the neutral, how far below?**

    Answer: For distribution, JEA installs fiber in the electric space below the neutral 85% of the time. The other 15% is above the neutral. We maintain 40 feet between the fiber and the neutral.
    For transmission or transmission with underbuilt distribution, JEA installs below the transmission C phase. We maintain 40 feet between the fiber and the C phase.

30. **Please provide the background materials utilized by McKinsey in its strategic work for JEA.**

    Answer: This information will be provided during the Negotiation Phase.

31. **In reference to an August 29th article in the Jacksonville Daily Record, where Jacksonville Deputy Counsel Lawsikia Hodges clarified that the "cone of silence" applies to companies and organizations planning to submit a proposal, can you provide specific guidelines on what activities constitute a violation of the "cone of silence"?**

    Answer: See Section 2.11 of the ITN, as revised by Addendum #2. Additional information regarding the prohibition on ex parte communications is located in Section 1-110 of the JEA Procurement Code, available at: https://www.jea.com/About/Procurement/Purchasing_Code.aspx. Any communications between a Vendor (or a representative or agent of a Vendor) and any JEA board member, employee, agent, or representative of JEA (including without limitation the City of Jacksonville Mayor and City of Jacksonville Council Members, as described in Addendum #2), except for communications with the Designated Procurement Representatives as described in Section 2.1.1 of the ITN, or communications otherwise subject to an "Exclusion" as identified in Section 1-110(3) of the JEA Procurement Code, would potentially constitute a violation of the "cone of silence."

32. In addition, please list examples of specific activities that would not be considered a violation of the "cone of silence"? We assume that there is no prohibition on holding public discussions about the various recapitalization options and/or specific companies publicly stating their interest in participating in the bid process given the comment by Ms. Hodges that another specific company's public discussion of the JEA process on August 16th was not considered to be in violation of the cone of silence.

Answer: Correct. Public statements by vendors of their intent to respond to the ITN do not violate the cone of silence because they do not constitute a communication between the Vendor or its agents or representatives and any JEA board member, employee, agent, or representative.

33. The ITN requires the Respondent to maintain comparable employee compensation and benefits for three years. Please provide total compensation (including latest annual salary and short-term and long-term incentives) as well as benefits paid to all employees (including to officers and union and non-union employees) separated by each of the water, wastewater, electric and district energy segments. Also, please provide total short-term and long-term incentives paid to such employees for the past 3 years.

Answer: See Addendum 4 - Attachment 7- FY16 FY17 FY18 Salary and Benefits

34. Please confirm the current funding status and the size of JEA pension funding and employee retirement benefits that the Respondent will fund.

Answer: The payment required by Section 120.203(j) of proposed Ordinance 2019-566 is to be from the proceeds from the transaction received by JEA. Following a Recapitalization Event, and the payment of JEA of the contributions required by the ordinance, the GEPP's Unfunded Actuarial Accrued Liability shall be an obligation of the City of Jacksonville.

FAQ 19 provides that the Respondent will agree "that for at least three years following any transaction, all continuing full-time JEA employees will be provided with compensation and benefits that are substantially comparable, in the aggregate, to the compensation and benefits JEA provided to them immediately prior to the transaction occurring." This obligation is unrelated to any pension obligation.

FAQ 26 speaks to certain Other Post-Employment Benefits. The OPEB benefits are unrelated to pension obligations and are to "be assumed and fulfilled by the successful participant in this process."

35. Please confirm that Respondent's identity and/or the contents of Respondent's Reply will only be disclosed publicly by JEA after a Notice of Intent to Award is posted, or 30 days after the submission of the final Replies to the last Request for BAFO(s). Specifically, please confirm that Respondent's identity (and/or any portion of the contents of their Reply) will not be disclosed by JEA (whether in response to a public records request, or independently by JEA) (i) at the public meeting to formally receive Replies (described in Section 2.1.1 of the ITN), (ii) through the formal acknowledgement of Replies received (in Table 1: Timeline of Events, page 24 of the ITN), (iii) through the Posting of Notice of Intent to Negotiate (in Table 1: Timeline of Events, page 24 of the ITN) or (iv) at the public meeting of the Negotiation Team to discuss the recommended award (described in Section 2.1.3 of the ITN).

Answer: See Response to FAQ #11 on page 44 of the ITN and Section 2.8 of the ITN. It is the intent of JEA that the identity and contents of Respondent's Reply will not be publicly disclosed until the earlier of the posting of a Notice of Intent to Award or 30 days after the submission of the final Replies to the last Request for BAFO(s). Notwithstanding the foregoing, the public meeting of the Negotiation Team to discuss the Recommended Award may include public discussion of the Reply(s) then under consideration for award. However, JEA anticipates, at this time, that such meeting will likely occur on the same day, or in close temporal proximity to, the date on which the Notice of Intent to Award is posted and such information would otherwise be subject to release.

36. JEA's charter prohibits awards to any business in which JEA officers or employees have a financial interest. Please confirm that the threshold for "financial interest" is a 5% interest as set forth in the Conflict of Interest Certificate.

Answer: Correct. Section 112.312(15), Florida Statutes, the Code of Ethics for Public Officers and Employees, defines a "material interest" as "direct or indirect ownership of more than 5 percent of the total assets or capital stock of any business entity."

37. What do you require from responders prior to the submittal? I have asked to be included on any updates and my request has been acknowledged.

Answer: There are no requirements from responders prior to the initial submission.

38. What is the total pension liability forecast or provide Statement/forecast of Pension liability?

Answer: Preliminary actuarial estimates are $132.3 million for the GEPP pension protection. This will be re-calculated contemporaneous with a transaction.

39. When was the last full Bond rating presentation and please provide the last Bond rating agency PowerPoint and supporting spreadsheets?

Answer: This information will be provided in the Negotiation Phase.

40. What reserve accounts does JEA maintain and what are the balances?

Answer: This information can be found in our monthly financial statements, which are provided with each board package and posted on our website at https://www.jea.com/About/Board_and_Management/Board_Meetings.

41. Provide a listing of all current Bonds owed and what are the balances?

Answer: This information can be found in our monthly financial statements, which are provided with each board package and posted on our website at https://www.jea.com/About/Board_and_Management/Board_Meetings.

42. What are the sources and uses of cash for 2017, 2018 and forecast for 2019?

Answer: This information can be found in our annual report, which can be found on our website at https://www.jea.com/About/Investor_Relations/Financial_Reports for 2017 and 2018. The 2019 forecast will be available to the bidders during the Negotiation Phase.

43. What is the fuel budget, fuel stabilization fund balance and fuel forecast for the coming year?

Answer: This information can be found in our Finance and Audit Committee Reports and Board packages, which are provided with each board package and posted on our website at https://www.jea.com/About/Board_and_Management/Board_Meetings.

44. How do the members of the Committee evaluate the ITN replies? Does each person on the committee review the full reply or is one person in charge of a certain ITN reply section or evaluation criteria?

Answer: Each Evaluation Committee member will evaluate the full Reply in accordance with Section 3.2.1 "Evaluation Committee" on page 34 of the ITN.

45. Subject to satisfying the minimum requirements of the ITN, would JEA consider a continued equity interest held by the City of Jacksonville as a strategic alternative that is aligned with JEA's stated process goals?

Answer: Yes, JEA will consider alternative structures that allow JEA to maximize customer, community, environmental, and financial value.

46. Will you provide JEA's estimates of the debt outstanding at year end FY 2020 and the associated debt defeasance costs of a potential take-private transaction? Can any debt be assignable to the new buyer?

Answer: See questions 1 and 21.

47. Will you clarify in the ITN the minimum requirement regarding the retirement obligation true-up?

- **a. Does JEA have an estimate of the cash cost required for this obligation?**
- **b. Would this cash cost be payable upon the closing of a transaction? Is it possible to defer any such payments?**
- **c. To whom would this cash be paid?**

d. Will you clarify your estimate of the increase in the annual pension expense that will be incurred by JEA as a result of any changes in the terms of employee pensions?

Answer:

A. Preliminary actuarial estimates are $132.3 million for the GEPP pension protection. This will be re-calculated prior to a transaction.
B. This would be required to be funded at the closing of a transaction.
C. The cash would be deposited in the City of Jacksonville's General Employees Retirement Plan.
D. JEA employees will no longer be eligible to participate in the current General Employee Retirement Plan under a non-governmental ownership structure. At this time, we do not have an estimate of costs associated with retirement benefits that may be offered as a non-governmental entity.

48. Subject to satisfying the minimum requirements of the ITN, would the JEA view a payment of the $400 million of value to customers over time in line with additional investment in the utility and associated increases in rates more favorably than an upfront payment of the $400 million of value to customers?

Answer: No.

49. Will you clarify and elaborate on whether ringfencing (structural protections to protect JEA from conflicting financial or strategic objectives of a new owner) is a requirement of meeting the Minimum Requirements? If so, please provide guidance on what ringfencing protections would be required.

Answer: There is no required corporate structure as part of the minimum requirements. Please refer to the ITN for minimum requirements.

50. Will you clarify and elaborate on whether the minimum requirement for >$3b value to the City is in the form of an upfront cash payment?

Answer: See Addendum 4 – Attachment 14 – Net Proceeds Calculation

51. Will you clarify whether the minimum requirement for >$3b value to City is a net proceeds figure after payment of certain items? Will you clarify and elaborate on the certain items and the quantum of such items?

Answer: Please see the response to question 21.

52. Will you confirm the discount rate used in estimating $2b of value to the City from existing contributions over a 20 year period?

Answer: JEA used an initial discount rate of 4% for purposes of this calculation and applied a 1.8x coverage factor to the 4%.

53. Will you clarify and elaborate on whether economic development funding, expanded employment, or increased tax receipts would be considered value to the City? If so, how would that value be quantified?

Answer: As described on page 35 of the ITN, criteria item #3, Respondents will be treated favorably for their willingness to make commitments to the City of Jacksonville.

54. Subject to satisfying the minimum requirements of the ITN, will JEA weigh value above the minimum requirements distributed to customers and the minimum requirements distributed to the city equally?

Answer: The Negotiation Team is not required to utilize numerical scoring and there are not assigned "weights" when determining best value. Consistent with Section 3.3.8 of the ITN, the Negotiation Team will determine the Reply that, as a whole, offers the best value based on the Selection Criteria.

55. In scoring the attractiveness of proposals under the evaluation criteria, will JEA take into account the empirical evidence of long-term job reductions at the headquarters of a utility acquired by a strategic acquirer (i.e. a larger utility) once any period of initial employment commitments expires?

Answer: The Evaluation Criteria that will be utilized in evaluating initial Replies are set forth in Section 3.2.3 of the ITN. In addition, as stated in Response to Question #54, consistent with Section 3.3.8 of the ITN, the Negotiation Team will determine the Reply that, as a whole, offers the best value based on the Selection Criteria.

56. Will JEA value proposals to extend contractually guaranteed base rate stability for customers beyond three years and/or limit future customer rate increases?

Answer: The Evaluation Criteria that will be utilized in evaluating initial Replies are set forth in Section 3.2.3 of the ITN. In addition, as stated in Response to Question #54, consistent with Section 3.3.8 of the ITN, the Negotiation Team will determine the Reply that, as a whole, offers the best value based on the Selection Criteria.

57. Will you clarify and elaborate on how JEA intends to facilitate the pairing of Respondents whose replies, while independently may not allow JEA to achieve its goals, may do so in combination with other potential Replies?

Answer: JEA intends to consider Replies received that may, in combination with other Replies received, satisfy the goals of the ITN and offer the best value. This will likely occur primarily in the Negotiation Phase of the ITN process. As JEA has not yet received Replies, it is not able to speculate at this time as to what Replies may ultimately be received or how any such Replies may complement one another.

58. Will you clarify and elaborate on whether the NDA to be signed by Vendors during the Negotiation Phase will allow Vendors to have discussions with other parties, including other Vendors, about a potential partnership arrangement?

Answer: Please see Addendum #2. It is anticipated that the NDA executed by Respondents will prohibit Vendors from having such discussions without JEA's prior consent.

59. Will you provide further details on the taxes that JEA currently pays (e.g., state gross receipt tax, city franchise fee, public service tax, sales tax, and income tax). Are these taxes fully passed through to customer bills? How do historical financials and approved budgets reflect these costs? Are these taxes incorporated into the calculation of EBITDA?

Answer: Florida Sales Tax – Florida Statutes Section 212 - JEA bills Sales Tax to its commercial electric customers and pays the amount billed to the State each month less any bad debt write-offs (less than 0.2%). When the Sales Tax is billed, it is charged to Sales Tax liability accounts. Revenue is not affected by Sales Tax. In addition to paying the Sales Tax billed, JEA is required to pay an estimated Sales Tax that is equal to 60% of the tax paid from the prior month. This estimated Sales Tax is charged to the Sales Tax liability account. The estimated Sales Tax reduces the tax liability shown in our financial statements. As of August 31, 2019 JEA has paid estimated sales tax of $1,472,000.

Public Service Tax – Florida Statutes Section 166.231 - JEA bills Public Service Tax (PST) to its electric and water customers and pays the amount billed to the each local municipality each month less any bad debt write-offs (less than 0.2%). When the PST is billed, it is charged to PST liability accounts. Revenue is not affected by PST. Each local municipality has the option of assessing a PST. Jacksonville assesses a PST on all electric billings and a PST on water. No other municipality in JEA's service territory has chosen to assess a PST on water.

Florida Gross Receipts Tax - Florida Statutes Section 203 - JEA bills Gross Receipts Tax (GRT) to its electric customers and pays the amount billed to the State each month less any bad debt write-offs (less than 0.2%). Florida Statutes Section 203 assesses the GRT against the utility not the customer. When GRT is billed to the customer it is charged to various electric revenue accounts. A journal entry is done each month equaling the amount of GRT billed to customers resulting in a GRT liability and expense in the GL. The GRT tax paid is equal to the liability recorded by the journal entry.

Franchise Fees and Agreements – Florida Statutes 180.16 - JEA bills Franchise Fees (FF) to its electric, water, and sewer customers and pays the amount billed to the local municipality each month less any bad debt write-offs (less than 0.2%). Each Franchise Agreement assesses the FF against the utility not the customer. When the FF is billed to the customer it is charged to various electric, water, and sewer revenue accounts. A journal entry is done each month equaling the amount of FF billed to customers resulting in a FF liability and expense in the GL. The FF paid is equal to the liability recorded by the journal entry. Jacksonville is the only municipality in JEA's service territory that assesses a FF on water and sewer. A copy JEA's Franchise Agreements is available upon request.

60. Will you clarify and elaborate on the property tax treatment post-privatization?

Answer: Currently, JEA owned assets located in Florida are not subject to property tax assessments. As a minority owner in Plant Scherer located in Georgia, JEA pays its proportionate share of property taxes, which are passed through to JEA as an operating expense. The treatment post-transaction will depend on the structure of the transaction.

61. Will the Florida Public Service Commission have immediate jurisdiction over the electric and water business, including the rates charged by each of these businesses?

Answer: The PSC will have jurisdiction over any post-transaction entity consistent with that entity's form and relevant state law. See ITN pp. 45, 49 and 51.

62. Will you clarify and elaborate on whether the Florida Public Service Commission will be involved in future phases of the ITN process. If so, would the Florida Public Service Commission provide clarity on what is the rate base and allowable costs as of the closing? Can future rates be agreed?

Answer: See response to FAQ #18 p. 45, #23 p. 49, and #27 p. 51 of the ITN.

63. Will you clarify and elaborate on what approvals by the Florida Public Service Commission and the Federal Energy Regulatory Commission, if any, would be required to close?

Answer: See response to FAQ #18 p. 45, #23 p. 49, and #27 p. 51 of the ITN.

64. Will you confirm and elaborate on what JEA's existing obligations with regards to the MEAG PPA. Do those obligations include additional capital contributions?

Answer: This information will be provided during the Negotiation Phase.

65. Will you confirm and elaborate on whether JEA has commissioned any analysis of how its rate base would be calculated under FPSC regulation? If so, please disclose that analysis.

Answer: This information will be provided during the Negotiation Phase.

66. Does the Conflict of Interest certification have to be signed even if there is no employee of JEA who owns the 5% or more of shares?

Answer: Yes. Please see Section 2.6 of the ITN.

67. If a bidder is open to being paired with the best fit to meet JEA's objectives, how will JEA facilitate any pairing process?

Answer: This information will be provided during the Negotiation Phase.

68. Please provide the current legal entity organizational structure for JEA, along with a description of which entities serve which business segment?

Answer: JEA is a body politic and corporate created and established under the laws of Florida. JEA serves all of its business segments.

69. What percentage of the Net Capital Assets is attributable to water versus wastewater segment?

Answer:

41% of Net Capital Assets is attributable to the Water System and 59% is attributable to the Wastewater System.

	Water	Wastewater	TOTAL
PLANT IN SERVICE:	1,833,787,499	2,659,421,987	4,493,209,657
ACCUMULATED DEPRECIATION:	(856,739,393)	(1,251,287,956)	(2,108,027,349)
CONSTRUCTION WORK IN PROGRESS:	122,049,305	175,631,927	297,681,233
TOTALS:	1,099,097,412	1,583,765,959	2,682,863,540

70. **Are there any contributed accounts included in Net Capital Plant at the water and wastewater segment? Does Net Capital Plant at the water and wastewater segment currently include any Contributions in Aid of Construction (CIAC) or other contributions from developers? If yes, what amount is considered contributed capital?**

    Answer:
    Contributions from developers are 10.5% of net plant assets ($272M/$2.6B) and 7.5% of gross plant assets ($360M/$4.8B).

    PLANT IN SERVICE - CIAC 360M
    ACCUMULATED DEPRECIATION -88M
    NET PLANT - 272M

71. **What is included in Other Revenue for the water and wastewater segment?**

    Answer: Other revenues include revenues related to tappings and connections, rental income, late fees, and other miscellaneous revenues that are not individually material.

72. **Would JEA be expected to pay ad valorem taxes if privatized? If so, please provide tax attributable to the electric, water and wastewater and district energy segments.**

    Answer: See response to question 60.

73. **Assuming the utilities are purchased by a private entity, we would like to know what property will be subject to property tax broken down by segment (electric, water, sewer, reuse) and including the estimated value.**

    Answer: It is likely that all JEA real property would be subject to ad valorem and other applicable taxes under a private ownership scenario. JEA owns property in Duval County, St. Johns County, Nassau County and Clay County, Florida, and Forsyth County, Georgia. The future assessed value of JEA's properties is dependent on a number of factors and assigning an estimated value of JEA's real property assets for an undetermined capitalization scenario would be speculative.

74. **Corporate structure (holding, controllate, ccontrollante)?**

    Answer: See response to question 68.

75. **Split of:**
    - **domestic/industrial customers (consume, #),**
    - **BT/MT/AT lines (km);**

    Answer: This information is provided at https://www.jea.com/About/

76. **Any employee medical insurance system?**

    Answer: JEA is self-insured and contracts with Florida Blue to manage three plans: PPO, HMO, HDHP

77. **If the collective contract exist; any trade unions?**

    Answer: JEA has contracts with five unions: IBEW, LIUNA, AFSCME, PEA and JSA.

78. **In case the referendum results is NO, what are the possible scenarios to proceed?**

    Answer: The Board of JEA may continue to evaluate other non-traditional responses, traditional responses, and/or status quo response.

79. **Any restrictions/specific requirements for foreign Co.?**

    Answer: Any Respondent is able to participate as long as it complies with all applicable laws.

80. Any specific additional licenses necessary in case of changing from Public to IOU?

Answer: There will be highly fact-specific federal, state, and local regulatory jurisdiction over any transition to an IOU. Additional information will be provided during the Negotiation Phase.

81. Any minimum level of quality of service required (SAIDI/SAIFI)?

Answer: There is no required level of SAIDI/SAIFI. JEA has internal goals for these metrics. Our current goals and actual levels are shown in the table below:

SAIDI: 75 (min) - Reliability Goals; 64.87 (min) - Actuals
CAIDI: 47 (min) - Reliability Goals; 49.73 (min) - Actuals
SAIFI: 1.6 - Reliability Goals; 1.3 - Actuals
SARFI-80: 45 - Reliability Goals; 31.59 - Actuals
(Current through August, 2019)

82. Does submitting a Reply with a partner permanently tie Respondent to that partner for the duration of the process or can partners change until a final proposal is submitted?

Answer: JEA has the discretion to evaluate for the best value of any Reply, per the language in the ITN.

83. How will JEA evaluate the impact of changes to rates (reductions or increases) for current customers above and beyond the three year period of guaranteed rate stability, including from years 4 onward?

Answer: See Section 3.2.3 of the ITN.

84. If a Respondent's proposal includes additional costs (such as profit on operating costs associated with using an O&M contractor or accelerated recovery of investment cost due to use of a lease or concession financing scheme), will JEA take that into account or will a proposal only be scored against the criteria as defined?

Answer: See Section 3.2.3 of the ITN.

85. How does JEA intend to evaluate the difference in responses that all meet the minimum requirements as set out by the ITN but have other material differences? Will this be part of the ITN submission or addressed as part of the next phase(s) of negotiation?

Answer: This information will be addressed during the Negotiation Phase.

86. If the Respondent does not have relevant expertise in a specific discipline (electric or water for example) is this an automatic disqualifier or will the rest of the proposal be scored?

Answer: No, all Replies will be evaluated against the Mandatory Requirements listed in Section 3.1.1 Table 3, on page 33 of the ITN.

87. How much of existing O&M does labor / staff expenses represent?

Answer: Labor / staff expenses, including both salaries and benefits, represent 59-62% of existing O&M expense over the last three fiscal years. Note that this may not represent total labor / staff disbursements as portions of those disbursements may be capitalized.

88. How much of existing Net Capital Assets is comprised of capitalized labor costs (direct labor and benefits)?

Answer: This information is not available.

89. Sec. 3.3.8.D. provides that following the Negotiation Team's recommendation, the Board of Directors will make the final decision as to which respondent should be selected for award. Once the JEA Board does that, does the award then go to the City Council for approval and, if approved, is it then subject to approval through the public referendum before it is final? That is, is that process carried out contemporaneously with the parties' application

and pursuit of all regulatory approvals? Or is sign off by the City Council and/or the public referendum deferred until later in the process?

Answer: Approval of City Council as well as referendum approval would follow as requisite next steps to JEA Board approval.

90. In the timing sequence, when would the final contract be executed by JEA and the Respondent? Would that take place prior to seeking any regulatory approvals or clearances, such as DOJ/FTC and FERC, as well as determination of the Respondent's state ratemaking matters, such as rate base, ROE and other matters before the FPSC?

Answer: It is anticipated that the final contract will be executed contemporaneously with the posting of Notice of Intent to Award and prior to seeking regulatory approvals or clearances and determination of matters before the PSC.

91. Sec. 3.3.8.E provides that subsequent to the Solicitation Process, "[a]ny final selection and award may be subject to not only additional Board of Directors action, but also additional approvals as set forth in federal, state and local law." What additional Board of Directors actions are anticipated after the approval described in Sec. 3.3.8.D. is obtained?

Answer: At this point in time, JEA does not anticipate any additional Board of Directors action beyond the approval process described in Section 3.3.8.D; however, depending on what direction the Board elects to take, further Board action may be required.

92. In the event the preferred transaction takes the form of a purchase and sale of all of JEA's assets, is it anticipated that JEA and Respondent will need to negotiate the details of the rate structure and specific terms that Respondent would submit to the FPSC as part of the negotiation of the purchase and sale agreement?

Answer: See response to question 62.

93. Please confirm that prior to the posting of a Notice of Intent to Award (Sec. 2.8), a Respondent's Replies will be protected from public disclosure and will not be made available to other Respondents. Is it possible that certain information in the Replies could be subject to public disclosure earlier, pursuant to Section 3.3.4A.? Under Sec. 2.13 Negotiation Phase, please clarify whether JEA will announce the names of the entities selected for negotiation before negotiations begin.

Answer: See Response to FAQ #11 on page 44 of the ITN and Sections 2.8 and 3.3.4 of the ITN. It is the intent of JEA that the identity and contents of Respondent's Reply will not be publicly disclosed until the earlier of the posting of a Notice of Intent to Award or 30 days after the submission of the final Replies to the last Request for BAFO(s). Notwithstanding the foregoing, the public meeting of the Negotiation Team to discuss the recommended award may include public discussion of the Reply(s) then under consideration for award. However, JEA anticipates, at this time, that such meeting will likely occur on the same day, or in close temporal proximity to, the date on which the Notice of Intent to Award is posted and such information would otherwise be subject to release.

94. Will all of the proposed "alternative structures" be made public during the process? Will Respondents ultimately be required to bid on an identical structure prior to award?

Answer: See Response to FAQ #11 on page 44 of the ITN, Sections 2.8 and 3.3.4 of the ITN, and Addendum 1 to the ITN. JEA intends to evaluate a range of potential alternatives, including assessing Replies that, while independently may not allow JEA to achieve its goals, may do so in combination with other potential Replies. Replies that may not individually satisfy all of the Evaluation Criteria completely may nonetheless provide the opportunity for JEA to achieve its goals when paired with other Replies.

95. Please provide more detail on the timeline from the ITN phase through to transaction close, including all stages anticipated in the bidding and approval process.

Answer: The timeline of events through the anticipated dates for the Negotiation Phase is provided in Section 2.2 Table 1 on page 24 of the ITN. Information on the timeline of events after the commencement of negotiations through the transaction close will be provided during the Negotiation Phase.

96. Please confirm that during the phase in which JEA will seek revised Replies, Respondents will receive access only to a confidential information presentation and certain financial projections, and only after revised Replies will qualified Respondents receive access to a full virtual data room containing JEA contracts, financing agreements, land and other real estate rights, litigation materials, and other similar types of confidential information typically relevant to a large-scale asset transaction. Sec. 3.3.3. See Q&A 22 in the ITN.

Answer: Confirmed.

97. How much time does JEA anticipate that Respondents will have in the data room before further refining their Replies?

Answer: This period will be determined by JEA's Negotiation Team per Section 3.3.3 on p. 37 of the ITN.

98. Will the Evaluation Committee Members' names be made public before a decision is made by them? Will the persons or entities assisting the Evaluation Committee Members names be made public before a decision is made by the Evaluation Committee?

Answer: At this time JEA does not intend to publicly disclose the names of Evaluation Committee Members or Subject Matter Experts prior to the Evaluation Phase occurring.

99. Will the names of the JEA Negotiation Team be made public prior to the start of negotiations?

Answer: At this time, JEA does not intend to publicly disclose the names of Negotiation Team Members prior to the Negotiation Phase occurring. However, JEA may identify the members of the Negotiation Team to vendors selected for negotiations in advance of the first negotiation session.

100. Will there be any document created to explain the recommendation of the Negotiation Team concomitant with the recommendation, or will the name of the entity simply be forwarded?

Answer: The Board will be provided all information necessary and appropriate to make an informed decision on the Negotiating Team's recommendation.

101. After the scores by the Members of the Evaluation Committee are compiled, will the scores be announced before negotiations begin?

Answer: The evaluation phase scoring will be utilized to compile a Respondent Shortlist, as described in Section 3.3.1 of the ITN. At this time, JEA does not anticipate publicly releasing Evaluation Phase scoring prior to the commencement of the Negotiation Phase.

102. Who within JEA will determine the competitive range within which to cut off the scores for negotiation? How will that decision be reached?

Answer: JEA's Chief Procurement Officer will make this determination using the guidelines provided in Section 3.3.1 on page 36 of the ITN.

103. How will JEA measure the $3 billion of value to the City of Jacksonville? Assuming an upfront payment for JEA, what are the required adjustments to get from upfront payment to "unencumbered cash" value to the city of Jacksonville?

Answer: Please see response to question 21.

104. Q&A No. 19 provides for the minimum requirement to distribute more than $400 million in value to JEA's customers, stating that "[a]ll such rebates will be paid by JEA out of the proceeds of the transaction." Would this requirement be satisfied if, instead of building such value into the purchase price and having JEA make such rebates, Respondent provided for a structure whereby it provided for a multi-year rate credit to customers post-closing having a net present value greater than $400 million?

Answer: Please see response to question 48.

105. Is there a preference to keep the water and wastewater business combined with the electric business?

Answer: JEA will consider alternative structures that allow JEA to maximize customer, community, environmental, and financial value.

106. How is the prospective ballot initiative to amend the FL constitution to allow for electric competition expected to impact the process?

Answer: JEA's procurement process is not impacted by prospective ballot initiatives.

107. What portion of water and wastewater gross and net plant is comprised of contributions from developers and other?

Answer: See response to question 70.

108. Does JEA anticipate any increases in electric or water rates prior to transaction close? I.e. will the base rate freeze be off current rates or some future rate?

Answer: As we do not know the expected closing date, JEA is unable to determine this at this time. The requirement to maintain stable base rates is based on the time of closing.

109. If JEA remains under municipal ownership, will the debt service obligations require remediation of a portion of the Vogtle debt in order to achieve tax compliance with MEAG's financing of Project J? If so, what is the expected amount of remediation that will be required? Will any remediation of outstanding debt be required if JEA is acquired?

Answer: We cannot determine at this time what remediation (if any) would be required under the MEAG Power Project J debt. As described in the ITN, JEA does not anticipate that any transaction will be structured in a manner that would violate the terms of the PPA. Additional details may be discussed with Respondents who ultimately proceed to the Negotiation Phase.

110. How does JEA intend to use the Nonfuel Purchased Power Stabilization Fund in the ramp up to the Vogtle PPA?

Answer: The non-fuel purchased power stabilization fund is eligible for use for Vogtle related costs.

111. Please provide an updated principal and interest payment schedule and O&M cost estimate for the Vogtle PPA. How is the PPA "margin" calculated?

Answer: The latest MEAG Power Project J debt service schedule is contained in the JEA 2018 Annual Report. Project J projections will be made available during the Negotiation Phase.

112. Is there a legal opinion or other confirmation that: (1) MEAG is entitled to claim nuclear PTCs pursuant to section 45J of the Internal Revenue Code, and (2) MEAG can validly transfer or sell its allocable share of nuclear PTCs to another party? If so, please provide.

Answer: Please refer to page 2 of the attachment for MEAG Power's recent disclosure, which is an excerpt of its Preliminary Official Statement dated September 11, 2019, for a description of the nuclear PTCs. Further details regarding MEAG's estimated potential proceeds from the sale of the PTCs can be found throughout the Preliminary Official Statement. See Addendum 4 - Attachment 13 – MEAG

113. Please clarify what JEA expects of Respondents with respect to pension obligations? The JEA Board of Directors has approved legislation for introduction to the Jacksonville City Council that, if approved, would satisfy the goal to "protect certain employee benefits." Is the Respondent expected to fund the additional benefits or would benefits be paid out of proceeds to the City? Is there an estimated cost for the legislation? Are there any other liabilities if JEA withdraws from the City of Jacksonville pension plan?

Answer: The payment required by Section 120.203(j) of proposed Ordinance 2019-566 is to be from the proceeds from the transaction received by JEA. Following a Recapitalization Event, and the payment of JEA of the contributions required by the ordinance, the GEPP's Unfunded Actuarial Accrued Liability shall be an obligation of the City of Jacksonville.

FAQ 19 provides that the Respondent will agree "that for at least three years following any transaction, all continuing full-time JEA employees will be provided with compensation and benefits that are substantially comparable, in the aggregate, to the compensation and benefits JEA provided to them immediately prior to the transaction occurring." This obligation is unrelated to any pension obligation.

FAQ 26 speaks to certain Other Post-Employment Benefits. The OPEB benefits are unrelated to pension obligations and are to "be assumed and fulfilled by the successful participant in this process."

114. Please estimate the amount of funds necessary at closing of a transaction to true up the pension for the changes in service credit and vesting period authorized by the Board for execution upon the close of a sale transaction.

Answer: Preliminary actuarial estimates are $132.3 million for the GEPP pension protection. This will be re-calculated prior to a transaction.

115. Is there a schedule of the anticipated cost to defease the $3.6bn of long-term debt in the context of a transaction type in which the debt must be retired? If so, please provide.

Answer: Please see response to question 1.

116. Has JEA evaluated how franchise tax, public service tax, and payments in lieu of taxes would change upon a conversion of the utility systems to an investor owned utility format?

Answer: Tax treatment post-transaction will depend on the structure of the transaction.

117. Have Nassau or St. Johns Counties indicated whether they might be interested in exercising their option to acquire the municipal water and sewer systems if there is a change in JEA ownership?

Answer: JEA's material contracts and related information will be available during the Negotiation Phase.

118. Please provide an estimate of water and wastewater net plant attributable to Nassau and St. Johns counties.

Answer: Please see response to question 24.

119. Please confirm that the City of Jacksonville will continue to purchase power, gas, water and sewer services from JEA under an exclusive long term supplier and services agreement post close. If not, how will the city contract for these future services?

Answer: JEA's franchised exclusive service territory for electric, water and sewer services include the City of Jacksonville.

120. Please confirm status for federal tax purposes. If JEA is a tax-exempt entity, has JEA obtained a determination letter from the IRS confirming tax-exempt status?

Answer: See Addendum 4 - Attachment 8 - IRS Letter Tax Status and Addendum 4 - Attachment 9 - JEA tax exemption certificate. JEA is currently a tax-exempt entity.

121. Please provide information on the represented workforce. What percentage of the workforce is represented? How many contracts? In general, what is the state of labor relations with the represented workforce?

Answer: 78% of the workforce is represented with five bargaining units, each with its own contract. Relations are generally good with the unions and the represented workforce.

122. As definitions will vary among jurisdictions, please define what resources qualify as "renewable" for fulfillment of the commitment to develop and provide the City of Jacksonville and the Duval County Public School system with 100% renewable electricity by the year 2030. Does "City of Jacksonville" mean governmental facilities only?

Answer: See the definition of renewable used by the US Energy Information Agency: Biomass; hydropower; wind; solar; and geothermal. https://www.eia.gov/energyexplained/renewable-sources/

123. For fulfillment of the commitment to develop and provide the City of Jacksonville and the Duval County Public School system with 100% renewable electricity by the year 2030, is there a desire to have this renewable commitment satisfied by new resources (i.e., is the desire to be able to make claims that JEA caused these renewable resources to get built), or could this requirement be satisfied with existing system resources, outside of JEA service territory? What is the projected City load by 2030? How much of the renewables have already been procured (e.g. 250 MW solar) and at what price?

Answer: The party providing the City the renewable electricity can determine the best manner in which to provide it. None of the current renewable portfolio is dedicated to COJ or DCPS. The current demand for COJ and DCPS is approximately 350,000 MWh (from 2019 ADR).

124. Please state any preference for technology type (utility scale solar, behind-the-meter solar, wind, biomass, etc.) or location (within JEA territory, within FRCC, within SERC, etc.) for fulfillment of the commitment to develop and provide the City of Jacksonville and the Duval County Public School system with 100% renewable electricity by the year 2030.

Answer: JEA has no preference for technology type and will consider all technology types.

125. What are the current applicable tariff rates for 100% renewable electricity and alternative water referenced in the footnote to the minimum requirements?

Answer: The intention is that these will be provided at the same rates as non-renewable and non-alternative sources. The City will not be receiving free service.

126. Under privatization, will the City be responsible for any pre-existing environmental liabilities associated with the CCRs at the SJRPP and Northside sites?

Answer: Successorship environmental liability associated with JEA property, if any, would be highly fact specific and may be discussed during the Negotiation Phase.

127. Are there any ongoing disputes over subsurface water rights associated with the water and sewer system? If so, please provide additional detail.

Answer: Florida law dictates that water is a “public resource” and there is generally no private ownership of water. Use of Florida water is permitted under Chapter 373 of the Florida Statutes. Groundwater in Florida belongs to the State. JEA is given the right to withdraw groundwater through a Consumptive Use Permit (CUP), granted by the St Johns River Water Management District.

128. Please provide a description of any material contracts that could not be assumed by an investor owned utility.

Answer: JEA's material contracts will be available during the Negotiation Phase.

129. Please provide copies of any long-range studies to develop alternative water supply capacity for Northeast Florida or within the JEA service territory.

Answer: JEA is currently under contract with CDM-Smith to conduct a comprehensive Integrated Water Resource Plan (IWRP) that will evaluate all available options for water supply sources, systems and strategies to cost-effectively meet our current and future demands. The IWRP is scheduled for completion in September 2020 (Scope of work attached). Flexibility, reliability, sustainability and cost-effectiveness will be weighed for each alternative.

Prior to the current effort, JEA completed a more limited scope IWRP in 2013 (Attached).
See Addendum 4 - Attachment 11 - IWRP_Final_Report and Addendum 4 - Attachment 12 - JEA_2019_IWRP_DSM_SOW_05-MAR-2019

130. Please provide an estimation of the lead service line (LSL) numbers in JEA's footprint and any steps taken to minimize the potential risks associated with a potential state wide mandate to replace LSL systems.

Answer: JEA’s policy is to replace LSL as they are found during routine or non-routine pipe repairs or replacements. JEA’s system is in compliance with the current Pb/Cu rule and there have been no indications of a systematic issue anywhere

within the distribution system. If a customer is concerned, JEA has implemented free in-house sampling. To date, there has not been a residence tested that has exceeded the MCL. JEA is prepared to meet all requirements of the Pb/Cu rule revisions anticipated to be finalized by the end of 2019.

131. Please provide the amount of FEMA dollars that have been provided to JEA over the past 5 years, a description of the process undertaken to secure FEMA funds, and an estimate of outstanding amounts due from FEMA and how those would be treated upon a transaction whereby JEA is sold to a private sector entity.

Answer:
THE FEMA/FDEM REIMBURSEMENT PROCESS:

1. Storm occurs and JEA begins repairing damaged equipment and documents the costs involved with these emergency/permanent repairs. JEA is responsible for paying all costs of restoration out of JEA's operating budget. JEA is eligible to apply for reimbursement for a portion of some of those costs; however, JEA will never receive 100% of its out of pocket costs. A breakdown is as follows:
FEMA Obligation = 75.0%
FDEM Obligation = 12.5%
JEA Obligation = 12.5%

2. Once all of the costs are assembled by JEA and submitted to FEMA through the FEMA Portal, the costs are reviewed and any additional information necessary to complete FEMA's file are provided by JEA. Once these costs are approved, FEMA/FDEM will reimburse JEA per the breakdown above.

3. Since JEA was an eligible applicant for FEMA funding for Hurricane Matthew and Hurricane Irma and all of the work was completed prior to any potential purchase, there should not be any issue with collecting FEMA funding, regardless of whether JEA is sold to a private sector entity.

Matthew:
Total FEMA Claim: $10,426,564
Paid to Date: $6,769,012

Irma:
Total FEMA Claim: $14,116,608
Paid to Date: $70,582

132. Please provide a summary of discussions with any parties interested in acquiring the SJRPP site or any internal feasibility studies for re-purposing the site.

Answer: JEA has had discussions with interested parties regarding SJRPP and its future development. JEA RFP 136-19, Real Estate Redevelopment Services, will provide JEA the ability to work with consulting engineers and land planners to create development alternatives and provide marketing support to maximize SJRPP's value. See response to question 25.

133. Please provide a brief overview of any utility of the future programs that exist (microgrids, ADMS, storage, EVs etc.)

Answer: JEA has the following programs underway: Residential Battery Storage Program, JEA Residential Connected Home Energy Management System (Real Time Demand based), Electrification, Commercial & Residential EV's (fleet and residential), Smart City and Autonomous Vehicle pilot/testing partnerships. In addition, we are researching several utility scale storage and utility scale solar projects. SOCC has an ADMS system in development and is still under control of the vendor. JEA is researching the possibility of installing a microgrid.

134. Are there any other counties that have purchase rights subject to a JEA change of control, similar to the purchase rights for the water / wastewater assets in the Nassau and St. Johns Interlocal Agreements?

Answer: JEA believes those are the only interlocal agreements with change of control provisions; however, material contracts will be available for bidder review during the Negotiation Phase.

135. Electric system - What else is collected through the fuel charge to customers? Capacity charge?

Answer: The following are collected: Natural gas pipeline capacity and reservation charges, fuel handling costs, rail car expenses, costs of fuel additives such as limestone etc, cost of Solar PPA's, cost of short-term market power purchases.

136. Water / wastewater / reuse rates

a. Please provide rate increase history for past 10 years for water, sewer and reuse.

Answer: See Addendum 4 - Attachment 10 - JEA Master Rates History File

137. What special contracts does JEA have with customers? Please provide each customers' billing determinants (separately by account by rate schedule) and revenue detail by charge for the most recent 12-month period available.

Answer: These will be provided during the Negotiation Phase.

138. In formulating the goal to deliver >$3bn of value to the City, has JEA incorporated one-off costs associated with the proposed transaction (e.g. defeasance costs for municipal debt)?

Answer: The net proceeds to the City will be after all other transaction costs and minimum requirements are met, such that total enterprise value, in addition to any net working capital that is released as part of the transaction, will need to be sufficient to pay for customer rebates of at least $400 million, employee retention payments estimated to be $165 million, employee pension protection estimated to be $132 million, all legal and advisory transaction costs incurred by JEA and pay off all of JEA's debt obligations and any other liabilities that are not assignable (these would include things like interest rate and commodity hedges). A total defeasance cost for the debt obligations and non-assignable liabilities is estimated to be $3.5 to $4.0 billion as of 12/31/2020.

139. How does the City of Jacksonville intend to maintain ongoing oversight and monitoring of JEA's operations post transaction?

Answer: Following any transaction, relevant federal, state, and local regulatory jurisdiction would apply. Particular ongoing oversight and monitoring will be based upon the ultimate structure of a transaction, if any.

140. Please describe JEA's current relationship with the Florida Public Service Commission (FPSC). Specifically: Have JEA and the FPSC had any discussion about the regulatory process and framework likely to apply to JEA under private ownership? What guidance, if any, has the FPSC provided?

Answer: See response to FAQ #23 on p. 49 of the ITN.

141. Will potential purchasers have the opportunity to engage in consultation with the FPSC in relation to the transaction during the Negotiation Phase?

Answer: No, the signed NDAs during the Negotiation Phase will prohibit discussion of confidential information in relation to this transaction.

142. Does JEA consider the presence of multiple utility operators under the jurisdiction of the FPSC to be constructive for customer and community outcomes? Will potential benefits to customers, via greater diversity of utility operators, be considered in the Evaluation Criteria?

Answer: The Evaluation Criteria that will be utilized in evaluating initial replies are set forth in Section 3.2.3 of the ITN. In addition, as stated in Response to Question #54, consistent with Section 3.3.8 of the ITN, the Negotiation Team will determine the Reply that, as a whole, offers the best value based on the Selection Criteria.

143. What are the City's expectations for base rate stability after the initial 3-year period, given JEA is targeting significant capex investment of $2.6bn over the next 5 years and is expected to be subject to a customary regulatory framework under the FPSC?

Answer: These will be provided during the Negotiation Phase.

144. Per footnote 1 on p 21 of the ITN, "Renewable electricity and alternative water to be provided at new or existing tariffs at a price equal to or less than the applicable tariff rate." How does JEA define "applicable tariff rate" for these purposes and over what period of time is this restriction to apply?

Answer: See response to question 125.

145. Can JEA please provide an update and additional details on the ongoing MEAG litigation referenced in the ITN? What further detail will be provided before ITN Replies are due on October 7, 2019?

Answer: These will be provided during the Negotiation Phase.

146. To what extent do JEA's debt service obligations under the Vogtle PPA extend to each of the financing instruments issued as Project J debt (including Build America Bonds, Tax Exempt Bonds and other financing facilities)?

Answer: In accordance with the stated terms of the PPA, JEA shall make payments to MEAG's Project J entity for certain amounts which include, but are not limited to, amounts equal to debt service on Project J bonds for the first 20 years. All Project J bonds are debt obligations of MEAG and/or its member cities.

147. Are JEA's total debt service obligations on Project J debt captured on page 26 of JEA's Annual Disclosure Report (fiscal year ended September 30, 2018)? Or does this refer to obligations relating only to a portion of the Project J debt? If the latter, please provide JEA's total projected net debt service obligations.

Answer: The table on page 26 of JEA's Annual Disclosure Report contains JEA's Project J debt obligations for the first 20 years on the total Project J debt issued through September 30, 2018. JEA's share of projected Project J debt service will be disclosed during the Negotiation Phase.

148. Do the legal theories that challenge the authority and validity of the Vogtle PPA apply to other PPAs entered into by JEA?

Answer: No.

149. What volume forecasts are underpinning JEA's expectations for a 26-55% increase in rates over the next decade – is this management's base case or a downside scenario?

Answer: This information will be provided during the Negotiation Phase.

150. In the July 23 Board Presentation (page 16), JEA forecast an 8% decline in energy sales (2019-2030) – how has JEA developed this forecast? Is there a market-based report supporting these forecasts that will be available to potential purchasers?

Answer: This information will be provided during the Negotiation Phase.

151. What are JEA's current projections for customer owned and generated power and their impact on energy sales and revenues?

Answer: This information will be provided during the Negotiation Phase.

152. How much capital expenditure will be required to maintain JEA's water supply capacity?

Answer: This information will be provided during the Negotiation Phase.

153. Given that the Floridan Aquifer "should be capable of meeting JEA's needs well into the future", why is it necessary to provide 40 MGD of alternative water supply by 2035?

Answer: The commitment to alternative water supplies is a long-term effort to provide diversified sources for water supply. Aquifer recharge, wetland treatment and potable reuse are the most promising alternative water supplies and all are being studied by JEA to ensure the future sustainability of the resource. JEA also has an aggressive demand side management program (conservation, etc.) to ensure the most efficient use of potable water. It is JEA's position to plan for these

alternatives now instead of reacting to a crisis that has happened in several areas of the U.S. These alternative water supplies can be implemented incrementally should requirements change in the future.

154. What restrictions (if any) are likely to apply to JEA's operations under private ownership (e.g. nature of business activities and geography)?

Answer: See Response to FAQ #18 on page 45 and 27 on page 51 of the ITN.

155. What is the estimate of free cash flow for the last 3 years and please provide a detailed current income statement?

Answer: JEA's financial statements are broadly available and can be found on our website at https://www.jea.com/About/Investor_Relations/Financial_Reports

156. What are current numbers or ratios that are benchmarked and what are those benchmarks?

Answer: Please refer to the monthly Board package for JEA Monthly Financial and Operations Dashboard.

ACKNOWLEDGE RECEIPT OF THIS ADDENDUM ON THE BID FORM

Attachment 1

Defeasance Summary

	October 15, 2019	December 31, 2020	
Electric System			
Par Defeased	**48,070,000**	**1,599,160,000**	
Sources:			
Senior Lien Accrued Interest	-	7,482,748	
Subordinate Lien Accrued Interest	88,070	10,085,231	
Accrued 2021 Principal (3 months Senior)		6,075,000	
Accrued 2021 Principal (3 months Sub)		8,710,000	
Debt Service Reserve Fund Release	-	60,580,000	
Funds Required for Defeasance	54,917,161	1,770,005,509	
Total Funds Required for Defeasance	55,005,231	1,862,938,488	
Uses:			
Swap Termination Payment	-	105,763,000	
SLGS Purchases	55,005,231	1,757,175,488	
Total Uses of Funds	55,005,231	1,862,938,488	$263,778,488
Water and Sewer System			
Par Defeased	**45,425,000**	**1,262,665,000**	
Sources:			
Senior Lien Accrued Interest	43,238	12,089,443	
Subordinate Lien Accrued Interest	31,221	2,073,311	
Accrued 2021 Principal (3 months Senior)		1,730,000	
Accrued 2021 Principal (3 months Sub)		612,500	
Senior Lien Debt Service Reserve Fund Release	-	74,970,000	
Subordinate Lien Debt Service Reserve Fund Release	-	13,465,000	
Funds Required for Defeasance	48,095,306	1,336,735,611	
Total Funds Required for Defeasance	48,169,765	1,441,675,865	
Uses:			
Swap Termination Payment	-	27,433,000	
Cash Deposit	1	-	
SLGS Purchases	48,169,764	1,414,242,865	
Total Uses of Funds	48,169,765	1,441,675,865	179,010,865
St. Johns River Power Park System			
Par Defeased		**251,765,000**	
Sources:			
Accrued Interest		2,473,485	

Accrued 2021 Principal (3 months)	3,543,750	
Debt Service Reserve Fund Release	12,400,000	
Funds Required for Defeasance	238,623,760	
Total Funds Required for Defeasance	257,040,995	
Uses:		
SLGS Purchases	257,040,995	
Total Uses of Funds	257,040,995	5,275,995

Bulk Power Supply System				
Par Defeased			**81,885,000**	
Sources:				
Accrued Interest			874,606	
Accrued 2021 Principal (3 months)			1,770,000	
Debt Service Reserve Fund Release			4,850,000	
Funds Required for Defeasance			81,531,055	
Total Funds Required for Defeasance			89,025,661	
Uses:				
Cash Deposit			1	
SLGS Purchases			89,025,660	
Total Uses of Funds			89,025,661	7,140,661
District Energy System				
Par Defeased			**31,410,000**	
Sources:				
Accrued Interest			313,473	
Accrued 2021 Principal (3 months)			442,500	
Funds Required for Defeasance			32,600,440	
Total Funds Required for Defeasance			33,356,413	
Uses:				
Cash Deposit			1	
SLGS Purchases			33,356,412	1,946,413
Total Uses of Funds			33,356,413	
	Principal Balance @ 12/31/2020	$3,226,885,000	***$3,684,037,420***	***$457,152,421***
			Swap Termination Payments	$133,196,000
			Gross Defeasance Cost	323,956,421
			Accrued Interest Credit	(35,392,296)
			Accrued Principal Credit	(22,883,750)
****Preliminary, subject to change*			DSRF Release Credit	(166,265,000)
Rates as of 8/12/19			Net Defeasance Cost	$99,415,375

JEA

U S Navy - Zip Code 32233 - Mayport - Electric Revenues and Taxes

Calendar Year	Electric Revenue	Jacksonville Franchise Fee	Florida Gross Receipts Tax	Grand Total
2009	$ 14,812,536	$ 35,878	$ 380,728	$ 15,229,142
2010	13,369,122	32,217	343,624	13,744,963
2011	14,730,969	30,015	378,486	15,139,471
2012	12,333,364	29,653	317,000	12,680,017
2013	11,451,506	30,567	294,412	11,776,486
2014	11,724,791	29,560	301,393	12,055,744
2015	10,459,438	26,940	268,881	10,755,259
2016	11,557,076	26,060	297,003	11,880,139
2017	10,360,550	29,001	266,398	10,655,949
2018	9,618,460	20,910	247,163	9,886,533
2019 8/14/2019	6,882,355	-	176,471	7,058,825
Grand Total	$ 127,300,168	$ 290,801	$ 3,271,560	$ 130,862,529

Navy is exempt from Public Service Tax and Sales Tax

JEA

City Of Atlantic Beach - Electric Revenues and Taxes

Calendar Year	Electric Revenue	Atlantic Beach Franchise Fee	Florida Gross Receipts Tax	Atlantic Beach Public Service Tax	Florida Sales Tax	Grand Total
2009	$ 14,157,926	$ 890,706	$ 386,780	$ 440,069	$ 237,605	$ 16,113,087
2010	14,624,838	922,903	399,554	496,263	228,265	16,671,823
2011	14,403,243	907,455	393,497	475,366	221,203	16,400,765
2012	13,185,834	832,895	360,236	459,181	211,268	15,049,415
2013	12,611,539	799,269	344,543	459,565	224,128	14,439,044
2014	13,092,463	830,700	357,643	475,355	178,294	14,934,455
2015	12,510,175	793,455	341,706	476,717	205,922	14,327,974
2016	12,955,440	822,444	353,862	487,001	210,288	14,829,034
2017	12,287,451	778,811	335,567	485,725	200,939	14,088,494
2018	12,739,725	808,345	347,897	503,985	201,761	14,601,712
2019 8/13/2019	7,241,377	458,827	197,738	286,366	114,768	8,299,076
Grand Total	$ 139,810,012	$ 8,845,811	$ 3,819,024	$ 5,045,592	$ 2,234,441	$ 159,754,880

Question #13 Answer:

JEA Annual Revenue Projection

Dark Fiber Utility Services *(Existing Program Offering)*

Annual Revenue Forecast	2017	2018	2019	2020	2021	2022
Dark Fiber Leasing Revenues[1]	**$ 1,897,227**	**$ 1,974,901**	**$ 2,023,450**	**$ 2,078,719**	**$ 2,135,646**	**$ 2,194,282**
50-mile ring lease[2]	$ 1,718,990	$ 1,770,559	$ 1,823,676	$ 1,878,386	$ 1,934,738	$ 1,992,780
High Speed Fiber Business[3]	$ 6,365	$ 6,000	$ 6,180	$ 6,365	$ 6,556	$ 6,753
5 Aggreements with Private Fiber Business[4]	$ 40,817	$ 60,214	$ 62,377	$ 62,750	$ 63,135	$ 63,532
Downtown duct bank[5]	$ 120,672	$ 120,672	$ 120,672	$ 120,672	$ 120,672	$ 120,672
Public Web Provider	$ 10,383	$ 10,545	$ 10,545	$ 10,545	$ 10,545	$ 10,545

Notes and Assumptions - Dark Fiber

1: Dark Fiber revenues increase based upon rate escalation in contracts, new contract opportunities, and expiration of joint-use agreements leading to new revenue.

Question #14 Answer:

JEA Current and Projected Revenues

Utility Pole Attachments

Annual Revenue Forecast	2017	2018	2019	2020	2021	2022
Utility Pole Attachment Revenues[1,2,3]	**$ 4,830,156**	**$ 4,821,332**	**$ 5,081,472**	**$ 5,349,416**	**$ 5,509,898**	**$ 5,675,195**

Notes and Assumptions - Utility Pole Attachments

1: Pole attachment revenue increases due to standard agreement with 3% escalator and new attachers; standard agreement in place across 10 attaching entities.

2: JEA Pole attachment rent rates calculated via APPA cost-based formula.

3: JEA is conducting a Pole Attachment Inventory in 2019 which may find unbillable revenues. This would include back billing.

JEA Current and Projected Revenues

Wireless Colocation Utility Services (Including Small Cell Facilities)

Annual Revenue Forecast	2017	2018	2019	2020	2021	2022
Wireless Colocation Leasing Revenues[1]	**$ 1,762,504**	**$ 1,877,202**	**$ 1,963,460**	**$ 2,090,262**	**$ 2,249,272**	**$ 2,413,043**
Wireless Colocation (Communication Towers and Electric Transmission Structure CoLo Rent)[1]	$ 1,762,504	$ 1,873,494	$ 1,947,367	$ 2,025,262	$ 2,144,272	$ 2,268,043
Small Cell Rent		$ 3,708	$ 16,093	$ 65,000	$ 105,000	$ 145,000

Notes and Assumptions - Wireless Colocation

1: Wireless Colocation revenues include macro-site (tower and transmission) rent.

Wireless colocation line of business does not incur capital costs; lessees pay all costs of construction.

Question #15 Answer:

Site Name	Address	Latitude	Longitude	Year Erected	Projected Replacement Date	Scheduled Replacement	Site Elevation (AMSL)	Total Structure Height Including Appurtenances (AGL)	Overall Height (AMSL)	Owner	Tower/Structure Type	Facility Type	Capacity Available (Y or N)	No. of Tenants (Wireless)	No. of Leases (Revenue Generating)	Approximate Rent Revenue	Available Tower Capacity %
Baymeadows (sub)	10357 Deerwood Club Rd. 32256	30 14 9.8	81 32 35.5	1997	2027	FY 26'	47	150	197	JEA	monopole	substation	N	5	4	$ 159,847	5
Black Hammock Island	15770 Sawpit Rd. 32226	30 31 11.8	81 28 54.8	2011	2041		14	127	141	JEA	monopole	coj park	N	1	0	$ -	0
Cecil Sub	10471 103rd Street, Jacksonville, Florida 32210	30 15 0.68	81 50 2.04	1973	2003	FY 25'	79	105	184	JEA	transmission pole - direct buried	substation	N	1	0	$ -	0
Center Park (sub)	2797 Kernan Rd. S 32246	30 17 47.7	81 29 10	2001	2031		33	177	210	JEA	lattice	substation	Y	4	0	$ -	60
Community Hall WTP	2935 Orange Picker Rd. 32223	30 09 01.7	81 38 05.1	2006	2036		25	198	223	JEA	monopole	water treatment plant	Y	3	0	$ -	69
Emerson (SSSC)	2325 Emerson St., Jacksonville, Florida 32207	30 17 10.9	081 38 14.3	1973	2003	FY 26'	26	125	151	JEA	monopole	service center parking lot	N	1	0	$ -	Ukn
Firestone (sub)	6919 Rampart Rd., Jacksonville, Florida 32244	30 13 21.9	81 45 55.4	2002	2032		36	344	380	JEA	lattice	substation	Y	5	2	$ 79,924	40
Ft. Caroline (sub)	12337 McCormick Rd. 32225	30 21 36	81 29 22	1998	2028		39	170	209	JEA	lattice	substation	N	5	4	$ 159,847	15
Garden City (sub) FCRS	2961 ArmsDale Rd. 32218	30 27 14.6	81 41 54.6	2001	2031		20	179	199	JEA	lattice	substation	Y	5	2	$ 79,924	63
Gator (new)	14798 Main ST. N. 32206	30 30 18.4	81 37 24.1	2011	2041		33	127	160	JEA	monopole	transmission corridor	N	0	0	$ -	0
Greenland (sub) (FCRS)	14247 Old St. Augustine Rd. 32258	30 08 48.4	81 31 50.3	2002	2032		17	499	516	JEA	lattice	substation	Y	5	1	$ 39,962	50
Greenland (sub)	14247 Old St. Augustine Rd. 32258	30 08 45.2	81 31 45.5	1998	2028		16	240	256	JEA	lattice	substation	Y	3	2	$ 79,924	25
Imeson Sub	599 Zoo Parkway 32218	30 24 30.5	-081 38 08.1	2015	2045		7	199	206	JEA	monopole	substation	Y	2	1	$ -	70
Jax Heights Sub	9800 Alvin Rd. 32222	30 13 26.4	81 49 11.3	2008	2038		70	180	250	JEA	monopole	substation (adjacent)	Y	2	1	$ 39,962	76
Mandarin (sub)	3476 Loretto Rd. 32233	30 09 30.8	81 37 11.7	1974	2004	FY 25'	21	125	146	JEA	monopole	substation	N	1	0	$ -	0
Mandarin WWTP	10868 Hampton Rd. 32257	30 10 46.4	81 37 20.7	2007	2037		22	180	202	JEA	monopole	wastewater treatment	Y	2	1	$ 39,962	52
Mayport (sub)	725 Wonderwood Dr. 32233	30 22 14.7	81 24 41.8	2008	2038		4	199	203	JEA	monopole	substation	Y	2	1	$ 39,962	57
Merrill Rd. (sub)	7730 Merrill Rd. 32211	30 21 05.9	81 34 02.1	2011	2041		41	199	240	JEA	monopole	substation	Y	3	2	$ 79,924	66
NAS Jax (sub)	7001 Roosevelt Blvd. 32244	30 13 21.8	81 42 01	1973	2003		15	80	95	JEA	lattice	substation	Y	1	0	$ -	Ukn
Nassau (sub)	85960 Wilson Neck Rd. Yulee, Florida 32097	30 35 22.8	81 35 04.1	2013	2043	Co-Lo Upgrade	18	127	145	JEA	monopole	substation	N	1	0	$ -	0
Nocatee	859 Nocatee Parkway, St. Augustine, Florida 32095	30 06 55.86	-081 24 38.28	2017	2047		19	199	218	JEA	monopole	re-use re-pump facility	Y	1	0	$ -	70
Normandy (sub)	9801 Crystal Springs Rd. 32221	30 18 22.6	81 49 10.5	2001	2031		92	166	258	JEA	monopole	substation	Y	4	1	$ 39,962	33
Orange Park (sub)	733 Shaw Avenue OP 32073	30 10 35.9	81 42 37.5	2012	2042		12	199	211	JEA	monopole	substation	Y	1	0	$ -	70
Phillips (sub)	7601 Phillips Hwy 32256	30 14 02.6	81 35 27.8	2012	2042		21	199	220	JEA	monopole	substation	Y	2	1	$ 39,962	70
Powers (sub)	6266 Powers Ave. 32217	30 15 33.9	81 37 10.3	1974	2004		26	120	146	JEA	monopole	substation	N	1	0	$ -	0
Randall St. (sub)	3065 Randall St. 32205	30 18 38.7	81 42 25.3	2006	2036		30	199	229	JEA	monopole	substation	Y	3	2	$ 79,924	54
Ribault (sub)	4205 Soutel Dr. 32208	30 24 16.1	81 42 50.7	2006	2036		20	199	219	JEA	monopole	substation	Y	1	0	$ -	10
Rivertown WTP	7612 Longleaf Pine Parkway	30 02 41.6	81 37 02.9	2012	2042		31	199	230	JEA	monopole	water treatment plant	Y	4	3	$ 79,923	70
Robinwood (sub)	10327 Alden Rd. 32246	30 18 04.8	81 31 39.7	2011	2041		40	199	239	JEA	monopole	substation	Y	3	2	$ 39,961	13
San Pablo (sub)	13865 William Davis Parkway	30 15 47.0	81 27 14.5	2011	2041		23	181	204	JEA	monopole	substation	Y	3	2	$ 39,961	42
SJRPP (sub, plant) FCRS	11201 New Berlin Rd. 32226	30 25 54.9	81 33 13.3	2000	2030		14	499	513	JEA	guyed	sjrpp plant area	Y	5	0	$ -	17
SJRPP Tower #1	11201 New Berlin Rd. 32226	30 25 01	81 32 59.3	1998	2028		17	170	187	JEA	lattice	sjrpp substation area	Y	1	0	$ -	Ukn
SOCC Annex tower	7695 Ramona Blvd. 32221	30 18 49.6	81 38 05.8	1998	2028	FY 22'	34	160	194	JEA	lattice	jea facility	N	3	0	$ -	0
Southeast Sub	9999 Chester Lake Dr. E. 32256	30 11 35	81 31 16.4	2011	2041		35	199	234	JEA	monopole	substation	Y	4	3	$ 79,923	37
St John's Forest WTP	2740-1 CR 210 W. 32259	30 03 51.2	81 31 41.9	2007	2037		30	199	229	JEA	monopole	water treatment plant	Y	5	3	$ 119,885	63
Switzerland (sub)	1310A Roberts Rd. 32259	30 04 25.5	81 36 05.6	2002	2032		28	198	226	JEA	monopole	substation	Y	4	3	$ 119,885	42
West Jax (sub)	1901 Picketville Rd. 32220	30 20 48.3	81 45 47.2	1974	2004	FY 22'	23	93	116	JEA	lattice	substation	Y	1	0	$ -	Ukn
Westlake Sub	5090 Jones Rd. 32219	30 23 07.7	-081 48 57.6	2014	2044		59	250	309	JEA	self-support	substation	Y	2	1	$ -	50
Yellow Water Rd. (tower)	2015 Yellow Water Rd. 32234	30 16 11.0	81 57 23.9	2002	2032		85	499	584	JEA	guyed	stand alone site	Y	3	0	$ -	5
Yulee Outflow	463260 SR 200 Yulee, Florida 32097	30 37 50.4	-081 35 40.6	2014	2044		19	199	218	JEA	monopole	jea outflow facility	Y	2	1	$ -	71
													Totals		43	$ 1,438,622	

Memorandum

To: *George Porter, P.E., JEA*

From: *Shayne Wood, P.E., CDM Smith*
Dan Rodrigo, CDM Smith
Jenny Bywater, P.E., CDM Smith

Date: *August 26, 2019*

Subject: *JEA IWRP: Preliminary Screening of 2035 Alternative Water Supplies*

Overview

JEA is developing an Integrated Water Resources Plan (IWRP) and Demand-Side Management (DSM) Strategy that will serve as a road map for implementing water supply projects and water conservation programs through year 2070. As a component of the IWRP process, future Alternative Water Supply (AWS) options which can help JEA meet their long-term water supply needs are being conceptualized. An additional goal of JEA is to have a path for achieving 40 million gallons per day (MGD) of AWS options by 2035.

There exist several alternative sources, at a variety of locations. One of the main objectives of the IWRP is to determine what combination of options, at which locations, best meets the financial, environmental and customers' needs of the community. Even though the final IWRP report is not scheduled for completion until September 2020, the team has already conceptualized many water supply options. This memo briefly lays out one possible combination of options which meets the theme of 40 MGD of alternative supply by 2035.

During a meeting with JEA staff on July 31st, 2019 as well as follow up discussions, the full list of potential future water supply projects was screened down to four projects capable of achieving the 2035 target for alternative water supply. The four options include:

- 10 MGD of potable reuse at a new south grid site with constructed wetlands at the First Coast Natural Resource Center for storage. This alternative water would be utilized within the south grid.
- 5 MGD of potable reuse at the Arlington East WRF with the alternative water utilized within the south grid.
- 10 MGD of potable reuse at the Southwest WRF with the alternative water utilized within the south grid. A river crossing would be required for this option.

- 15 MGD of potable reuse at either Cedar Bay WRF or a new facility. This alternative water would be utilized in either the north grid or Nassau grid.

This memo provides a brief description of each of the screened alternative water supply options and a summary of the overall cost estimate to meet the 2035 alternative water supply goal. The yield for each option is a placeholder for now and final recommended capacities will be determined by the IWRP.

Alternative Supply Options

Potable Reuse – South Grid

Instead of delivering reclaimed water to customers for non-potable uses, reclaimed water could undergo additional advanced treatment to make it suitable for aquifer recharge (indirect potable reuse) or as an immediate potable supply (direct potable reuse). As part of the Water Purification Technology program focused on evaluating purified water for potable reuse, JEA is implementing a 1 MGD demonstration facility that can be expanded to 10 MGD of purified water production. JEA continues to evaluate both direct and aquifer recharge options and is well positioned to implement either. For this analysis, the purified water is assumed to be used to recharge the Floridan aquifer and result in beneficial reuse credits for the JEA consumptive use permit (CUP). Advanced treatment facilities are assumed to be constructed at the Arlington East WRF, Southwest WRF, and a new south grid site.

As the demand for reclaimed water is not always a direct match to the available supply, storage is a key component needed to fully utilize reclaimed water – be it through traditional means or through potable reuse. The First Coast Natural Resource Center will utilize 200 acres of land for 100-160 million gallons of reclaimed water storage within a constructed wetland. Flow from the south grid reclaimed water system could be pumped into the wetland during times of excess capacity and then withdrawn from the wetlands for use in the south grid to support implementation of potable reuse and/or meet demands for JEA's reclaimed water system. The project would also include a natural resource center and public amenities for hiking, birding, and other recreational and educational activities.

Potable Reuse – North Grid/Nassau

This option is similar to the south grid options but would produce purified water for the north grid or Nassau grid service areas. The facility could be at the Cedar Bay WRF or a new future location depending on growth and development patterns. The purified water produced is assumed to be utilized for direct potable reuse.

Costs

For each water supply option, preliminary capital costs were developed. These costs are intended for use as a screening level evaluation for conceptual projects. The developed costs rely on a mix of previous feasibility studies and JEA planning reports. When previous studies were not available,

cost estimates were determined in a manner consistent with planning level order-of-magnitude cost estimates. **Table 1** provides a summary of the supply option capital costs subdivided into facilities, conveyance, storage and total. The capital cost per additional gallon capacity is also provided. All costs are expressed in 2019 dollars.

Table 1. Summary of Supply Options Costs

Type	Supply Options	Yield (MGD)	Capital Cost ($M)					Capital Cost per Gallon ($/gal)
			Facility	Conveyance	Storage	Concentrate Management	Total	
Potable Reuse for South Grid[1]	South Grid Site with First Coast Natural Resource Center[2]	10	$100	$50	$25	$60	$235	$23.50
	Arlington East WRF	5	$50	$25	$10	$40	$125	$25.00
	Southwest WRF	10	$100	$100	$20	$10	$230	$23.00
North Grid / Nassau Purified Water[3]		15	$150	$15	$30	$30	$225	$15.00
Total		**40**	**$400**	**$190**	**$85**	**$140**	**$815**	**$20.38**

[1]Option is either aquifer recharge or direct potable reuse with costs shown based on aquifer recharge
[2]First Coast Natural Resource Center costs include educational, outreach and visitor center components
[3]Conveyance cost is minimal as it assumed the majority of these costs will be covered under general system expansions.

FINAL REPORT

DEPRECIATION STUDY

B&V PROJECT NO. 402547

PREPARED FOR

JEA

AUGUST 2019

BLACK & VEATCH

Table of Contents

LIST OF TABLES

Section 1. Executive Summary

This report presents the results of our analysis of the depreciation expense requirements of the electric, water, wastewater, and chilled water utility properties solely owned and maintained by JEA (collectively referred to as the "combined utilities"). The results presented herein are representative of activity through December 2018 with recognition given to certain known and measurable changes that have occurred or are anticipated to occur subsequent to that date. We consider the rates developed and recommended herein to be reasonable and appropriate for prospective use. We recommend, however, that depreciation rates be reviewed at a minimum of once every five years. Existing depreciation rates were developed in 2011 based on plant activity through May 2011. Ultimately, the appropriate level of depreciation expense rates is a management decision taking into account various factors.

Black & Veatch conducted physical site observations of major JEA facilities on June 24 through 27, 2019. During the plant tours, we interviewed and were assisted by JEA staff that appeared experienced, qualified, well trained, and knowledgeable with regard to JEA's routine and preventative maintenance practices. We appreciate the cooperation we received during our plant tours.

Based on our observations and interviews conducted, JEA appears to operate and maintain its systems prudently and in accordance with current regulatory standards and generally accepted industry practices.

Since 2005, JEA has accrued depreciation expense and maintained reserve balances as prescribed by the Federal Energy Regulatory Commission ("FERC") for the electric system and the National Association of Regulatory Utility Commissioners ("NARUC") for the water and wastewater systems. JEA currently accrues depreciation at the account level, and as such, we have identified appropriate rates for each applicable FERC and NARUC account used by JEA.

Depreciation rate recommendations for production and treatment accounts are primarily based upon our unit property analyses. Survivor curve analysis and benchmarking of comparable utilities are relied upon in our analyses for mass property accounts. JEA's continuing property record contains sufficient retirement history to perform survivor curve analyses on some, but not all of the accounts. We therefore relied upon the experience of comparable utilities for the balance of accounts for which survivor curve analyses could not be effectively utilized. The rates recommended in this report for mass property accounts are reflective of results derived from survivor curve analyses, where appropriate, and observations made relative to benchmarking against our comparable utility survey.

In Section 2 of this report, we briefly discuss the practice of depreciation accounting.

In Section 3 we discuss, in general, the type of information examined in the analysis and the methods applied to develop depreciation expense rates. The results of the analyses performed are discussed in Sections 4 through 6. These discussions include a determination of whole life depreciation accrual rates for unit property accounts (Section 4), mass property accounts (Section 5), and our analysis of the adequacy of current depreciation reserve amounts and recommended

depreciation rates (Section 6). The depreciation expense rates developed for the purpose of this report are considered appropriate for use in the near future.

In the following table, we summarize the change in annual depreciation expense resulting from our recommended rates:

Recommended Change in Depreciation Expense

DESCRIPTION	AMOUNT
Electric Utility	
Steam Production	($251,311)
Other Production	($1,582,638)
Transmission	($699,926)
Distribution	($2,007,546)
General Plant	($260,633)
Water Utility	
Source of Supply & Pumping Plant	($84,622)
Water Treatment Plant	($50,346)
Transmission & Distribution Plant	($46,698)
General Plant	($190,827)
Wastewater Utility	
Collection Plant	($3,258)
System Pumping Plant	($100,227)
Treatment & Disposal Plant	($478,818)
Reclaimed Water Plant	($10,429)
Reclaimed Water Distribution Plant	$0
General Plant	($25,788)
Chilled Water Utility	
Chilled Water Plant	$110,515
TOTAL	**($5,682,552)**

As shown in the table above, the depreciation rates we recommend in this report result in an overall annual decrease in depreciation expense of approximately $5.7million. This is a decrease of approximately 1.5 percent. The principal factors contributing to this recommended decrease are related to:

- Electric Production. Approximately $1.6 million of the decrease to depreciation expense relates to Other Production plant. Based on our unit property analysis of JEA's Other Production plants, we recommend a decrease to the composite depreciation rate for other production from 4.69 percent to 4.50 percent. The decrease is primarily the result of changes to lifespan estimates for the generation stations. Our recommendation is based on the current level of investment in electric production plant as well as the estimated life spans, capital expenditures and interim activities.

- Electric Transmission. Approximately $700,000 of the reduction to depreciation expense is related to electric transmission plant. We find that the current depreciation rates are higher than those indicated by our actuarial analysis of JEA's data, and higher than the majority of the comparable utilities in our benchmarking study. We also find that many transmission accounts are heavily depreciated, with reserve ratios above 50 percent. This is the basis for our recommendation that JEA reduce depreciation expense for electric transmission.
- Electric Distribution. Of the approximately $2 million reduction to depreciation expense related to electric distribution plant, $800,000 relates to Overhead Conductor and Devices and $900,000 relates to Services. We find that JEA's current depreciation rates are higher than the majority of the comparable utilities in our benchmarking study. We also find that the results of our actuarial analysis indicate longer average service lives than the current depreciation rates would imply for these accounts. This is the basis for our recommendation that JEA adjust its depreciation rates down to move partway towards the rates indicated in our analyses.
- Treatment and Disposal Equipment. Approximately $500,000 of the decrease to depreciation expense is related to wastewater treatment plants. Based on our unit property analysis of JEA's wastewater treatment plants, we recommend a decrease from 3.88 percent to 3.78 percent on a composite basis. The decrease is driven by a change in expected lifespans of wastewater treatment plants. Our recommendation is based on the current level of investment in wastewater treatment plant as well as the estimated life spans, capital expenditures and interim activities.

CONCLUSIONS AND RECOMMENDATIONS

- In order to have data specific to JEA to perform depreciation studies, we recommend JEA continue to maintain its books and records in accordance with the Uniform System of Accounts. JEA currently (and since 1999) maintains detailed data regarding plant additions, retirements, and transfers by account, vintage year, and transaction year.
- We recommend JEA implement the recommended depreciation rates set forth in Section 6.0, in Column Q of Tables 6-1 (electric), 6-2 (water), 6-3 (wastewater), and 6-4 (chilled water)
- We recommend JEA transfer depreciation reserve between accounts in the amounts set forth in Column M of Tables 6-1, and 6-2.
- We recommend JEA again review the adequacy of its depreciation rates in five years.

Section 2. Depreciation Accounting

The FERC Uniform System of Accounts defines "Depreciation" as:

"[T]he loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of electric plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand, and requirements of public authorities."[1]

Although this definition applies specifically to electric property, NARUC has a nearly identical definition applicable to water and wastewater utility property.

Depreciation accounting provides a method whereby charges for the loss in service value are made against current income derived from operation of the utility. By properly charging depreciation, the total cost of utility property is appropriately distributed over the useful life in such a way as to equitably allocate cost to the period during which service is provided through the use and consumption of such property. It should be noted that for the purposes delineated herein, total cost represents gross plant investment less salvage value (if any) plus cost of removal.

ANNUAL DEPRECIATION EXPENSE

Annual depreciation expense represents the annual charge against income associated with the loss of service value of utility property. Historically, utilities have relied on a number of different methods to identify the appropriate level of depreciation expense. Some of these methods include:

- A direct apportionment by management;
- A percentage of revenues;
- An amount equal to the original cost investment retired during the year;
- A charge per unit of delivery (kWh, kW, Mcf, Ccf, gallons, etc.); and
- A percentage of the investment in depreciable property.

JEA calculates depreciation expense based on the application of a straight-line depreciation rate to the respective balance in each plant account. This rate, which represents a fixed percentage of investment, yields an annual depreciation expense that is intended to amortize the total cost (or original investment plus cost of removal less salvage) over the life of the property in generally equal amounts.

DEPRECIATION RESERVE

Depreciation reserve is a balance sheet item that reflects the accumulation of annual depreciation activities and associated retirement accounting. Under the FERC and NARUC System of Accounts, depreciation reserve is shown on the balance sheet as "Accumulated Provision for Depreciation."

[1] Uniform System of Accounts Prescribed for Public Utilities and Licensees Subject to the Provisions of the Federal Power Act. (18 CFR Part 101 Definitions). For the purposes of this report, we use the term "loss in service value" in the accounting sense where value represents the original cost of facilities.

The depreciation expense charged against income is credited to (accumulated in) depreciation reserve. For utility properties, FERC and NARUC provide that upon retirement of an asset, the utility depreciation reserve is reduced by the original cost of the asset retired, is increased by any benefits derived from the sale of assets removed (salvage), and reduced by the costs attributable to removal.[2] As such, the use of appropriate depreciation rates corresponding to the service life of utility properties will result in accruals to the depreciation reserve which equal the total investment ultimately retired, adjusted for salvage and cost of removal.

For the purposes of this report, we have included consideration for net salvage (salvage less cost of removal) where appropriate. More specifically, for those depreciation rates recommended for unit property accounts and rates derived through actuarial analysis for mass property accounts, we have provided allowance for net salvage[3] based on industry trends and our experience with similar property. For the mass property accounts, we have also used as a reference the historical salvage, cost of removal, and retirement experience of JEA. Additionally, for those recommended depreciation rates derived from the results of industry survey, an allowance for net salvage equal to that which is imbedded in the rates of the comparable utilities surveyed is incorporated in our recommended depreciation rates.

2 Note that the depreciation practices for utilities as prescribed by FERC and NARUC differ substantially from the practices followed for non-utility property.

3 Net salvage represents proceeds from sale of retired assets less cost of removal.

Section 3. Historical Information and Procedures

Depreciation expense rates are intended to recover the net investment (total cost) in utility property over its useful life. In this regard, depreciation rates typically consist of three components. The components, which are further defined below, include the following: (i) service life of the property; (ii) total cost to be recovered; and (iii) reserve requirements.

Normally, the determination of average service life is largely dependent on analyses of detailed utility records. Such records generally provide information regarding additions and retirements by transaction year (year added or retired) and vintage (year originally installed) for each account and for each production, water treatment, and wastewater treatment plant. Once determined, we adjust average service life to reflect expectations over the remaining service life based on our experience, judgment, and those conditions anticipated to occur.

We normally develop average service lives by account. We first separate accounts into two groups: mass property and unit property. Mass property represents relatively homogeneous property units that tend to be retired individually. Meters, mains, conduit, conductor, services, and line transformers are examples of mass property. Conversely, unit property represents a more heterogeneous property group, which by the nature of their interconnected or integrated operations, tends to be retired simultaneously, or as a group. We normally consider power generation facilities for electric utilities and treatment facilities for water and wastewater utilities as unit property. Generally, utilities maintain detailed unit property data by physical location. Utilities typically maintain mass property data on an aggregate level.

For unit property accounts, we typically define service life based on planned retirement dates. We normally develop a history of investment activity by account for each location or site. This life history reflects gross additions, retirements, surviving property and account balances. Based on the estimated lifespan (planned retirement date) for each unit property (generating station, chilled water plant, water treatment plant, wastewater treatment plant), we typically forecast plant investment activity (interim additions, retirements and account balances) at the account level for each year that units within such an account are forecast to remain in service. We then calculate a whole life, straight line depreciation accrual rate by dividing the gross additions (original investment plus interim additions) by the sum of the annual depreciable plant balances over the life of the unit property. Gross additions include both historical and forecast additions and retirements to unit properties throughout the entire lifespan of such properties.

For mass property, we typically define service lives by account based on actuarial analyses (retirement or survivor curve analysis) or semi-actuarial analysis (simulated plant balance). These analyses, which are based on historical plant activity (specifically retirements), utilize survivor curves to illustrate the percent of vintage additions surviving by age for each account. More specifically, using a least squares technique, actual survivor stub curves (specific to the utility property under investigation) are compared to general survivor curve types to identify the best fitting curves and lives. We use average service lives developed by this method as a principal method to determine a reasonable average service life applicable to each account. Appropriate whole life depreciation expense rates are then calculated by dividing one minus the expected net salvage ratio by the average service life. In addition to our analysis of historical experience, we

consider our experience in the industry, practices of other utilities, and basic information regarding expected life characteristics of the property. Results derived from the application of these methods are then evaluated in connection with other available information such as: (i) past, present, and anticipated economic conditions; (ii) recent industry trends; and (iii) engineering experience and judgment.

Each of these techniques, including a summary of the information required and the information provided by JEA, are further discussed below.

JEA DATA

Currently JEA's books and records do not provide sufficient detailed data upon which to develop depreciation expense rates as outlined above for many accounts. Data since 1999, when JEA converted to its existing Power Plant accounting system, appear relatively complete. Data prior to 1999, however, are limited to vintage plant balances at the time of conversion to Power Plan, which does not provide sufficient detail to perform comprehensive analysis due to the lack of retirement history. JEA is not unique in this regard.

With limited exception, municipally owned utility systems often do not have a comprehensive record of additions and retirements. We have also encountered investor-owned utility accounting records which do not have the required detail for one reason or another (often due to records system conversion) even though required by state and federal regulations to maintain detailed records in conformance with the Uniform System of Accounts. JEA, as have other municipal systems we have worked with, has maintained sufficient accounting records, but did not preserve the detail of somewhat limited value when changing accounting systems. Instead, in order to simplify converting accounting systems, the utilities have "rolled-up" historical detailed data.

Where we have encountered investor-owned systems without a complete history of detailed data, we usually have been able to rely on less detailed data. Investor-owned electric and gas systems had filed reports annually as a result of federal and state regulatory requirements. These annual reports contain data regarding annual plant additions and plant balances by account. Usually investor-owned utilities have available most, if not all, of these reports for 50 or more years. We can rely on this data to perform semi-actuarial simulated plant balance studies, which provide some insight into historical retirement experience.

Municipally owned systems, on the other hand, do not have the detailed reporting requirement. While the utility may report (audit or other reports) total annual additions and plant balances, municipal utilities seldom report more detailed information by plant account. We make these observations solely to demonstrate that any lack of detailed retirement records that JEA has is by no means unique. We find that of the level detail maintained by JEA is consistent with our experience with other municipal systems. In fact, if regulations did not require investor owned systems to maintain and report such detailed data, investor-owned systems would probably not maintain or report it.

JEA's historical data that we rely on include the following:

- Plant balances by account, by plant (for unit property), and by vintage (year of initial installation).
- Vintage beginning balances, additions, retirements, and adjustments by account for transaction years (year of activity) 2000 through 2018.

PLANNED RETIREMENTS (UNIT PROPERTY ACCOUNTS)

For JEA's unit property, data are limited upon which to develop an investment history. A complete life history would reflect gross additions, retirements, surviving property, and account balances by year since the unit property initially went into service. JEA's property records include vintage balances as of 1999 and a complete history going forward. Based on the estimated life (planned retirement date based on expected lifespan for the various units), we forecast plant investment activity (interim additions, retirements, and balances) for each year that we expect the property to remain in service. In the event that other reasonably anticipated planned additions and retirements are required in order for the property to reach the final retirement date, we consider implications of such additions and retirements as well. We reviewed the 2018 Annual Water Resource Master Plan and the 2019 Ten Year Site Plan (electric) to identify anticipated retirement dates and major capital additions. Additionally, JEA management provided information related to forecasted retirement dates, which was relied upon along with our experience and consideration of our site observations to develop reasonable lifespans for each unit property. We also relied upon JEA's capital projects budget, where JEA identifies several major projects relating to the electric generation, water and wastewater treatment plants, and the district energy system. We incorporate this information into our recommended depreciation rates.

Based on the data described above, we calculate a whole life, straight line depreciation accrual rate by dividing the gross additions (original investment plus interim additions) by the sum of the annual depreciable balances over the life of the unit property accounts. Gross additions include both historical and forecast additions to plant in-service. Annual depreciable balances are based on actual balances reported plus forecast balances, considering forecast additions and retirements. Our recommended rates for unit property accounts are discussed in Section 4.

RETIREMENT ANALYSIS (MASS PROPERTY ACCOUNTS)

In general, the level of effort required for any depreciation rate study is highly dependent upon the availability of the continuing property record ("CPR") and fixed asset data, and the available format and "condition" of this data. If CPR data is sufficiently complete, we use "retirement analysis" or survivor curve analysis as the primary measure of average service life for mass property accounts. In performing retirement analyses, we rely on computerized statistical routines to determine the average service life which best fits historical data using individual generalized survivor curves, typically referred to as "Iowa Curves." A comparison of the statistical fits of the various Iowa Curves (using the "best fitting" average service life) provides an indication of the average service life of mass properties based on historical retirements.

In this regard, JEA provided original cost account balances by vintage year along with subsequent additions, retirements, and transfers for the period September 2000 through December 2018.

Eighteen years of retirement history seldom provides sufficient detail to perform reliable retirement analysis, however for shorter lived accounts the results can be reasonable. We prefer 30 years of data but can often get reasonable results with less provided vintage plant balances are reliable and available retirement data is reasonable. We conducted retirement analyses for all electric, water and wastewater mass property accounts. The results of the analyses were generally not statistically robust for many accounts but were improved from our pervious study. For accounts that produced curve fits, we used the resulting average service lives as a directional guide for making our depreciation recommendation.

SIMULATED PLANT BALANCE (MASS PROPERTY ACCOUNTS)

As an alternative to retirement analysis, we normally rely on a method referred to as the simulated plant balance approach. We use the simulated plant balance method when aged retirement data are unavailable or insufficient. In order to estimate average service lives using the simulated plant balance approach, we require a history (preferably at least 30 years) of annual additions and end of year plant balances by account. In the simulated plant balance approach, each of a number of combinations of survivor curves and average service lives is used to compute a series of plant balances at the end of a number of chosen time periods. We test each combination to determine which calculated plant balances most closely simulates the actual book balances.

As discussed earlier, JEA does not have a history of annual additions and end of year plant balances by account, only remaining balances as of 1999. Therefore, the data available are the same as for the actuarial analysis making simulated plant balance irrelevant.

COMPARABLE UTILITY ANALYSIS (MASS PROPERTY ACCOUNTS)

With an absence of a statically robust retirement analysis for many mass property accounts, we relied on benchmarking as the primary approach to determine average service lives (depreciation rates). In Appendix A, we show depreciation rates that we summarized for the electric, water, wastewater and chilled water utilities in our benchmarking survey. Using this data, we determine the median depreciation rates for each mass property account. We consider these median values to be a preliminary indication of the appropriate depreciation rates. The results derived from the aforementioned survey activities are summarized below for the electric, water, wastewater, and chilled water systems.

Comparable Electric Utilities

We surveyed depreciation expense rates used by 15 electric utilities across the nation. The complete listing of utilities in our survey can be found in Appendix A. The utilities include Florida investor-owned systems and electric utilities serving approximately the same number of customers as JEA.

In Table 3-1 we summarize the median, first quartile (25th percentile), and third quartile (75th percentile) depreciation expense rates from our electric utility survey and compare those to JEA's existing depreciation expense rates for mass property accounts. We provide a median value depreciation expense rate in order to eliminate the effect of outliers. In addition, we show quartiles to demonstrate a more reasonable measure of range rather than simple minimum and maximum

values. We also show the number of data points included for each account in Table 3-1. In Appendix A, we present additional detail.

Table 3-1 Depreciation Benchmarking Results of Electric Utility Analysis

Acct.	Description	Median	1st Quartile	3rd Quartile	Data Points	JEA
311	Structures & Improvements	2.39%	2.33%	3.07%	5	3.51%
312	Boiler Plant Equipment	2.96%	2.66%	3.51%	5	3.71%
314	Turbogenerator Equipment	3.04%	2.78%	3.75%	5	3.38%
315	Accessory Electric Equipment	3.35%	2.45%	3.55%	5	3.43%
316	Miscellaneous Plant Equipment	2.89%	2.39%	3.89%	5	4.14%
341	Structures & Improvements	3.50%	2.84%	4.05%	6	4.10%
342	Fuel Holders, Producers / Accessories	2.57%	2.41%	3.69%	6	4.90%
343	Prime Movers	3.16%	2.94%	3.83%	6	4.83%
344	Generators	2.93%	2.81%	3.79%	6	4.75%
345	Accessory Electric Equipment	3.42%	3.04%	3.95%	6	4.02%
346	Miscellaneous Plant Equipment	3.23%	2.62%	3.90%	6	3.90%
352	Structures & Improvements	1.78%	1.70%	1.96%	17	2.24%
353	Station Equipment	1.99%	1.86%	2.30%	17	2.54%
354	Towers & Fixtures	1.69%	1.40%	2.00%	17	2.14%
355	Poles & Fixtures	2.35%	2.27%	3.51%	17	3.24%
356	Overhead Conductors & Devices	2.00%	1.64%	2.33%	17	2.51%
357	Underground Conduit	1.63%	1.30%	1.80%	10	1.81%
358	Underground Conductors & Devices	1.87%	1.35%	2.26%	15	2.18%
359	Roads & Trails	1.49%	1.39%	1.64%	14	1.76%
361	Structures & Improvements	1.60%	1.52%	1.76%	17	2.43%
362	Station Equipment	2.08%	1.85%	2.40%	17	2.57%
364	Poles, Towers & Fixtures	3.58%	2.38%	4.00%	17	4.20%
365	Overhead Conductors & Devices	2.72%	2.15%	3.26%	17	4.24%
366	Underground Conduit	1.81%	1.61%	2.02%	17	2.33%
367	Underground Conductors & Devices	1.99%	1.83%	2.40%	17	2.90%
368	Line Transformers	2.82%	2.08%	3.40%	17	3.62%
369	Services	2.92%	2.17%	3.53%	16	4.66%
370	Meters	6.51%	3.70%	7.19%	17	6.68%
371	Installations on Customers' Premises	4.02%	1.15%	5.28%	13	4.00%
373	Street Lighting & Signal Systems	3.87%	2.69%	4.55%	17	5.27%
382	Computer Hardware	14.22%	10.63%	19.89%	10	20.00%
383	Computer Software	14.22%	10.63%	19.89%	10	20.00%
390	Structures & Improvements	2.30%	2.00%	2.83%	17	3.07%
391	Office Furniture & Equipment	6.16%	4.95%	10.77%	14	4.00%
392	Transportation Equipment	5.48%	5.28%	8.29%	11	7.50%
393	Stores Equipment	4.67%	4.00%	5.23%	13	5.39%
394	Tools, Shop & Garage Equipment	5.00%	4.00%	6.67%	13	6.69%
395	Laboratory Equipment	5.70%	4.15%	6.67%	13	4.00%
396	Power Operated Equipment	5.99%	4.40%	8.39%	13	6.63%
397	Communications Equipment	5.68%	4.47%	10.18%	16	6.66%
398	Miscellaneous Equipment	5.00%	5.00%	5.67%	13	4.00%
399	Other Tangible Property	20.00%	20.00%	20.00%	1	8.67%

Comparable Water and Wastewater Utilities

Similar to the process outlined above for the electric system, we conducted a survey of 12 water and 11 wastewater utilities located in Florida. The complete listing of utilities in our survey can be found in Appendix A. The utilities surveyed ranged in size from nominally less than 1,000 customers to greater than 36,000 customers. Data was gathered from Annual Reports filed before the Florida Public Service Commission.

In Tables 3-2 and 3-3, we summarize the median, first quartile (25th percentile), and third quartile (75th percentile) depreciation expense rates from our water and wastewater utility survey and compare those to JEA's existing depreciation expense rates by NARUC account. The rates listed below for JEA and the comparable utilities are representative of a composite rate considering all functional components of the NARUC system of accounts.

Table 3-2 Depreciation Benchmarking Results of Water Utility Analysis

Acct.	Description	Median	1st Quartile	3rd Quartile	Data Points	JEA
804.2	Structure and Improvements	3.03%	3.03%	3.13%	11	3.03%
805.2	Collecting and Impounding Reservoirs	2.00%	2.00%	2.00%	2	2.00%
806.2	Lake, River and Other Intakes	2.50%	2.50%	2.50%	2	2.50%
807.2	Wells and Springs	3.33%	3.33%	3.70%	12	3.33%
808.2	Infiltration Galleries and Tunnels	2.50%	2.50%	2.50%	1	2.50%
809.2	Supply Mains	2.86%	2.86%	3.13%	9	2.86%
810.2	Power Generation Equipment	5.00%	5.00%	5.88%	9	5.00%
811.2	Pumping Equipment	5.00%	5.00%	5.22%	12	5.00%
820.3	Water Treatment Equipment	4.55%	4.55%	4.88%	12	3.86%
830.4	Distribution Reservoirs and Standpipes	2.70%	2.70%	2.87%	11	3.07%
831.4	Transmission and Distribution Mains	2.33%	2.33%	2.53%	12	2.33%
833.4	Services	2.50%	2.50%	2.59%	12	2.50%
834.4	Meters and Meter Installations	5.00%	5.00%	5.22%	12	6.67%
835.4	Hydrants	2.22%	2.22%	2.50%	11	2.22%
836.4	Backflow Prevention Devices	6.67%	6.67%	6.67%	3	6.67%
839.4	Other Plant / Miscellaneous Equipment	5.00%	4.00%	5.56%	9	4.00%
840.52	Office Furniture & Equipment	6.67%	6.67%	6.67%	11	4.00%
841.5	Transportation Equipment	16.67%	16.67%	16.67%	11	7.50%
842.5	Stores Equipment	5.56%	5.42%	5.56%	4	5.39%
843.5	Tools, Shop and Garage Equipment	6.25%	6.25%	6.25%	12	6.69%
844.5	Laboratory Equipment	6.67%	6.67%	6.67%	5	4.00%
845.5	Power Operated Equipment	8.33%	8.33%	8.33%	8	6.63%
846.5	Communication Equipment	10.00%	10.00%	10.00%	6	6.66%
847.5	Miscellaneous Equipment	6.67%	6.67%	6.67%	4	4.00%
848.5	Other Tangible Plant	10.00%	10.00%	10.00%	7	8.67%

Table 3-3 Depreciation Benchmarking Results of Wastewater Utility Analysis

Acct.	Description	Median	1st Quartile	3rd Quartile	Data Points	JEA
854.2	Structures and Improvements	3.13%	3.08%	3.70%	11	3.13%
855.2	Power Generation Equipment	5.00%	5.00%	5.00%	5	5.00%
860.2	Collection Sewers - Force	3.33%	3.33%	3.70%	11	3.33%
861.2	Collection Sewers - Gravity	2.22%	2.22%	2.50%	9	2.23%
862.2	Special Collecting Structures	2.60%	2.50%	3.03%	8	2.50%
863.2	Services to Customers	2.63%	2.63%	2.86%	10	2.63%
864.2	Flow Measuring Devices	20.00%	20.00%	20.00%	7	10.00%
865.2	Flow Measuring Installations	2.63%	2.63%	2.63%	3	5.96%
866.6	Reuse Services	2.50%	2.50%	2.50%	3	3.64%
867.6	Reuse Meters and Meter Installations	5.00%	5.00%	5.00%	3	6.67%
870.3	Receiving Wells	3.67%	3.33%	4.39%	8	3.33%
871.3	Pumping Equipment	5.56%	5.56%	5.56%	9	5.00%
874.5	Reuse Distribution Reservoirs	2.70%	2.70%	2.70%	1	2.70%
875.6	Reuse Transmission and Distribution System	2.33%	2.33%	2.89%	4	2.33%
880.4	Treatment and Disposal Equipment	5.56%	5.56%	6.67%	9	3.75%
881.4	Plant Sewers	2.86%	2.86%	2.86%	3	3.10%
882.4	Outfall Sewer Lines	3.33%	3.33%	3.33%	5	3.57%
889.2	Other Plant / Miscellaneous Equipment	5.56%	5.56%	6.67%	9	6.25%
890.72	Office Furniture and Equipment	6.67%	6.67%	9.17%	8	4.00%
891.7	Transportation Equipment	16.67%	16.67%	20.00%	7	7.50%
892.7	Stores Equipment	5.56%	5.56%	5.56%	3	5.39%
893.7	Tools, Shop and Garage Equipment	6.25%	6.25%	6.46%	7	6.69%
894.7	Laboratory Equipment	6.67%	6.67%	6.67%	5	4.00%
895.7	Power Operated Equipment	8.33%	8.33%	9.17%	7	6.63%
896.7	Communication Equipment	10.00%	10.00%	10.00%	3	6.66%
897.7	Miscellaneous Equipment	6.67%	6.67%	6.67%	4	4.00%
898.7	Other Tangible Plant	10.00%	10.00%	10.00%	6	0.00%

Comparable Chilled Water Utilities

Our survey of chilled water utilities resulted in only two similar utilities. We found that most chilled water utilities are privately operated (by University campuses, for example), and identifying publicly available depreciation information was not readily accessible.

Section 4. Unit Property

In Tables 4-1, 4-2, and 4-3, we summarize whole life depreciation accrual rates for the unit properties of the electric, water, wastewater, and chilled water utilities by FERC and NARUC account numbers, as applicable. The whole life accrual rate is defined as the rate which, when applied to annual depreciable plant balances, will result in recovery of the original cost of gross additions, including net salvage, over the entire life of a property. The depreciation accrual rates applicable to unit property developed in this report are based on application of the whole life method.

We show summary data regarding the unit property owned by JEA as of December 2018 in Tables 4-3, 4-4, and 4-5. The retirement dates shown for each of the unit properties are based on input from JEA management, our experience and general guidelines regarding the lifespan of utility properties comparable to JEA's. The lifespan values represent reasonable levels based on our experience in a variety of settings, as well as information ascertained from JEA's master plan, capital budget, and management.

In Table 4-4, we summarize the in-service date, projected retirement date, capacity, unit type and fuel type for each generating unit. JEA solely owns and operates electric generating equipment at four sites. These are identified as J. Dillon Kennedy, Northside, Brandy Branch, and Greenland. The aggregate capacity of JEA's solely owned generation amounts to nominally 2,908 MW in the winter[4].

We summarize information regarding JEA's water and wastewater unit properties in Tables 4-5 and 4-6. In these tables we show the in-service date, projected retirement date, and associated capacity of each plant. JEA's water treatment facilities consist of 38 water treatment plants (WTPs) having an aggregate capacity (average daily flow rate) of approximately 309 MGD. Capacities of the WTPs range from 0.04 MGD to 23.1 MGD. JEA's wastewater treatment facilities consist of 11 wastewater treatment plants (WWTPs) having a combined permitted capacity of approximately 120 MGD. Capacities of the WWTPs range from 0.24 MGD to 52.2 MGD.

We summarize information regarding JEA's chilled water unit properties in Table 4-7. There are four chilled water plants currently operating in JEA's District Energy Service (DES). DES was established as a separate utility system within JEA in 2004. The DES chilled water plants have an aggregate capacity of 26,700 tons and range from 800 tons to 9,700 tons.

The annual accrual rates we develop will, if applied to annual unit property account balances over the entire life of the various properties from the year of commercial operation to the year of retirement, recover JEA's investment, including consideration for the impact of net salvage. The principal forecasts, for which assumptions are made, that we rely on in the analyses include:

- The retirement date (life span) of the individual facilities.
- The level of interim additions and retirements.

[4] In addition to the capacity of this solely owned equipment, JEA jointly owns the St. John's River Power Park and Scherer Unit 4.

- The level of major plant additions, upgrades, and improvements anticipated for the individual units over the next 10 years.
- The level of forecasted future additions and retirements beyond the 10-year CIP projection required to operate facilities until final retirement.
- The net salvage values associated with interim and final retirements.

With regard to major plant additions, upgrades, and improvements, we have included only those items identified in JEA's capital projects budget. Estimated additions and retirement for the period beyond the budget are primarily based on historical interim activity.

Table 4-1 Depreciation Rate Analysis – Electric Unit Properties

[A] Acct. No.	[B] Description	[C] Depreciation Rate Existing	[D] Depreciation Rate Indicated	[E] Net Salvage
	Steam Production			
311	Structures and Improvements	3.51%	3.49%	-10.00%
312	Boiler Plant Equipment	3.71%	3.69%	-8.00%
314	Turbogenerator Units	3.38%	3.36%	-5.00%
315	Accessory Generation Equipment	3.43%	3.55%	-5.00%
316	Miscellaneous Power Plant Equipment	4.14%	3.86%	-5.00%
	Other Production			
341	Structures and Improvements	4.10%	3.82%	-8.00%
342	Fuel Holders	4.90%	4.64%	-8.00%
346	Prime Movers	4.83%	4.73%	-8.00%
344	Generators	4.75%	4.48%	-10.00%
345	Accessory Electrical Equipment	4.02%	4.05%	-5.00%
346	Miscellaneous Power Plant Equipment	3.90%	3.98%	-5.00%

Table 4-2 Depreciation Rate Analysis – Water and Wastewater Unit Properties

[A] Acct. No.	[B] Description	[C] Depreciation Rate Existing	[D] Depreciation Rate Indicated	[E] Net Salvage
	Water Treatment			
804.3	Structures & Improvements	4.31%	4.22%	-10.00%
811.3	Pumping Equipment	5.00%	5.00%	-10.00%
820.3	Water Treatment Equipment	3.86%	3.94%	-10.00%
	Wastewater Treatment and Disposal			
854.4	Structures and improvements	4.12%	4.02%	-15.00%
855.4	Power Generation Equipment	5.84%	4.63%	-10.00%
880.4	Treatment & Disposal Equipment	3.75%	3.67%	-10.00%
881.4	Plant Sewer	3.10%	3.20%	-5.00%
882.4	Outfall Sewer Line	3.57%	3.34%	-10.00%
889.4	Other Plant & Misc. Equipment	4.03%	4.00%	-5.00%

Table 4-3 Depreciation Rate Analysis – Chilled Water Unit Properties

[A] Acct. No.	[B] Description	[C] Depreciation Rate Existing	[D] Depreciation Rate Indicated	[E] Net Salvage
362	Station Equip - Chilled Water	4.19%	4.94%	-5.00%
369	Services - Chilled Water	3.87%	3.73%	-5.00%
390	Structures - Chilled Water	4.15%	3.24%	-5.00%

Table 4-4 Summary of Electric Plant Characteristics

[A] Line	[B] Plant/Unit	[C] In-Service Date	[D] Estimated Retirement Date	[E] Capacity(1)	[F] Unit Type(2)	[G] Fuel Type(3)	[H] Estimated Age at Retirement
1	Kennedy						
2	Unit 7	2000	2040	191	CT	G/LO	40
3	Unit 8	2009	2049	191	CT	G/LO	40
4	Northside						
5	Unit 1	2003(4)	2063	293	ST	PC/C	60
6	Unit 2	2003(4)	2063	293	ST	PC/C	60
7	Unit 3	1977	2029	524	ST	G/HO	52
8	Unit 3	1975	2030	62	CT	LO	55
9	Unit 4	1975	2030	62	CT	LO	55
10	Unit 5	1974	2030	62	CT	LO	56
11	Unit 6	1974	2030	62	CT	LO	56
12	Brandy Branch						
13	Unit 1	2001	2041	191	CT	G/LO	40
14	Unit 2	2001	2041	186	CT	G/LO	40
15	Unit 3	2001	2041	186	CT	G/LO	40
16	Unit 2-3	2005	2041	223	CC	WH	36
17	Greenland						
18	Unit 1	2011	2051	191	CT	G/LO	40
19	Unit 2	2011	2051	191	CT	G/LO	40

(1) Winter capacity shown in megawatts (MW).

(2) CT – Combustion Turbine; ST – Steam Turbine; IC – Internal Combustion Engine; CC – Steam Turbine Component of Combined Cycle.

(3) LO – Light Oil; G – Natural Gas; PC – Pet Coke; C – Coal; HO – Heavy Oil; WH – Waste Heat.

(4) Retrofit boilers. Original install dates: Unit1, 1966; Unit 2, 1972.

Source: Annual Disclosure Report for Electric Utility System, May 28, 2019, Page 21.

Table 4-5 Summary of Water Plant Characteristics

[A] Line	[B] Plant/Unit	[C] In-Service Date	[D] Estimated Retirement Date	[E] Capacity[(1)]	[F] Estimated Age at Retirement
1	**Major Grid (Duval and St. Johns Counties)**				
2	Arlington	1991	2046	9.42	55
3	Beacon Hills	2010	2065	2.55	55
4	Brierwood	1999	2054	18.00	55
5	Cecil Commerce Center	2004	2059	10.80	55
6	Community Hall	1994	2049	13.03	55
7	Deerwood III	1998	2053	22.61	55
8	Fairfax	1950	2030	13.29	80
9	Greenland	2018	2068	5.76	50
10	Hendricks	2001	2056	16.63	55
11	Highlands	2001	2056	14.40	55
12	Julington Creek Plantation	1999	2054	4.32	55
13	Lakeshore	1950	2030	12.46	80
14	Lovegrove	1971	2030	8.31	59
15	Main Street	1890	2030	23.11	140
16	Marietta	1974	2030	9.64	56
17	McDuff	1950	2030	16.06	80
18	Monument Road	1985	2040	2.47	55
19	Northwest	2019	2069	6.50	50
20	Norwood	1950	2030	8.86	80
21	Oakridge	1977	2030	16.39	53
22	Ridenour	1996	2051	19.44	55
23	Royal Lakes	1972	2030	6.98	58
24	Southeast	1995	2050	5.54	55
25	Southwest	1981	2036	18.72	55
26	St. Johns Forest	2002	2057	3.35	55
27	St. Johns North	1988	2043	3.19	55
28	Westlake	2002	2057	3.00	55
29	Woodmere	1965	2035	3.54	70
30	**Independent Plant**				
31	Mayport	1993	2048	0.79	55
32	**Lofton Oaks Grid (Nassau County)**				
33	Lofton Oaks	1989	2044	0.04	55
34	Nassau Regional	1999	2054	4.29	55
35	Otter Run	1995	2050	0.59	55
36	West Nassau	2019	2069	1.41	50
37	**Ponce de Leon Grid (St. Johns County)**				
38	A1A North	1965	2035	0.09	70
39	A1A South	1965	2035	0.09	70
40	Ponce de Leon	1988	2043	0.87	55
41	**Ponte Vedra Grid (St. Johns County)**				
42	Corona Road	1968	2035	2.08	67
43	Ponte Vedra North	1968	2035	0.98	67

(1) Permitted Capacity shown in millions of gallons per day (MGD) on an average daily basis.

Source: Annual Water Resource Master Plan, Septemeber 2018, Pages W-15, W-29,W-44, W-55, W-65, W-75.

Table 4-6 Summary of Wastewater Plant Characteristics

[A]	[B]	[C]	[D]	[E]	[F]
Line	Plant/Unit	In-Service Date	Estimated Retirement Date	Capacity[(1)]	Estimated Age at Retirement
1	Buckman	1961	2035	52.50	74
2	Arlington East	1978	2040	25.00	62
3	Southwest	1976	2040	14.00	64
4	District II	1970	2030	10.00	60
5	Mandarin	1998	2048	8.75	50
6	Monterey	1996	2046	3.60	50
7	Blacks Ford	1999	2049	3.00	50
8	Nassau Regional	1989	2039	1.55	50
9	Julington Creek	2008	2058	1.00	50
10	Ponte Vedra	2004	2054	0.80	50
11	Ponce De Leon	2008	2058	0.24	50

(1) Permitted Capacity shown in millions of gallons per day (MGD).

Source: Annual Water Resource Master Plan, Septemeber 2018, Page S-8.

Table 4-7 Summary of Chilled Water Plant Characteristics

[A]	[B]	[C]	[D]	[E]	[F]
Line	Plant/Unit	In-Service Date	Estimated Retirement Date	Capacity[(1)]	Estimated Age at Retirement
1	Springfield	2005	2035	9,000	30
2	Downtown	2003	2033	7,200	30
3	Hogan's Creek	2003	2033	9,700	30
4	San Marco	2007	2037	800	30

(1) Capacity shown in tons.

Source: Annual Disclosure Report for Water and Sewer System and District Energy System, May 28, 2018, Page 39.

Section 5. Mass Property

For mass property accounts (transmission, distribution, collection, general plant, etc.), we develop base (indicated) depreciation rates based on retirement analyses (where applicable) and the depreciation rates reported by comparable utilities, as previously discussed in Section 3. In this section, we summarize JEA's existing and indicated base accrual rates and the annual change in depreciation expense which results if these indicated rates are applied to the depreciable plant balance.

There are two fundamental approaches (methods) used to develop depreciation rates. These are the whole life approach and the remaining life approach. The basic equation used to determine a whole life depreciation rate is as follows:

$$\text{Whole Life Rate} = \frac{1 - \text{Salvage Ratio}}{\text{Estimated Average Life}}$$

As evident from the above, this equation consists of two elements. The first element reflects recovery of the initial investment. The second element reflects recovery of net salvage. As we previously indicated, the purpose of considering net salvage in determining the accrual rate is to credit salvage and recover cost of removal over the life of the property.

An underlying assumption of the whole life method is that for mass property accounts, as property is retired, and new property is installed, the average service life of the group does not change significantly. The whole life method is predicated on homogeneity of the property units included in this group. For mass property accounts that have significant retirement history, where vintage retirement history is available, and where we consider life characteristics in the future to be similar to those observed in the past, we use an actuarial analysis as the principal basis to estimate average service life.

The basic equation used to determine a remaining life depreciation rate is as follows:

$$\text{Remaining Life Rate} = \frac{1 - \text{Salvage Ratio} - \text{Reserve Ratio}}{\text{Estimated Average Remaining Life}}$$

As demonstrated above, the whole life and remaining life equations are comparable. The only difference is, as the names imply, that under the whole life approach, investment is recovered equally over the entire life. With the remaining life method, undepreciated investment is recovered over the remaining life. So long as no change in life or other characteristics occur, the whole life and remaining life depreciation rates will be the same.

In order to develop the annual accrual rates for the mass property accounts using the whole life methodology, we determine the expected average service life and the general survivor curve type that reasonably approximates retirement experience. JEA provided available detailed historical data for each mass property account. This data includes additions, retirements and transfers by vintage and transaction year from beginning of fiscal year 2000 through calendar year 2018.

Upon receipt of this data, we verified its reasonableness and accuracy. In addition, we adjusted certain data to eliminate negative vintage year and account balances. We analyze in detail the

original cost additions by vintage year along with retirements and adjustments for each year in which data was provided to develop survivor curves based on the life (retirement) history of each mass property account. “Stub survivor curves” are developed since the development of a complete survivor curve is not possible until all properties have been retired. Theoretically, a complete survivor curve can only be developed after a period of time equal to approximately twice the average service life and then only if the number of property units retired is sufficient to produce meaningful results. As we previously discussed, we are able to generate reasonable results for many accounts, however the results of the analyses were generally not statistically robust. Additionally, the actuarial results generally indicate lower depreciation rates than those currently used by JEA as well as those resulting from our survey of comparable utilities. For accounts that produced curve fits, we used the resulting average service lives as a directional guide for making our depreciation recommendation. We have summarized the actuarial results in Table 5-1.

We base our recommendation of indicated depreciation accrual rates on a number of factors. In general, for accounts where the existing depreciation rate is within the bounds of our comparable utility survey and the account is not heavily depreciated, we have left the rate unchanged. For those mass property accounts which fall outside of the bounds of the comparable utilities and have a reserve ratio greater than 50 percent, we use our actuarial results to provide an indication of whether the lives are trending shorter and adjusted the depreciation recommendation accordingly. As a result, we shifted the depreciation rates gradually towards the median for several accounts where the actuarial results indicate actual experience is much different from the depreciation rate. In Tables 5-2 through 5-4, we summarize existing and indicated base accrual rates for each mass property account. Although no net salvage ratio is explicitly stated for these accounts, inherent in the results observed for the surveyed utilities is an implicit allowance.

For general plant, we analyzed the data for the electric, water and wastewater utilities together. We set the depreciation rates applicable to water and wastewater general plant equal to the rates for electric utility. We are unaware of any justification for general plant depreciation rates to differ dramatically between the various utilities. This approach is consistent with our previous study and JEA’s current practice.

Table 5-1 Depreciation Rate Analysis – Mass Property Accounts Retirement Analysis

		Actuarial Indicated			Benchmark Survey	
Acct.	Description	ASL [1]	Rate [2]	JEA Existing	Median	3rd Quartile
	Electric Mass Property					
352	Structures and Improvements	60	1.67%	2.24%	1.78%	1.96%
353	Station Equipment	50	2.00%	2.54%	1.99%	2.30%
354	Towers and Fixtures	no fit	na	2.14%	1.69%	2.00%
355	Poles and Attachments	50	2.00%	3.24%	2.35%	3.51%
356	Overhead Conductor and Devices	65	1.54%	2.51%	2.00%	2.33%
357	Underground Conduit	no fit	na	1.81%	1.63%	1.80%
358	Underground Conductor and Devices	70	1.43%	2.18%	1.87%	2.26%
359	Roads and Trails	no fit	na	1.76%	1.49%	1.64%
361	Structures and Improvements	55	1.82%	2.43%	1.60%	1.76%
362	Station Equipment	45	2.22%	2.57%	2.08%	2.40%
364	Poles, Towers, and Fixtures	43	2.33%	4.20%	3.58%	4.00%
365	Overhead Conductor and Devices	35	2.86%	4.24%	2.72%	3.26%
366	Underground Conduit	60	1.67%	2.33%	1.81%	2.02%
367	Underground Conductor and Devices	45	2.22%	2.90%	1.99%	2.40%
368	Line Transformers	32	3.13%	3.62%	2.82%	3.40%
369	Services	30	3.33%	4.66%	2.92%	3.53%
370	Meters	20	5.00%	6.68%	6.51%	7.19%
373	Street Light and Signal Systems	19	5.26%	5.27%	3.87%	4.55%
	Water Mass Property					
804.2	Structures & Improvements	40	2.50%	3.03%	3.03%	3.13%
805.2	Collecting & Impounding Reservoirs	50	2.00%	2.00%	2.00%	2.00%
806.2	Lake, River & Other Intakes	no fit	na	2.50%	2.50%	2.50%
807.2	Wells & Springs	50	2.00%	3.33%	3.33%	3.70%
808.2	Infiltration Galleries & Tunnels	no fit	na	2.50%	2.50%	2.50%
809.2	Supply Mains	40	2.50%	2.86%	2.86%	3.13%
810.2	Power Generation Equipment	25	4.00%	5.00%	5.00%	5.88%
811.2	Pumping Equipment	30	3.33%	5.00%	5.00%	5.22%
804.4	Structures & Improvements	40	2.50%	3.03%	3.03%	3.13%
811.4	Pumping Equipment	30	3.33%	5.00%	5.00%	5.22%
830.4	Distribution Reservoirs & Standpipes	38	2.63%	3.07%	2.70%	2.87%
831.4	Transmission & Distribution Mains	55	1.82%	2.33%	2.33%	2.53%
833.4	Services	55	1.82%	2.50%	2.50%	2.59%
834.4	Meters & Meter Installations	25	4.00%	6.67%	5.00%	5.22%
835.4	Hydrants	50	2.00%	2.22%	2.22%	2.50%
836.4	Backflow Prevention Devices	20	5.00%	6.67%	6.67%	6.67%
839.4	Other Plant & Miscellaneous Equipment	12	8.33%	4.00%	5.00%	5.56%
	Wastewater Mass Property					
854.2	Structures & Improvements	50	2.00%	3.13%	3.13%	3.70%
855.2	Power Generation Equipment	25	4.00%	5.00%	5.00%	5.00%
860.2	Collection Sewers - Force	40	2.50%	3.33%	3.33%	3.70%
861.2	Collection Sewers - Gravity	50	2.00%	2.23%	2.22%	2.50%
862.2	Special Collecting Sewers	35	2.86%	2.50%	2.60%	3.03%
863.2	Services to Customers	50	2.00%	2.63%	2.63%	2.86%
864.2	Flow Measuring Devices	25	4.00%	10.00%	20.00%	20.00%
865.2	Flow Measuring Installations	30	3.33%	5.96%	2.63%	2.63%
889.2	Other Plant & Miscellaneous Equipment	20	5.00%	6.25%	5.56%	6.67%
854.3	Structures & Improvements	50	2.00%	3.13%	3.13%	3.70%
855.3	Power Generation Equipment	25	4.00%	5.00%	5.00%	5.00%
870.3	Receiving Wells	40	2.50%	3.33%	3.67%	4.39%
871.3	Pumping Equipment	35	2.86%	5.00%	5.56%	5.56%
889.3	Other Plant & Miscellaneous Equipment	20	5.00%	6.25%	5.56%	6.67%
854.5	Structures & Improvements	50	2.00%	3.13%	3.13%	3.70%
855.5	Power Generation Equipment	25	4.00%	5.00%	5.00%	5.00%
871.5	Pumping Equipment	35	2.86%	5.00%	5.56%	5.56%
874.5	Reuse Distribution Reservoirs	no fit	na	2.70%	2.70%	2.70%
880.5	Treatment & Disposal Equipment	no fit	na	5.56%	5.56%	6.67%
854.6	Structures & Improvements	50	2.00%	3.13%	3.13%	3.70%
867.6	Reuse Meters & Meter Installations	no fit	na	6.67%	3.33%	3.70%
875.6	Reuse Transmission & Distribution System	no fit	na	2.33%	2.60%	3.03%

(Continued next page)

Acct.	Description	Actuarial Indicated ASL [1]	Actuarial Indicated Rate [2]	JEA Existing	Benchmark Survey Median	Benchmark Survey 3rd Quartile
	Combined General Plant Mass Property					
	Computer Hardware	10	10.00%	20.00%	14.22%	19.89%
	Computer Software	no fit	na	20.00%	14.22%	19.89%
	Structures and Improvements	35	2.86%	3.07%	2.30%	2.83%
	Office Furniture and Equipment	10	10.00%	4.00%	6.16%	10.77%
	Transportation Equipment	19	5.33%	7.50%	5.48%	8.29%
	Stores Equipment	15	6.67%	5.39%	4.67%	5.23%
	Tools, Shop, and Garage Equipment	16	6.33%	6.69%	5.00%	6.67%
	Laboratory Equipment	18	5.56%	4.00%	5.70%	6.67%
	Mobile Equipment	18	5.56%	6.63%	5.99%	8.39%
	Communications Equipment	22	4.55%	6.66%	5.68%	10.18%
	Miscellaneous Equipment	25	4.00%	4.00%	5.00%	5.67%
	Other Tangible Property	12	8.33%	8.67%	0.00%	0.00%

(1) Average Service Life rounded to full year.
(2) Excludes allowance for net salvage

Table 5-2 Summary of Existing and Indicated Rates for Mass Property Accounts – Electric Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
	FERC		Depreciable	Base Accrual Rate		Difference in Depreciation	
Line	Acct.	Description	Plant [1]	Existing	Indicated [2]	Amount	Percent
		Transmission					
1	352	Structures and Improvements	45,145,402	2.24%	2.24%	-	0.00%
2	353	Station Equipment	295,722,832	2.54%	2.54%	-	0.00%
3	354	Towers and Fixtures	28,587,227	2.14%	1.92%	(62,892)	-10.28%
4	355	Poles and Attachments	94,388,985	3.24%	2.80%	(415,312)	-13.58%
5	356	Overhead Conductor and Devices	71,827,128	2.51%	2.26%	(179,568)	-9.96%
6	357	Underground Conduit	14,683,400	1.81%	1.72%	(13,215)	-4.97%
7	358	Underground Conductor and Devices	19,292,889	2.18%	2.03%	(28,939)	-6.88%
8	359	Roads and Trails	5,946,643	1.76%	1.76%	-	0.00%
9		Total Transmission	$ 575,594,505	*2.57%*	*2.45%*	$ (699,926)	*-4.73%*
10		Distribution					
11	361	Structures and Improvements	31,566,648	2.43%	2.43%	-	0.00%
12	362	Station Equipment	176,187,487	2.57%	2.49%	(140,950)	-3.11%
13	364	Poles, Towers, and Fixtures	136,365,866	4.20%	4.10%	(136,366)	-2.38%
14	365	Overhead Conductor and Devices	248,344,773	4.24%	3.91%	(819,538)	-7.78%
15	366	Underground Conduit	279,928,517	2.33%	2.33%	-	0.00%
16	367	Underground Conductor and Devices	352,470,826	2.90%	2.90%	-	0.00%
17	368	Line Transformers	428,536,484	3.62%	3.62%	-	0.00%
18	369	Services	159,770,558	4.66%	4.09%	(910,692)	-12.23%
19	370	Meters	130,586,769	6.68%	6.68%	1,306	0.01%
20	373	Street Light and Signal Systems	117,265,225	5.27%	5.27%	-	0.00%
21		Total Distribution	$ 2,061,023,153	*3.70%*	*3.60%*	$ (2,006,240)	*-2.63%*
22		General Plant					
23	382	Computer Hardware	48,339,146	20.00%	20.00%	-	0.00%
24	383	Computer Software	94,175,510	20.00%	20.00%	-	0.00%
25	390	Structures and Improvements	89,417,769	3.07%	2.86%	(187,777)	-6.84%
26	391	Office Furniture and Equipment	4,990,887	4.00%	4.00%	-	0.00%
27	392	Transportation Equipment	69,996,893	7.50%	7.50%	-	0.00%
28	393	Stores Equipment	1,292,666	5.39%	4.67%	(9,307)	-13.36%
29	394	Tools, Shop, and Garage Equipment	10,834,451	6.69%	6.33%	(39,004)	-5.38%
30	395	Laboratory Equipment	4,304,576	4.00%	5.56%	67,151	39.00%
31	396	Mobile Equipment	8,569,709	6.63%	5.56%	(91,696)	-16.14%
32	397	Communications Equipment	65,491,574	6.66%	6.66%	-	0.00%
33	398	Miscellaneous Equipment	3,548,428	4.00%	4.00%	-	0.00%
34	399	Other Tangible Property	9,475,117	8.67%	8.67%	-	0.00%
35		Total General Plant	$ 410,436,725	*10.61%*	*10.55%*	$ (260,633)	*-0.60%*
36		TOTAL MASS PROPERTY	$ 3,047,054,383	*4.41%*	*4.32%*	$ (2,966,799)	*-2.21%*

(1) As of December 2018

(2) Representative of results derived from retirement analyses and comparable utilities survey.

Table 5-3 Summary of Existing and Indicated Rates for Mass Property Accounts – Water Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
			Depreciable	Base Accrual Rate		Difference in Depreciation	
Line	Account No.	Description	Plant [1]	Existing	Indicated [2]	Amount	Percent
1		Source of Supply & Pumping Plant					
2	804.2	Structures & Improvements	25,785,447	3.03%	3.03%	-	0.00%
3	805.2	Collecting & Impounding Reservoirs	20,847,194	2.00%	2.00%	-	0.00%
4	806.2	Lake, River & Other Intakes	90,296	2.50%	2.50%	-	0.00%
5	807.2	Wells & Springs	38,037,422	3.33%	3.33%	-	0.00%
6	808.2	Infiltration Galleries & Tunnels	-	2.50%	2.50%	-	0.00%
7	809.2	Supply Mains	20,869,658	2.86%	2.68%	(37,565)	-6.29%
8	810.2	Power Generation Equipment	9,411,305	5.00%	4.50%	(47,057)	-10.00%
9	811.2	Pumping Equipment	34,755,303	5.00%	5.00%	-	0.00%
10		Total Source of Supply & Pumping Plant	$ 149,796,626	*3.52%*	*3.46%*	$ (84,622)	-1.61%
11		Transmission & Distribution Plant					
12	804.4	Structures & Improvements	4,087,780	3.03%	2.50%	(21,665)	-17.49%
13	811.4	Pumping Equipment	2,789,842	5.00%	5.00%	-	0.00%
14	830.4	Distribution Reservoirs & Standpipes	5,931,919	3.07%	2.85%	(13,050)	-7.17%
15	831.4	Transmission & Distribution Mains	781,704,579	2.33%	2.33%	-	0.00%
16	833.4	Services	128,210,765	2.50%	2.50%	-	0.00%
17	834.4	Meters & Meter Installations	254,437,858	6.67%	6.67%	-	0.00%
18	835.4	Hydrants	59,604,454	2.22%	2.22%	-	0.00%
19	836.4	Backflow Prevention Devices	717,542	6.67%	5.00%	(11,983)	-25.04%
20	839.4	Other Plant & Miscellaneous Equipment	7,045	4.00%	4.00%	-	0.00%
21		Total Transmission & Distribution Plant	$ 1,237,491,785	*3.25%*	*3.25%*	$ (46,698)	-0.12%
22		General Plant					
23	804.5	Structures & Improvements	89,638,438	3.03%	2.86%	(152,385)	-5.61%
24	840.51	Computer Equipment	31,732,252	20.00%	20.00%		
25	840.52	Office Furniture & Equipment	5,103,572	4.00%	4.00%	-	0.00%
26	841.5	Transportation Equipment	31,578,242	7.50%	7.50%	-	0.00%
27	842.5	Stores Equipment	849,709	5.39%	4.67%	(6,118)	-13.36%
28	843.5	Tools, Shop & Garage Equipment	3,112,614	6.69%	6.33%	(11,205)	-5.38%
29	844.5	Laboratory Equipment	1,880,908	4.00%	5.56%	29,342	39.00%
30	845.5	Power Operated Equipment	4,715,975	6.63%	5.56%	(50,461)	-16.14%
31	846.5	Communication Equipment	44,379,865	6.66%	6.66%	-	0.00%
32	847.5	Miscellaneous Equipment	1,460,681	4.00%	4.00%	-	0.00%
33	848.5	Other Tangible Equipment	30,207,882	8.67%	8.67%	-	0.00%
34		Total General Plant	$ 244,660,139	*7.32%*	*7.24%*	$ (190,827)	-1.07%
35		TOTAL MASS PROPERTY	$ 1,631,948,549	*3.88%*	*3.86%*	$ (322,148)	-0.51%

(1) As of December 2018

(2) Representative of results derived from retirement analyses and comparable utilities survey.

Table 5-4 Summary of Existing and Indicated Rates for Mass Property Accounts – Wastewater Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
			Depreciable	Base Accrual Rate		Difference in Depreciation	
Line	Account No.	Description	Plant [1]	Existing	Indicated [2]	Amount	Percent
		Collection Plant					
1	854.2	Structures & Improvements	354,534	3.13%	3.13%	-	0.00%
2	855.2	Power Generation Equipment	102,592	5.00%	4.50%	(513)	-10.00%
3	860.2	Collection Sewers - Force	386,829,533	3.33%	3.33%	-	0.00%
4	861.2	Collection Sewers - Gravity	1,010,062,614	2.23%	2.23%	-	0.00%
5	862.2	Special Collecting Sewers	270,818	2.50%	2.50%	-	0.00%
6	863.2	Services to Customers	98,381,471	2.63%	2.63%	-	0.00%
7	864.2	Flow Measuring Devices	102,479	10.00%	10.00%	-	0.00%
8	865.2	Flow Measuring Installations	93,017	5.96%	3.33%	(2,446)	-44.12%
9	889.2	Other Plant & Miscellaneous Equipment	23,952	6.25%	5.00%	(299)	-19.97%
10		Total Collection Plant	$ 1,496,221,009	*2.54%*	*2.54%*	$ (3,258)	*-0.01%*
11		System Pumping Plant					
12	854.3	Structures & Improvements	139,507,296	3.13%	3.13%	-	0.00%
13	855.3	Power Generation Equipment	28,669,567	5.00%	4.50%	(143,348)	-10.00%
14	870.3	Receiving Wells	22,873,020	3.33%	3.67%	77,768	10.21%
15	871.3	Pumping Equipment	206,995,669	5.00%	5.00%	-	0.00%
16	889.3	Other Plant & Miscellaneous Equipment	2,771,750	6.25%	5.00%	(34,647)	-20.00%
17		Total System Pumping Plant	$ 400,817,302	*4.26%*	*4.24%*	$ (100,227)	*-0.59%*
18		Reclaimed Water Plant					
19	854.5	Structures & Improvements	27,316,662	3.13%	3.13%	-	0.00%
20	855.5	Power Generation Equipment	345,980	5.00%	4.50%	(1,730)	-10.00%
21	871.5	Pumping Equipment	6,816,866	5.00%	5.00%	-	0.00%
22	874.5	Reuse Distribution Reservoirs	305,860	2.70%	2.70%	-	0.00%
23	880.5	Treatment & Disposal Equipment	18,225,367	5.56%	5.56%	-	0.00%
24	881.5	Reuse Plant Sewers	368,589	5.56%	3.20%	(8,699)	-42.45%
25		Total Reclaimed Water Plant	$ 53,379,325	*4.22%*	*4.21%*	$ (10,429)	-0.46%
26		Reclaimed Water Distribution Plant					
27	854.6	Structures & Improvements	353,681	3.13%	3.13%	-	0.00%
28	866.6	Reuse Services	3,924,693	3.64%	3.64%	-	0.00%
29	867.6	Reuse Meters & Meter Installations	1,006,498	6.67%	6.67%	-	0.00%
30	871.6	Reuse Pumping Equipment	1,507,975	5.00%	5.00%	-	0.00%
31	875.6	Reuse Transmission & Distribution System	77,230,635	2.33%	2.33%	-	0.00%
32	889.6	Reuse Other Miscellaneous Equipment	17,329	5.56%	5.56%	-	0.00%
33		Reclaimed Water Distribution Plant	$ 84,040,809	*2.50%*	*2.50%*	$ -	*0.00%*
34		General Plant					
35	854.7	Structures & Improvements	5,788,116	3.13%	2.86%	(15,628)	-8.63%
36	890.71	Computer Equipment	6,779,450	20.00%	20.00%	-	0.00%
37	890.72	Office Furniture & Equipment	1,043,747	4.00%	4.00%	-	0.00%
38	891.7	Transportation Equipment	7,973,721	7.50%	7.50%	-	0.00%
39	892.7	Stores Equipment	25,846	5.39%	4.67%	(186)	-13.35%
40	893.7	Tools, Shop & Garage Equipment	3,869,171	6.69%	6.33%	(13,929)	-5.38%
41	894.7	Laboratory Equipment	1,362,624	4.00%	5.56%	21,257	39.00%
42	895.7	Power Operated Equipment	1,616,972	6.63%	5.56%	(17,302)	-16.14%
43	896.7	Communication Equipment	25,814,377	6.66%	6.66%	-	0.00%
44	897.7	Miscellaneous Equipment	1,130,612	4.00%	4.00%	-	0.00%
45	898.7	Other Tangible Equipment	18,940,881	0.00%	0.00%	-	0.00%
46		General Plant	$ 74,345,518	*5.87%*	*5.83%*	$ (25,788)	*-0.59%*
47		TOTAL MASS PROPERTY	$ 2,108,803,964	*3.03%*	*3.02%*	$ (139,702)	*-0.22%*

(1) As of December 2018

(2) Representative of results derived from retirement analyses and comparable utilities survey.

Table 5-5 Summary of Existing and Indicated Rates for Mass Property Accounts – Chilled Water Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
			Depreciable	Base Accrual Rate		Difference in Depreciation	
Line	Account No.	Description	Plant [(1)]	Existing	Indicated	Amount	Percent
1		Chilled Water					
2	303	CW Intangible Software - DES	-	10.00%	10.00%	$ -	0.00%
3	361	CW Structures and Improvements	-	4.00%	4.00%	-	0.00%
4	365	CW Overhead Conductor and Devices	-	4.00%	4.00%	-	0.00%
5	366	CW UG Conduit	6,510,694	4.00%	4.00%	-	0.00%
6	370	CW Meters	1,811,376	5.00%	5.00%	-	0.00%
7		Total Distribution	$ 8,322,071	*4.22%*	*4.22%*	$ -	0.00%
8		General Plant					
9	382	Computer Hardware	607,860	20.00%	20.00%	-	0.00%
10	383	Computer Software	322,130	20.00%	20.00%	-	0.00%
11	391	CW Office Furniture and Equipment	25,314	4.00%	4.00%	-	0.00%
12	394	CW Tools, Shop, and Garage Equipment	20,148	6.69%	6.33%	(72)	-5.33%
13	396	CW Mobile Equipment	46,917	6.63%	5.56%	(504)	-16.21%
14	397	CW Communications Equipment	1,264,578	6.66%	6.66%	-	0.00%
15		Total General Plant	$ 2,286,947	*12.05%*	*12.03%*	$ (576)	-0.21%
16		TOTAL MASS PROPERTY	$ 10,609,017	*5.91%*	*5.90%*	$ (576)	-0.09%

(1) As of December 2018

Section 6. Recommended Depreciation Rates

In Sections 4 and 5, we develop indicated depreciation expense rates for unit and mass property accounts, respectively. As the final step in developing recommended depreciation rates, we consider our experience, the adequacy of JEA's depreciation reserve levels, and other appropriate factors. In Tables 6-1 through 6-4, we summarize the development of our recommended rates.

As we describe in Section 5, for those mass property accounts for which we were unable to conduct retirement analyses, we rely on the depreciation rates charged by comparable utilities to inform our recommendation. We use the experience of other utilities in the expectation that the service lives and other considerations, which should go into the development of JEA's depreciation rates, are similar to those of these other utilities. We also factored JEA's depreciation reserve balances into our recommendation. The ratio of depreciation reserve to plant in service represents the reserve ratio. We do not expect this ratio, which provides a relative measure of the reserve, to exceed 50 percent (absent consideration for net salvage) for mature systems such as JEA. In general, we limited our recommendations regarding reducing depreciation rates to those accounts that had a reserve ratio greater than 50 percent for mass property accounts.

For both unit and mass properties, we recommend that reserves be transferred between accounts in the amounts shown in Column M of Tables 6-1 (electric), 6-2 (water), 6-3 (waste water), and 6-4 (chilled water). For unit properties, the transfers are generally recommended so that the number of years to depreciate the various accounts is comparable. For mass properties, the transfers are intended to generally reduce the reserve ratio to about 50 to 60 percent. As an initial step, to the extent practical, we transfer reserves (in $100,000 increments) between accounts with in the same category (i.e. steam production) so that the maximum reserve ratio does not exceed 50 percent. By this recommended transfer, we reduce the reserve associated with highly depreciated accounts which, in turn, increases the reserve to accounts less depreciated. However, we have limited the number of reserve transfers in this study to allow for easier tracking of the effect of the recommended depreciation rates on reserve accruals in JEA's next depreciation study.

Our recommended depreciation rates are set forth in Column Q of Tables 6-1, 6-2, 6-3, and 6-4 for the electric, water, wastewater and chilled water utilities, respectively. Overall, the depreciation expense resulting from our recommended rates decreases by 1.5 percent, or approximately $5.7 million.

Our recommended depreciation rates for the electric assets of JEA account for approximately $4.8 million of the reduction to depreciation. For the Steam Production accounts, our recommended depreciation rates result in a small decrease in the composite depreciation rate from 3.60 percent to 3.59 percent, resulting in a decrease of approximately $250,000. For the Other Production accounts, our recommended depreciation rates result in a decrease to the composite depreciation rate from 4.69 percent to 4.50 percent, resulting in a decrease of approximately $1.6 million to annual depreciation expense. The decrease for electric unit property is primarily the result of changes to lifespan estimates for the generation stations. Our recommendation is based on the current level of investment in electric production plant as well as the estimated life spans, capital expenditures and interim activities.

For the electric transmission accounts, our recommended depreciation rates result in a composite decrease from 2.57 percent to 2.45 percent, resulting in an approximate $700,000 reduction. We find that the current depreciation rates are higher than those indicated by our actuarial analysis of JEA's data and the majority of the comparable utilities in our benchmarking study. We recommend reducing depreciation only on the accounts with reserve ratios above 50 percent.

For the electric distribution accounts, our recommended depreciation rates result in a composite decrease from 3.70 percent to 3.60 percent, resulting in an approximate $2 million reduction. The primary drivers of this reduction are Overhead Conductor and Devices and Services which we recommend reducing annual depreciation by approximately $800,00 and $900,000, respectively. We find that JEA's current depreciation rates are higher than the majority of the comparable utilities in our benchmarking study. We also find that the results of our actuarial analysis indicate longer average service lives than the current depreciation rates would imply for these accounts. We recommended reducing depreciation only on the accounts with reserve ratios above 50 percent. Our recommendation adjusts these depreciation rates down to move partway toward the rates indicated in our analyses

Our recommended depreciation rates for the water assets of JEA is minor and spread across all functions. In total our recommended depreciation rates for water assets is approximately $370,000 of the overall reduction to depreciation.

Our recommended depreciation rates for the wastewater assets of JEA account for approximately $600,000 of the reduction to depreciation. Approximately $500,000 of this decrease to depreciation expense is related to wastewater treatment plants. Based on our unit property analysis of JEA's wastewater treatment plants, our recommended depreciation rates result in a decrease from 3.88 percent to 3.78 percent on a composite basis. The decrease is primarily driven by a change in expected lifespans of wastewater treatment plants. Our recommendation is based on the current level of investment in wastewater treatment plant as well as the estimated life spans, capital expenditures and interim activities.

There is minimal change recommended to chilled water assets based on our unit property analysis. Chilled water depreciation expense increases by $110,000 as a result of our recommendation.

We recommend JEA continue to maintain its books and records in accordance with the Uniform System of Accounts to build a more complete CPR for future depreciation studies. We further recommend JEA review the adequacy of its depreciation rates in five years

Table 6-1 Recommended Depreciation Rates – Electric Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]	[R]
								Depreciation	Depreciation Reserve							Recommended	
	Account		Dec. 31, 2018	Net	Total Cost	Base Accrual Rate		Expense	Existing Reserve		Yrs. To		Adjusted	Adjusted	Yrs. To	Accrual	Change In
Line	No.	Description	Plant Balance	Salvage	To Recover	Existing	Indicated	Difference	Amount	Ratio	Depreciate	Transfer	Reserve	Ratio	Depreciate	Rate	Expense
		Production Plant															
		Steam Production															
1	311	Structures and Improvements	126,192,041		126,192,041	3.51%	3.49%	(25,238)	69,830,879	55.34%	12.8	-	69,830,879	55.34%	12.8	3.49%	(25,238)
2	312	Boiler Plant Equipment	801,376,979		801,376,979	3.71%	3.69%	(160,275)	513,755,041	64.11%	9.7	-	513,755,041	64.11%	9.7	3.69%	(160,275)
3	314	Turbogenerator Units	335,201,417		335,201,417	3.38%	3.36%	(67,040)	204,013,240	60.86%	11.6	-	204,013,240	60.86%	11.6	3.36%	(67,040)
4	315	Accessory Generation Equipment	50,626,674		50,626,674	3.43%	3.55%	60,752	16,646,402	32.88%	18.9	-	16,646,402	32.88%	18.9	3.55%	60,752
5	316	Miscellaneous Power Plant Equipment	21,253,558		21,253,558	4.14%	3.86%	(59,510)	12,075,541	56.82%	11.2	-	12,075,541	56.82%	11.2	3.86%	(59,510)
6		Total Steam Production	$ 1,334,650,668		$ 1,334,650,669	*3.60%*	*3.59%*	$ (251,311)	$ 816,321,103	61.16%	10.8	$ -	$ 816,321,103	61.16%	10.8	3.59%	$ (251,311)
7		Other Production															
8	341	Structures and Improvements	65,594,091		65,594,091	4.10%	3.82%	(183,663)	35,091,062	53.50%	12.2	-	35,091,062	53.50%	12.2	3.82%	(183,663)
9	342	Fuel Holders	74,624,637		74,624,637	4.90%	4.64%	(194,024)	30,027,865	40.24%	12.9	-	30,027,865	40.24%	12.9	4.64%	(194,024)
10	343	Prime Movers	285,893,748		285,893,748	4.83%	4.73%	(285,894)	101,264,088	35.42%	13.7	-	101,264,088	35.42%	13.7	4.73%	(285,894)
11	344	Generators	348,210,074		348,210,074	4.75%	4.48%	(940,167)	248,131,858	71.26%	6.4	-	248,131,858	71.26%	6.4	4.48%	(940,167)
12	345	Accessory Electrical Equipment	49,770,187		49,770,187	4.02%	4.05%	14,931	18,058,369	36.28%	15.7	-	18,058,369	36.28%	15.7	4.05%	14,931
13	346	Miscellaneous Power Plant Equipment	7,723,919		7,723,919	3.90%	3.98%	6,179	3,282,970	42.50%	14.4	-	3,282,970	42.50%	14.4	3.98%	6,179
14		Total Other Production	$ 831,816,656		$ 831,816,656	*4.69%*	*4.50%*	$ (1,582,638)	$ 435,856,212	52.40%	10.6	$ -	$ 435,856,212	52.40%	10.6	4.50%	$ (1,582,638)
15		TOTAL PRODUCTION	$ 2,166,467,324		2,166,467,325	*4.02%*	*3.94%*	(1,833,949)	$ 1,252,177,316	*57.80%*	10.7	$ -	$ 1,252,177,316	57.80%	10.7	3.94%	$ (1,833,949)
16		Transmission															
17	352	Structures and Improvements	45,145,402	0.0%	45,145,402	2.24%	2.24%	-	9,149,302	20.27%	35.6	-	9,149,302	20.27%	35.6	2.24%	-
18	353	Station Equipment	295,722,832	0.0%	295,722,832	2.54%	2.54%	-	126,454,309	42.76%	22.5	-	126,454,309	42.76%	22.5	2.54%	-
19	354	Towers and Fixtures	28,587,227	0.0%	28,587,227	2.14%	1.92%	(62,892)	17,713,660	61.96%	19.8	-	17,713,660	61.96%	19.8	1.92%	(62,892)
20	355	Poles and Attachments	94,388,985	0.0%	94,388,985	3.24%	2.80%	(415,312)	67,853,614	71.89%	10.0	-	67,853,614	71.89%	10.0	2.80%	(415,312)
21	356	Overhead Conductor and Devices	71,827,128	0.0%	71,827,128	2.51%	2.26%	(179,568)	44,083,708	61.37%	17.1	-	44,083,708	61.37%	17.1	2.26%	(179,568)
22	357	Underground Conduit	14,683,400	0.0%	14,683,400	1.81%	1.72%	(13,215)	7,501,505	51.09%	28.4	-	7,501,505	51.09%	28.4	1.72%	(13,215)
23	358	Underground Conductor and Devices	19,292,889	0.0%	19,292,889	2.18%	2.03%	(28,939)	11,324,921	58.70%	20.3	-	11,324,921	58.70%	20.3	2.03%	(28,939)
24	359	Roads and Trails	5,946,643	0.0%	5,946,643	1.76%	1.76%	-	1,862,501	31.32%	39.0	-	1,862,501	31.32%	39.0	1.76%	-
25		Total Transmission	$ 575,594,505		$ 575,594,506	*2.57%*	*2.45%*	$ (699,926)	$ 285,943,519	49.68%	20.6	$ -	$ 285,943,519	49.68%	20.6	2.45%	$ (699,926)
26		Distribution															
27	361	Structures and Improvements	31,566,648	0.0%	31,566,648	2.43%	2.43%	-	13,141,550	41.63%	24.0	-	13,141,550	41.63%	24.0	2.43%	-
28	362	Station Equipment	176,187,487	0.0%	176,187,487	2.57%	2.49%	(140,950)	102,373,566	58.10%	16.8	-	102,373,566	58.10%	16.8	2.49%	(140,950)
29	364	Poles, Towers, and Fixtures	136,365,866	-5.0%	143,184,159	4.20%	4.10%	(136,366)	81,146,577	59.51%	11.1	-	81,146,577	59.51%	11.1	4.10%	(136,366)
30	365	Overhead Conductor and Devices	248,344,773	0.0%	248,344,773	4.24%	3.91%	(819,538)	143,643,794	57.84%	10.8	-	143,643,794	57.84%	10.8	3.91%	(819,538)
31	366	Underground Conduit	279,928,517	0.0%	279,928,517	2.33%	2.33%	-	130,646,138	46.67%	22.9	-	130,646,138	46.67%	22.9	2.33%	-
32	367	Underground Conductor and Devices	352,470,826	0.0%	352,470,826	2.90%	2.90%	-	164,551,993	46.69%	18.4	-	164,551,993	46.69%	18.4	2.90%	-
33	368	Line Transformers	428,536,484	0.0%	428,536,484	3.62%	3.62%	-	184,052,403	42.95%	15.8	-	184,052,403	42.95%	15.8	3.62%	-
34	369	Services	159,770,558	0.0%	159,770,558	4.66%	4.09%	(910,692)	115,817,055	72.49%	6.7	-	115,817,055	72.49%	6.7	4.09%	(910,692)
35	370	Meters	130,586,769	0.0%	130,586,769	6.68%	6.68%	-	71,131,199	54.47%	6.8	-	71,131,199	54.47%	6.8	6.68%	-
36	373	Street Light and Signal Systems	117,265,225	0.0%	117,265,225	5.27%	5.27%	-	65,084,386	55.50%	8.4	-	65,084,386	55.50%	8.4	5.27%	-
37		Total Distribution	$ 2,061,023,153		$ 2,067,841,446	*3.70%*	*3.60%*	$ (2,007,546)	$ 1,071,588,661	51.99%	13.4	$ -	$ 1,071,588,661	51.99%	13.4	3.60%	$ (2,007,546)
38		General Plant															
39	382	Computer Hardware	48,339,146	0.0%	48,339,146	20.00%	20.00%	-	47,510,558	98.29%	0.1	-	47,510,558	98.29%	0.1	20.00%	-
40	383	Computer Software	94,175,510	0.0%	94,175,510	20.00%	20.00%	-	90,794,452	96.41%	0.2	-	90,794,452	96.41%	0.2	20.00%	-
41	390	Structures and Improvements	89,417,769	0.0%	89,417,769	3.07%	2.86%	(187,777)	39,570,912	44.25%	19.5	1,000,000	40,570,912	45.37%	19.1	2.86%	(187,777)
42	391	Office Furniture and Equipment	4,990,887	0.0%	4,990,887	4.00%	4.00%	-	3,818,856	76.52%	5.9	(500,000)	3,318,856	66.50%	8.4	4.00%	-
43	392	Transportation Equipment	69,996,893	20.0%	55,997,514	7.50%	7.50%	-	43,832,862	62.62%	2.3	-	43,832,862	62.62%	2.3	7.50%	-
44	393	Stores Equipment	1,292,666	0.0%	1,292,666	5.39%	4.67%	(9,307)	1,084,864	83.92%	3.4	(300,000)	784,864	60.72%	8.4	4.67%	(9,307)
45	394	Tools, Shop, and Garage Equipment	10,834,451	5.0%	10,292,729	6.69%	6.33%	(39,004)	6,480,624	59.81%	5.6	-	6,480,624	59.81%	5.6	6.33%	(39,004)
46	395	Laboratory Equipment	4,304,576	0.0%	4,304,576	4.00%	5.56%	67,151	2,637,008	61.26%	7.0	-	2,637,008	61.26%	7.0	5.56%	67,151
47	396	Mobile Equipment	8,569,709	0.0%	8,569,709	6.63%	5.56%	(91,696)	6,763,984	78.93%	3.8	(200,000)	6,563,984	76.60%	4.2	5.56%	(91,696)
48	397	Communications Equipment	65,491,574	0.0%	65,491,574	6.66%	6.66%	-	51,676,491	78.91%	3.2	-	51,676,491	78.91%	3.2	6.66%	-
49	398	Miscellaneous Equipment	3,548,428	0.0%	3,548,428	4.00%	4.00%	-	2,644,592	74.53%	6.4	-	2,644,592	74.53%	6.4	4.00%	-
50	399	Other Tangible Property	9,475,117	0.0%	9,475,117	8.67%	8.67%	-	821,493	8.67%	10.5	-	821,493	8.67%	10.5	8.67%	-
51		Total General Plant	$ 410,436,725		$ 395,895,625	*10.61%*	*10.55%*	$ (260,633)	$ 297,636,696	72.52%	2.3	$ -	$ 297,636,696	72.52%	2.3	10.55%	$ (260,633)
52		TOTAL MASS PROPERTY	$ 3,047,054,383		$ 3,039,331,577	*4.41%*	*4.32%*	$ (2,968,105)	$ 1,655,168,876	54.32%	10.5	$ -	$ 1,655,168,876	54.32%	10.5	4.32%	$ (2,968,105)
53		GRAND TOTAL	$ 5,213,521,708		$ 5,205,798,902	*4.25%*	*4.16%*	$ (4,802,054)	$ 2,907,346,191	55.77%	10.6	$ -	$ 2,907,346,191	55.77%	10.6	4.16%	$ (4,802,054)

Table 6-2 Recommended Depreciation Rates – Water Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]	[R]
								Depreciation	Depreciation Reserve							Recommended	
Line	Account		Dec. 31, 2018	Net	Total Cost	Base Accrual Rate		Expense	Existing Reserve		Yrs. To		Adjusted	Adjusted	Yrs. To	Accrual	Change In
No.	No.	Description	Plant Balance	Salvage	To Recover	Existing	Indicated	Difference	Amount	Ratio	Depreciate	Transfer	Reserve	Ratio	Depreciate	Rate	Expense
1		Source of Supply & Pumping Plant															
2	804.2	Structures & Improvements	25,785,447	0.0%	25,785,447	3.03%	3.03%	-	13,532,152	52.48%	15.7	-	13,532,152	52.48%	15.7	3.03%	-
3	805.2	Collecting & Impounding Reservoirs	20,847,194	0.0%	20,847,194	2.00%	2.00%	-	7,154,073	34.32%	32.8	2,000,000	9,154,073	43.91%	28.0	2.00%	-
4	806.2	Lake, River & Other Intakes	90,296	0.0%	90,296	2.50%	2.50%	-	46,902	51.94%	19.2	-	46,902	51.94%	19.2	2.50%	-
5	807.2	Wells & Springs	38,037,422	0.0%	38,037,422	3.33%	3.33%	-	17,476,452	45.95%	16.2	-	17,476,452	45.95%	16.2	3.33%	-
7	809.2	Supply Mains	20,869,658	0.0%	20,869,658	2.86%	2.68%	(37,565)	9,667,819	46.32%	20.0	-	9,667,819	46.32%	20.0	2.68%	(37,565)
8	810.2	Power Generation Equipment	9,411,305	0.0%	9,411,305	5.00%	4.50%	(47,057)	5,591,356	59.41%	9.0	-	5,591,356	59.41%	9.0	4.50%	(47,057)
9	811.2	Pumping Equipment	34,755,303	0.0%	34,755,303	5.00%	5.00%	-	22,673,129	65.24%	7.0	(2,000,000)	20,673,129	59.48%	8.1	5.00%	-
10		Total Source of Supply & Pumping Plant	$ 149,796,626		$ 149,796,625	*3.52%*	*3.46%*	$ (84,622)	$ 76,141,883	50.83%	14.2	$ -	$ 76,141,883	50.83%	14.2	3.46%	$ (84,622)
11		Water Treatment Plant															
12	804.3	Structures & Improvements	97,184,770		97,184,770	4.31%	4.22%	(87,466)	38,445,882	39.56%	14.3	-	38,445,882	39.56%	14.3	4.22%	(87,466)
13	811.3	Pumping Equipment	9,505,306		9,505,306	5.00%	5.00%	-	4,389,106	46.18%	10.8	-	4,389,106	46.18%	10.8	5.00%	-
14	820.3	Water Treatment Equipment	46,400,350		46,400,350	3.86%	3.94%	37,120	20,324,426	43.80%	14.3	-	20,324,426	43.80%	14.3	3.94%	37,120
15	839.3	Other Plant & Miscellaneous Equipment	43,798		43,798	4.00%	4.00%	-	41,539	94.84%	1.3	-	41,539	94.84%	1.3	4.00%	-
16		Total Water Treatment Plant	$ 153,134,224		$ 153,134,224	*4.22%*	*4.18%*	$ (50,346)	$ 63,200,953	41.27%	14.0	$ -	$ 63,200,953	41.27%	14.0	4.18%	$ (50,346)
17		Transmission & Distribution Plant															
18	804.4	Structures & Improvements	4,087,780	0.0%	4,087,780	3.03%	2.50%	(21,665)	3,074,382	75.21%	9.9	(1,000,000)	2,074,382	50.75%	19.7	2.50%	(21,665)
19	811.4	Pumping Equipment	2,789,842	0.0%	2,789,842	5.00%	5.00%	-	117,490	4.21%	19.2	800,000	917,490	32.89%	13.4	5.00%	-
20	830.4	Distribution Reservoirs & Standpipes	5,931,919	0.0%	5,931,919	3.07%	2.85%	(13,050)	2,799,453	47.19%	18.5	-	2,799,453	47.19%	18.5	2.85%	(13,050)
21	831.4	Transmission & Distribution Mains	781,704,579	0.0%	781,704,579	2.33%	2.33%	-	247,097,434	31.61%	29.4	500,000	247,597,434	31.67%	29.3	2.33%	-
22	833.4	Services	128,210,765	0.0%	128,210,765	2.50%	2.50%	-	55,433,022	43.24%	22.7	-	55,433,022	43.24%	22.7	2.50%	-
23	834.4	Meters & Meter Installations	254,437,858	0.0%	254,437,858	6.67%	6.67%	-	120,235,017	47.26%	7.9	-	120,235,017	47.26%	7.9	6.67%	-
24	835.4	Hydrants	59,604,454	0.0%	59,604,454	2.22%	2.22%	-	17,932,014	30.09%	31.5	-	17,932,014	30.09%	31.5	2.22%	-
25	836.4	Backflow Prevention Devices	717,542	0.0%	717,542	6.67%	5.00%	(11,983)	656,158	91.45%	1.7	(300,000)	356,158	49.64%	10.1	5.00%	(11,983)
26	839.4	Other Plant & Miscellaneous Equipment	7,045	0.0%	7,045	4.00%	4.00%	-	7,045	100.00%	0.0	-	7,045	100.00%	0.0	4.00%	-
27		Total Transmission & Distribution Plant	$ 1,237,491,785		$ 1,237,491,784	*3.25%*	*3.25%*	$ (46,698)	$ 447,352,015	36.15%	19.7	$ -	$ 447,352,015	36.15%	19.7	3.25%	$ (46,698)
28		General Plant															
29	804.5	Structures & Improvements	89,638,438	0.0%	89,638,438	3.03%	2.86%	(152,385)	38,556,756	43.01%	19.9	-	38,556,756	43.01%	19.9	2.86%	(152,385)
30	840.51	Computer Equipment	31,732,252	0.0%	31,732,252	20.00%	20.00%	-	31,464,656	99.16%	0.0	-	31,464,656	99.16%	0.0	20.00%	-
31	840.52	Office Furniture & Equipment	5,103,572	0.0%	5,103,572	4.00%	4.00%	-	5,050,404	98.96%	0.3	-	5,050,404	98.96%	0.3	4.00%	-
32	841.5	Transportation Equipment	31,578,242	20.0%	25,262,593	7.50%	7.50%	-	14,249,592	45.12%	4.7	-	14,249,592	45.12%	4.7	7.50%	-
33	842.5	Stores Equipment	849,709	0.0%	849,709	5.39%	4.67%	(6,118)	768,383	90.43%	2.0	-	768,383	90.43%	2.0	4.67%	(6,118)
34	843.5	Tools, Shop & Garage Equipment	3,112,614	5.0%	2,956,984	6.69%	6.33%	(11,205)	2,650,800	85.16%	1.6	-	2,650,800	85.16%	1.6	6.33%	(11,205)
35	844.5	Laboratory Equipment	1,880,908	0.0%	1,880,908	4.00%	5.56%	29,342	685,020	36.42%	11.4	-	685,020	36.42%	11.4	5.56%	29,342
36	845.5	Power Operated Equipment	4,715,975	0.0%	4,715,975	6.63%	5.56%	(50,461)	2,756,075	58.44%	7.5	-	2,756,075	58.44%	7.5	5.56%	(50,461)
37	846.5	Communication Equipment	44,379,865	0.0%	44,379,865	6.66%	6.66%	-	32,919,709	74.18%	3.9	-	32,919,709	74.18%	3.9	6.66%	-
38	847.5	Miscellaneous Equipment	1,460,681	0.0%	1,460,681	4.00%	4.00%	-	949,604	65.01%	8.7	-	949,604	65.01%	8.7	4.00%	-
39	848.5	Other Tangible Equipment	30,207,882	0.0%	30,207,882	8.67%	8.67%	-	30,207,882	100.00%	0.0	-	30,207,882	100.00%	0.0	8.67%	-
40		Total General Plant	$ 244,660,139		$ 238,188,859	*7.32%*	*7.24%*	$ (190,827)	$ 160,258,882	65.50%	4.4	$ -	$ 160,258,882	65.50%	4.4	7.24%	$ (190,827)
41		GRAND TOTAL	$ 1,785,082,773		$ 1,778,611,492	*3.91%*	*3.89%*	$ (372,493)	$ 746,953,733	*41.84%*	14.8	$ -	$ 746,953,733	*41.84%*	14.8	*3.89%*	$ (372,493)

Table 6-3 Recommended Depreciation Rates – Wastewater Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]	[R]
	Account		Dec. 31, 2018	Net	Total Cost	Base Accrual Rate		Depreciation Expense	Depreciation Reserve: Existing Reserve		Yrs. To		Adjusted	Adjusted	Yrs. To	Recommended Accrual	Change In
Line	No.	Description	Plant Balance	Salvage	To Recover	Existing	Indicated	Difference	Amount	Ratio	Depreciate	Transfer	Reserve	Ratio	Depreciate	Rate	Expense
		Collection Plant															
1	854.2	Structures & Improvements	354,534	0.00%	354,534	3.13%	3.13%	-	103,181	29.10%	22.7	-	103,181	29.10%	22.7	3.13%	-
2	855.2	Power Generation Equipment	102,592	0.00%	102,592	5.00%	4.50%	(513)	34,163	33.30%	14.8	-	34,163	33.30%	14.8	4.50%	(513)
3	860.2	Collection Sewers - Force	386,829,533	0.00%	386,829,533	3.33%	3.33%	-	160,858,004	41.58%	17.5	-	160,858,004	41.58%	17.5	3.33%	-
4	861.2	Collection Sewers - Gravity	1,010,062,614	0.00%	1,010,062,614	2.23%	2.23%	-	399,856,613	39.59%	27.1	-	399,856,613	39.59%	27.1	2.23%	-
5	862.2	Special Collecting Sewers	270,818	0.00%	270,818	2.50%	2.50%	-	183,492	67.75%	12.9	-	183,492	67.75%	12.9	2.50%	-
6	863.2	Services to Customers	98,381,471	0.00%	98,381,471	2.63%	2.63%	-	32,053,949	32.58%	25.6	-	32,053,949	32.58%	25.6	2.63%	0
7	864.2	Flow Measuring Devices	102,479	0.00%	102,479	10.00%	10.00%	-	91,235	89.03%	1.1	-	91,235	89.03%	1.1	10.00%	-
8	865.2	Flow Measuring Installations	93,017	0.00%	93,017	5.96%	3.33%	(2,446)	93,017	100.00%	0.0	-	93,017	100.00%	0.0	3.33%	(2,446)
9	889.2	Other Plant & Miscellaneous Equipment	23,952	0.00%	23,952	6.25%	5.00%	(299)	23,952	100.00%	0.0	-	23,952	100.00%	0.0	5.00%	(299)
10		Total Source of Supply & Pumping Plant	$ 1,496,221,009	*0.00%*	$ 1,496,221,010	*2.54%*	*2.54%*	$ (3,258)	$ 593,297,607	39.65%	23.7	$ -	$ 593,297,607	39.65%	23.7	2.54%	$ (3,259)
11		System Pumping Plant															
12	854.3	Structures & Improvements	139,507,296	0.00%	139,507,296	3.13%	3.13%	-	73,556,265	52.73%	15.1	-	73,556,265	52.73%	15.1	3.13%	-
13	855.3	Power Generation Equipment	28,669,567	0.00%	28,669,567	5.00%	4.50%	(143,348)	10,724,925	37.41%	13.9	-	10,724,925	37.41%	13.9	4.50%	(143,348)
14	870.3	Receiving Wells	22,873,020	0.00%	22,873,020	3.33%	3.67%	77,768	7,852,115	34.33%	17.9	-	7,852,115	34.33%	17.9	3.67%	77,768
15	871.3	Pumping Equipment	206,995,669	0.00%	206,995,669	5.00%	5.00%	-	82,097,366	39.66%	12.1	-	82,097,366	39.66%	12.1	5.00%	0
16	889.3	Other Plant & Miscellaneous Equipment	2,771,750	0.00%	2,771,750	6.25%	5.00%	(34,647)	772,641	27.88%	14.4	-	772,641	27.88%	14.4	5.00%	(34,647)
17		Total System Pumping Plant	$ 400,817,302	*0.00%*	$ 400,817,302	*4.26%*	*4.24%*	$ (100,227)	$ 175,003,311	43.66%	13.3	$ -	$ 175,003,311	43.66%	13.3	4.24%	$ (100,226)
18		Treatment & Disposal Plant															
19	854.4	Structures & Improvements	185,169,415		185,169,415	4.12%	4.02%	(185,169)	112,169,489	60.58%	9.8	-	112,169,489	60.58%	9.8	4.02%	(185,169)
20	855.4	Power Generation Equipment	4,253,181		4,253,181	5.84%	4.63%	(51,463)	2,090,901	49.16%	11.0	-	2,090,901	49.16%	11.0	4.63%	(51,463)
21	880.4	Treatment & Disposal Equipment	297,180,124		297,180,124	3.75%	3.67%	(237,744)	171,430,275	57.69%	11.5	-	171,430,275	57.69%	11.5	3.67%	(237,744)
22	881.4	Plant Sewers	17,260,445		17,260,445	3.10%	3.20%	17,260	8,831,094	51.16%	15.3	-	8,831,094	51.16%	15.3	3.20%	17,260
23	882.4	Outfall Sewer Lines	9,423,484		9,423,484	3.57%	3.34%	(21,674)	4,558,076	48.37%	15.5	-	4,558,076	48.37%	15.5	3.34%	(21,674)
24	889.4	Other Plant & Miscellaneous Equipment	91,929		91,929	4.03%	4.00%	(28)	91,929	100.00%	0.0	-	91,929	100.00%	0.0	4.00%	(28)
25		Total Treatment & Disposal Plant	$ 513,378,579	*0.00%*	$ 513,378,578	*3.88%*	*3.78%*	$ (478,818)	$ 299,171,765	58.28%	11.0	$ -	$ 299,171,765	58.28%	11.0	3.78%	$ (478,818)
26		Reclaimed Water Plant															
27	854.5	Structures & Improvements	27,316,662	0.00%	27,316,662	3.13%	3.13%	-	10,775,987	39.45%	19.3	-	10,775,987	39.45%	19.3	3.13%	-
28	855.5	Power Generation Equipment	345,980	0.00%	345,980	5.00%	4.50%	(1,730)	241,325	69.75%	6.7	-	241,325	69.75%	6.7	4.50%	(1,730)
29	871.5	Pumping Equipment	6,816,866	0.00%	6,816,866	5.00%	5.00%	-	2,740,885	40.21%	12.0	-	2,740,885	40.21%	12.0	5.00%	(0)
30	874.5	Reuse Distribution Reservoirs	305,860	0.00%	305,860	2.70%	2.70%	-	188,674	61.69%	14.2	-	188,674	61.69%	14.2	2.70%	-
31	880.5	Treatment & Disposal Equipment	18,225,367	0.00%	18,225,367	5.56%	5.56%	-	10,526,790	57.76%	7.6	-	10,526,790	57.76%	7.6	5.56%	0
32	881.5	Reuse Plant Sewers	368,589	0.00%	368,589	5.56%	3.20%	(8,699)	204,569	55.50%	13.9	-	204,569	55.50%	13.9	3.20%	(8,699)
33		Total Reclaimed Water Plant	$ 53,379,325	*0.00%*	$ 53,379,324	*4.22%*	*4.21%*	$ (10,429)	$ 24,678,231	46.23%	12.8	$ -	$ 24,678,231	46.23%	12.8	4.21%	$ (10,429)
34		Reclaimed Water Distribution Plant															
35	854.6	Structures & Improvements	353,681	0.00%	353,681	3.13%	3.13%	-	129,805	36.70%	20.2	-	129,805	36.70%	20.2	3.13%	-
36	866.6	Reuse Services	3,924,693	0.00%	3,924,693	3.64%	3.64%	-	985,156	25.10%	20.6	-	985,156	25.10%	20.6	3.64%	-
37	867.6	Reuse Meters & Meter Installations	1,006,498	0.00%	1,006,498	6.67%	6.67%	-	547,582	54.40%	6.8	-	547,582	54.40%	6.8	6.67%	-
38	871.6	Reuse Pumping Equipment	1,507,975	0.00%	1,507,975	5.00%	5.00%	-	604,641	40.10%	12.0	-	604,641	40.10%	12.0	5.00%	(0)
39	875.6	Reuse Transmission & Distribution System	77,230,635	0.00%	77,230,635	2.33%	2.33%	-	18,487,966	23.94%	32.6	-	18,487,966	23.94%	32.6	2.33%	-
40	889.6	Reuse Other Miscellaneous Equipment	17,329	0.00%	17,329	5.56%	5.56%	-	2,746	15.85%	15.1	-	2,746	15.85%	15.1	5.56%	-
41		Reclaimed Water Distribution Plant	$ 84,040,809	*0.00%*	$ 84,040,811	*2.50%*	*2.50%*	$ -	$ 20,757,896	24.70%	30.2	$ -	$ 20,757,896	24.70%	30.2	2.50%	$ (0)
42		General Plant															
43	854.7	Structures & Improvements	5,788,116	0.00%	5,788,116	3.13%	2.86%	(15,628)	907,145	15.67%	29.5	-	907,145	15.67%	29.5	2.86%	(15,628)
43	890.71	Computer Equipment	6,779,450	0.00%	6,779,450	20.00%	20.00%	-	6,779,450	100.00%	0.0	-	6,779,450	100.00%	0.0	20.00%	-
44	890.72	Office Furniture & Equipment	1,043,747	0.00%	1,043,747	4.00%	4.00%	-	723,880	69.35%	7.7	-	723,880	69.35%	7.7	4.00%	0
45	891.7	Transportation Equipment	7,973,721	20.00%	6,378,977	7.50%	7.50%	-	3,668,217	46.00%	4.5	-	3,668,217	46.00%	4.5	7.50%	-
46	892.7	Stores Equipment	25,846	0.00%	25,846	5.39%	4.67%	(186)	12,954	50.12%	10.7	-	12,954	50.12%	10.7	4.67%	(186)
47	893.7	Tools, Shop & Garage Equipment	3,869,171	5.00%	3,675,713	6.69%	6.33%	(13,929)	2,662,548	68.81%	4.1	-	2,662,548	68.81%	4.1	6.33%	(13,929)
48	894.7	Laboratory Equipment	1,362,624	0.00%	1,362,624	4.00%	5.56%	21,257	629,697	46.21%	9.7	-	629,697	46.21%	9.7	5.56%	21,257
49	895.7	Power Operated Equipment	1,616,972	0.00%	1,616,972	6.63%	5.56%	(17,302)	1,283,047	79.35%	3.7	-	1,283,047	79.35%	3.7	5.56%	(17,302)
50	896.7	Communication Equipment	25,814,377	0.00%	25,814,377	6.66%	6.66%	-	16,415,477	63.59%	5.5	-	16,415,477	63.59%	5.5	6.66%	(0)
51	897.7	Miscellaneous Equipment	1,130,612	0.00%	1,130,612	4.00%	4.00%	-	905,088	80.05%	5.0	-	905,088	80.05%	5.0	4.00%	(0)
52	898.7	Other Tangible Equipment	18,940,881	0.00%	18,940,881	0.00%	0.00%	-	18,940,881	100.00%		-	18,940,881	100.00%		0.00%	-
53		Total General Plant	$ 74,345,518	*2.41%*	$ 72,557,315	*5.87%*	*5.83%*	$ (25,788)	$ 52,928,383	71.19%	4.5	$ -	$ 52,928,383	71.19%	4.5	5.83%	$ (25,788)
54		GRAND TOTAL	$ 2,622,182,543	*0.07%*	$ 2,620,394,340	*3.19%*	*3.17%*	$ (618,520)	$ 1,165,837,193	44.46%	17.5	$ -	$ 1,165,837,193	44.46%	17.5	3.17%	$ (618,520)

Table 6-4 Recommended Depreciation Rates – Chilled Water Utility

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]	[R]
	Account		Dec. 31, 2018	Net	Total Cost	Base Accrual Rate		Depreciation Expense	Depreciation Reserve							Recommended	
									Existing Reserve		Yrs. To		Adjusted	Adjusted	Yrs. To	Accrual	Change In
Line	No.	Description	Plant Balance	Salvage	To Recover	Existing	Indicated	Difference	Amount	Ratio	Depreciate	Transfer	Reserve	Ratio	Depreciate	Rate	Expense
		Chilled Water Plant															
1	303	CW Intangible Software - DES	-		-	10.00%	10.00%	-	-								
2	361	CW Structures and Improvements	-		-	4.00%	4.00%	-	-								
3	362	CW Station Equipment	26,451,691		26,451,691	4.19%	4.94%	197,166	10,889,019	41.17%	11.9	-	10,889,019	41.17%	11.9	4.94%	197,166
4	365	CW Overhead Conductor and Devices	-		-	4.00%	4.00%	-	-								
5	366	CW UG Conduit	6,510,694	0.00%	6,510,694	4.00%	4.00%	-	2,911,198	44.71%	13.8	-	2,911,198	44.71%	13.8	4.00%	-
6	369	CW Services	11,657,390		11,657,390	3.87%	3.73%	(16,732)	6,172,260			-	6,172,260	52.95%	12.6	3.73%	(16,732)
7	370	CW Meters	1,811,376	0.00%	1,811,376	5.00%	5.00%	-	767,328	42.36%	11.5	-	767,328	42.36%	11.5	5.00%	-
8		Total Distribution	$ 46,431,152		$ 46,431,151	*4.11%*	*4.50%*	180,434	20,739,805	44.67%	12.3	-	20,739,805	44.67%			180,434
9		General Plant															
10	382	Computer Hardware	607,860	0.00%	607,860	20.00%	20.00%	-	555,119	91.32%	0.4	-	555,119	91.32%	0.4	20.00%	-
11	383	Computer Software	322,130	0.00%	322,130	20.00%	20.00%	-	322,130	100.00%	0.0	-	322,130	100.00%	0.0	20.00%	-
12	390	CW Structures and Improvements	7,657,466		7,657,466	4.15%	3.24%	(69,343)	4,164,910	54.39%	14.1	-	4,164,910	54.39%	14.1	3.24%	(69,343)
13	391	CW Office Furniture and Equipment	25,314	0.00%	25,314	4.00%	4.00%	-	14,758	58.30%	10.4	-	14,758	58.30%	10.4	4.00%	-
14	394	CW Tools, Shop, and Garage Equipment	20,148	0.00%	20,148	6.69%	6.33%	(72)	10,011	49.69%	7.9	-	10,011	49.69%	7.9	6.33%	(72)
15	396	CW Mobile Equipment	46,917	0.00%	46,917	6.63%	5.56%	(504)	40,126	85.53%	2.6	-	40,126	85.53%	2.6	5.56%	(504)
16	397	CW Communications Equipment	1,264,578	0.00%	1,264,578	6.66%	6.66%	-	316,786	25.05%	11.3	-	316,786	25.05%	11.3	6.66%	-
17		Total General Plant	9,944,413		9,944,413	*5.97%*	*5.26%*	$ (69,919)	$ 5,423,840			-	$ 5,423,840	54.54%			(69,919)
18		GRAND TOTAL	$ 56,375,565	*0.00%*	$ 56,375,564	*4.44%*	*4.64%*	$ 110,515	$ 26,163,645	*46.41%*	11.6	$ -	$ 26,163,645	*46.41%*	*11.6*	*4.64%*	$ 110,515

Appendix A – Results of Comparable Utility Survey

Table A-1 – Electric Utility Depreciation Rate Survey Findings

FERC Account Number	Account Name	Baltimore Gas and Electric company	Cleo Power	Duke Energy Carolinas	Duke Energy Progress	Empire District Electric Company	Florida Power & Light	Florida Public Utilities	Georgia Power Company	Gulf Power Company	Indiana Michigan Power Company	Kansas City Power & Light	Northern Illinois Public Service Company	Oklahoma Gas & Electric	Potomac Electric Power Company - DC	Potomac Electric Power Company - MD	Santee Cooper	Tampa Electric Company	JEA (Existing)	Median	Average	1st Qaurtile	3rd Quartile	Count
311	Structures & Improvements		2.33%	3.07%	1.95%	3.19%											2.39%		3.51%	2.39%	2.59%	2.33%	3.07%	5
312	Boiler Plant Equipment		2.66%	2.96%	4.02%	3.51%											2.39%		3.71%	2.96%	3.11%	2.66%	3.51%	5
314	Turbogenerator Equipment		3.75%	3.95%	3.04%	2.78%											2.39%		3.38%	3.04%	3.18%	2.78%	3.75%	5
315	Accessory Electric Equipment		4.23%	3.35%	3.55%	2.45%											2.39%		3.43%	3.35%	3.19%	2.45%	3.55%	5
316	Miscellaneous Plant Equipment		2.26%	4.09%	3.89%	2.89%											2.39%		4.14%	2.89%	3.10%	2.39%	3.89%	5
341	Structures & Improvements		2.51%	2.80%	2.95%	4.05%				4.70%							4.04%		4.10%	3.50%	3.51%	2.84%	4.05%	6
342	Fuel Holders, Producers / Accessories		2.51%	2.62%	2.25%	2.38%				4.70%							4.04%		4.90%	2.57%	3.08%	2.41%	3.69%	6
343	Prime Movers		3.13%	2.87%	3.18%	2.74%				4.70%							4.04%		4.83%	3.16%	3.44%	2.94%	3.83%	6
344	Generators		3.03%	2.80%	2.83%	2.28%				4.70%							4.04%		4.75%	2.93%	3.28%	2.81%	3.79%	6
345	Accessory Electric Equipment		2.51%	3.17%	3.67%	3.00%				4.70%							4.04%		4.02%	3.42%	3.52%	3.04%	3.95%	6
346	Miscellaneous Plant Equipment		2.50%	2.99%	3.46%	2.29%				4.70%							4.04%		3.90%	3.23%	3.33%	2.62%	3.90%	6
352	Structures & Improvements	2.78%	1.78%	1.96%	1.78%	1.82%	1.70%	1.80%	1.45%	1.70%	1.53%	1.71%	2.01%	1.66%	2.44%	3.27%	1.95%	1.70%	2.24%	1.78%	1.94%	1.70%	1.96%	17
353	Station Equipment	1.97%	1.86%	2.13%	1.90%	2.23%	2.04%	2.60%	1.99%	2.80%	1.85%	1.54%	2.34%	1.78%	1.95%	3.07%	1.27%	2.30%	2.54%	1.99%	2.10%	1.86%	2.30%	17
354	Towers & Fixtures	4.10%	2.47%	1.69%	1.35%	1.54%	1.11%	2.10%	1.56%	2.00%	1.65%	0.67%	0.46%	1.40%	1.69%	1.91%	1.82%	2.30%	2.14%	1.69%	1.75%	1.40%	2.00%	17
355	Poles & Fixtures	2.35%	3.75%	2.27%	2.22%	3.51%	2.32%	4.10%	2.25%	4.60%	2.84%	2.34%	1.83%	2.29%	2.63%	2.91%	1.70%	3.60%	3.24%	2.35%	2.79%	2.27%	3.51%	17
356	Overhead Conductors & Devices	2.14%	2.15%	2.00%	1.56%	1.71%	2.38%	2.50%	2.33%	2.60%	1.94%	1.08%	1.01%	2.29%	1.80%	1.51%	1.64%	2.80%	2.51%	2.00%	1.97%	1.64%	2.33%	17
357	Underground Conduit	1.80%		1.12%			1.43%		1.26%		1.83%	1.14%	2.27%		1.75%	1.50%		1.80%	1.81%	1.63%	1.59%	1.30%	1.80%	10
358	Underground Conductors & Devices	2.22%	0.79%	1.39%	2.30%		1.87%		2.11%	1.50%	1.69%	1.30%	3.20%	0.27%	1.93%	1.24%	2.77%	2.30%	2.18%	1.87%	1.79%	1.35%	2.26%	15
359	Roads & Trails	1.94%	1.33%	1.46%	1.37%		1.33%	1.50%	1.48%	1.90%	1.49%		0.65%		1.87%	1.49%	1.68%	1.50%	1.76%	1.49%	1.50%	1.39%	1.64%	14
361	Structures & Improvements	1.60%	1.64%	1.94%	1.52%	1.56%	1.75%	1.70%	1.88%	1.90%	1.44%	1.55%	1.59%	1.47%	1.76%	1.21%	1.47%	1.80%	2.43%	1.60%	1.63%	1.52%	1.76%	17
362	Station Equipment	1.89%	1.67%	2.59%	2.33%	2.19%	1.90%	2.40%	2.70%	3.10%	2.03%	1.75%	2.08%	1.83%	2.54%	1.85%	1.81%	2.40%	2.57%	2.08%	2.18%	1.85%	2.40%	17
364	Poles, Towers & Fixtures	2.26%	2.71%	1.98%	3.95%	4.00%	3.58%	3.90%	2.33%	4.30%	5.25%	11.76%	2.79%	2.74%	3.69%	2.38%	0.40%	4.40%	4.20%	3.58%	3.67%	2.38%	4.00%	17
365	Overhead Conductors & Devices	1.91%	1.70%	1.94%	2.15%	3.39%	2.57%	3.40%	3.06%	3.00%	3.26%	2.72%	1.35%	2.66%	3.95%	2.41%	3.38%	3.10%	4.24%	2.72%	2.70%	2.15%	3.26%	17
366	Underground Conduit	1.75%	2.13%	1.57%	2.26%	2.62%	1.42%	1.80%	1.86%	1.10%	1.84%	2.02%	1.30%	1.81%	2.07%	1.61%	1.87%	1.80%	2.33%	1.81%	1.81%	1.61%	2.02%	17
367	Underground Conductors & Devices	1.97%	1.83%	2.00%	1.76%	2.58%	1.96%	3.20%	2.18%	2.40%	1.96%	1.71%	1.82%	1.83%	2.19%	1.99%	2.93%	3.00%	2.90%	1.99%	2.19%	1.83%	2.40%	17
368	Line Transformers	1.69%	2.99%	1.77%	2.54%	2.08%	2.98%	4.00%	2.39%	3.40%	5.00%	1.56%	1.61%	2.82%	3.96%	2.63%	2.99%	4.40%	3.62%	2.82%	2.87%	2.08%	3.40%	17
369	Services	2.95%	3.50%	1.32%	1.96%	4.44%	2.40%	3.60%	2.04%		3.05%	4.82%	55.00%	1.99%	2.89%	2.55%	2.21%	3.40%	4.66%	2.92%	6.13%	2.17%	3.53%	16
370	Meters	12.03%	3.08%	7.19%	6.41%	2.37%	2.84%	3.70%	3.92%	7.90%	6.78%	4.96%	7.11%	6.51%	7.10%	10.00%	1.92%	7.20%	6.68%	6.51%	5.94%	3.70%	7.19%	17
371	Installations on Customers' Premises	7.04%	42.38%	2.16%	1.15%	4.43%	3.33%	4.50%			9.04%	0.03%	4.02%	5.28%	0.70%	-5.58%			4.00%	4.02%	6.04%	1.15%	5.28%	13
372	Leased Property		2.62%						4.57%								2.55%			2.62%	3.25%	2.59%	3.60%	3
373	Street Lighting & Signal Systems	2.75%	2.01%	2.69%	3.87%	3.49%	2.47%	4.90%	3.94%	4.10%	5.57%	4.55%	2.25%	4.20%	3.31%	2.30%	5.69%	5.40%	5.27%	3.87%	3.73%	2.69%	4.55%	17
382	Computer Hardware	7.39%	20.00%	12.50%	12.50%	10.00%		20.00%				15.94%			10.00%	19.56%		25.00%	20.00%	14.22%	15.29%	10.63%	19.89%	10
383	Computer Software	7.39%	20.00%	12.50%	12.50%	10.00%		20.00%				15.94%			10.00%	19.56%		25.00%	20.00%	14.22%	15.29%	10.63%	19.89%	10
390	Structures & Improvements	7.11%	2.83%	3.22%	2.42%	3.57%	1.50%	2.00%	2.11%	2.00%	2.04%	2.79%	1.86%	1.58%	2.66%	13.97%	1.82%	2.30%	3.07%	2.30%	3.28%	2.00%	2.83%	17
391	Office Furniture & Equipment	5.65%	12.16%	6.67%	5.00%	4.76%		14.29%	11.90%		4.69%	5.00%	4.93%	7.39%	1.99%	6.67%		14.30%	4.00%	6.16%	7.53%	4.95%	10.77%	14
392	Transportation Equipment		5.00%	5.23%	10.29%	7.15%	5.48%	11.90%				9.42%	6.34%	5.33%			5.42%	5.10%	7.50%	5.48%	6.97%	5.28%	8.29%	11
393	Stores Equipment	6.38%	2.42%	5.00%	5.00%	2.50%		14.29%			4.11%	4.00%	5.23%	4.00%	4.00%	4.67%		14.30%	5.39%	4.67%	5.84%	4.00%	5.23%	13
394	Tools, Shop & Garage Equipment	4.94%	3.31%	5.00%	5.00%	5.00%		14.29%			6.70%	4.08%	3.71%	4.00%	4.00%	6.67%		14.30%	6.69%	5.00%	6.23%	4.00%	6.67%	13
395	Laboratory Equipment	16.03%	2.37%	6.67%	6.67%	2.17%		14.29%			5.47%	4.08%	4.15%	5.00%	6.67%	5.70%		14.30%	4.00%	5.70%	7.20%	4.15%	6.67%	13
396	Power Operated Equipment		2.01%	6.54%	5.99%	5.65%	7.05%	4.40%	16.44%	1.40%	4.35%	8.39%		4.87%			10.09%	14.30%	6.63%	5.99%	7.04%	4.40%	8.39%	13
397	Communications Equipment	3.11%	6.16%	10.00%	5.00%	4.76%	1.95%	20.00%	4.01%	5.20%	3.83%	4.62%	10.73%	10.00%	6.63%	14.51%		14.30%	6.66%	5.68%	7.80%	4.47%	10.18%	16
398	Miscellaneous Equipment	5.08%	4.09%	5.00%	5.00%	3.13%		14.29%	5.67%		3.15%		5.29%	5.00%	5.00%	6.65%		14.30%	4.00%	5.00%	6.28%	5.00%	5.67%	13
399	Other Tangible Property							20.00%											8.67%	20.00%	20.00%	20.00%	20.00%	1

Table A-2 – Water Utility Depreciation Rate Survey Findings

JEA Account Number	NARUC Account Number	Account Name	Lake Utility Services Inc. - FL	Lighthouse Utilities Company, Inc.	Marion Utilities, Inc. - FL	North Beach Utilities, Inc.	Parkland Utilities, Inc.	Peoples Water Service Companuy of Florida, Inc.	Royal Utility Company	Southlake Utilities, Inc.	Sunshine Utilities of Central Florida, Inc.	Tradewinds Utilities, Inc.	Utilities, Inc. of Florida	Water Management Services, Inc.	JEA (Existing)	Median	Average	1st Qaurtile	3rd Quartile	Count
	301	Organization					2.50%					25.00%	2.50%			2.50%	10.00%	2.50%	13.75%	3
	302	Franchises	2.50%						2.50%				2.50%			2.50%	2.50%	2.50%	2.50%	3
804.2	304	Structure and Improvements	3.13%	3.03%	3.03%	3.57%	3.70%	3.13%	3.03%	3.03%	3.03%		3.13%	3.03%	3.03%	3.03%	3.17%	3.03%	3.13%	11
805.2	305	Collecting and Impounding Reservoirs	2.00%										2.00%		2.00%	2.00%	2.00%	2.00%	2.00%	2
806.2	306	Lake, River and Other Intakes	2.50%										2.50%		2.50%	2.50%	2.50%	2.50%	2.50%	2
807.2	307	Wells and Springs	3.33%	3.33%	3.33%	3.70%	3.70%	3.33%	5.00%	3.33%	3.33%	6.67%	3.33%	3.33%	3.33%	3.33%	3.81%	3.33%	3.70%	12
808.2	308	Infiltration Galleries and Tunnels	2.50%												2.50%	2.50%	2.50%	2.50%	2.50%	1
809.2	309	Supply Mains	2.86%	2.86%		3.13%	5.88%		2.86%		2.86%	3.13%	2.86%	2.86%	2.86%	2.86%	3.26%	2.86%	3.13%	9
810.2	310	Power Generation Equipment	5.00%	4.55%		5.88%			5.00%	5.00%	6.67%	6.67%	5.00%	5.00%	5.00%	5.00%	5.42%	5.00%	5.88%	9
811.2	311	Pumping Equipment	5.00%	5.00%	5.00%	5.88%	6.67%	5.00%	5.00%	5.00%	5.00%	6.67%	5.00%	5.00%	5.00%	5.00%	5.35%	5.00%	5.22%	12
820.3	320	Water Treatment Equipment	4.55%	4.55%	4.55%	5.88%	5.88%	4.55%	4.55%	4.55%	4.55%	14.29%	4.55%	4.55%	3.86%	4.55%	5.58%	4.55%	4.88%	12
830.4	330	Distribution Reservoirs and Standpipes	2.70%	2.70%	2.70%	3.03%		2.70%	2.70%	2.70%	4.55%	3.33%	2.70%	2.70%	3.07%	2.70%	2.96%	2.70%	2.87%	11
831.4	331	Transmission and Distribution Mains	2.33%	3.03%	2.33%	2.63%	2.63%	2.33%	2.22%	2.33%	2.33%	2.50%	2.33%	2.33%	2.33%	2.33%	2.44%	2.33%	2.53%	12
833.4	333	Services	2.50%	2.50%	2.50%	2.86%	2.86%	2.50%	2.50%	2.50%	2.33%	2.86%	2.50%	2.50%	2.50%	2.50%	2.58%	2.50%	2.59%	12
834.4	334	Meters and Meter Installations	5.00%	5.00%	5.00%	5.88%	5.88%	5.00%	5.00%	5.00%	5.00%	5.88%	5.00%	5.00%	6.67%	5.00%	5.22%	5.00%	5.22%	12
835.4	335	Hydrants	2.22%	5.00%		2.50%	2.50%	2.22%	2.22%	2.22%	2.22%	5.00%	2.22%	2.22%	2.22%	2.22%	2.78%	2.22%	2.50%	11
836.4	336	Backflow Prevention Devices	6.67%					6.67%					6.67%		6.67%	6.67%	6.67%	6.67%	6.67%	3
839.2	339	Other Plant / Miscellaneous Equipment	5.56%	5.00%			4.00%	5.56%	4.00%	4.00%	4.00%	16.67%	5.56%		4.00%	5.00%	6.04%	4.00%	5.56%	9
840.51	340	Office Furniture and Equipment - Computers													20.00%					0
840.52	340	Office Furniture and Equipment	6.67%		6.67%	6.67%	6.67%	6.67%	6.67%	6.67%	6.67%	16.67%	6.67%	6.67%	4.00%	6.67%	7.58%	6.67%	6.67%	11
841.5	341	Transportation Equipment	20.00%	16.67%	16.67%	16.67%	16.67%	16.67%	16.67%		16.67%	16.67%	20.00%	16.67%	7.50%	16.67%	17.28%	16.67%	16.67%	11
842.5	342	Stores Equipment	5.56%					5.56%			5.00%		5.56%		5.39%	5.56%	5.42%	5.42%	5.56%	4
843.5	343	Tools, Shop and Garage Equipment	6.25%	5.00%	6.25%	7.14%	6.25%	6.25%	6.25%	6.25%	6.25%	6.67%	6.25%	6.25%	6.69%	6.25%	6.26%	6.25%	6.25%	12
844.5	344	Laboratory Equipment	6.67%					6.67%	6.67%		10.00%		6.67%		4.00%	6.67%	7.34%	6.67%	6.67%	5
845.5	345	Power Operated Equipment	8.33%	5.00%		10.00%		8.33%		8.33%	8.33%		8.33%	8.33%	6.63%	8.33%	8.12%	8.33%	8.33%	8
846.5	346	Communication Equipment	10.00%		10.00%			10.00%			10.00%		10.00%	10.00%	6.66%	10.00%	10.00%	10.00%	10.00%	6
847.5	347	Miscellaneous Equipment	6.67%						6.67%		6.67%		6.67%		4.00%	6.67%	6.67%	6.67%	6.67%	4
848.5	348	Other Tangible Plant	10.00%	20.00%	10.00%	10.00%			10.00%	10.00%			10.00%		8.67%	10.00%	11.43%	10.00%	10.00%	7

***Data from the Florida Public Service Commission Website 2018 Annual Reports**

Table A-3 – Wastewater Utility Depreciation Rate Survey Findings

JEA Account Number	NARUC Account Number	Account Name	Forest Utilities, Inc.	Lake Utility Services INC	Marion Utilities, Inc.	Mid County Services Inc	North Beach Utilities, Inc.	North Peninsula Utility Corporation	Parkland Utilities, Inc.	Royal Utility Company	Southlake Utilities, Inc.	Tradewinds Utilities, Inc.	Utilities, Inc. of Florida	JEA (Existing)	Median	Average	1st Qaurtile	3rd Quartile	Count
851.1	351	Organization							2.50%			3.45%	2.00%	33.33%	2.50%	2.65%	2.25%	2.98%	3
852.1	352	Franchises	2.50%	2.50%		2.50%		2.50%				33.33%	2.50%	33.33%	2.50%	7.64%	2.50%	2.50%	6
854.2	354	Structures and Improvements	2.86%	3.13%	3.03%	3.13%	3.70%	3.70%	3.70%	2.86%	3.13%	3.70%	3.13%	3.13%	3.13%	3.28%	3.08%	3.70%	11
855.2	355	Power Generation Equipment	5.00%	5.00%		5.00%				5.00%			5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5
860.2	360	Collection Sewers - Force	3.33%	3.33%	3.33%	3.33%	3.70%	3.70%	3.70%	3.33%	3.33%	3.70%	3.33%	3.33%	3.33%	3.46%	3.33%	3.70%	11
861.2	361	Collection Sewers - Gravity	2.86%	2.22%		2.22%		2.50%	2.50%	2.22%	2.22%	2.50%	2.22%	2.23%	2.22%	2.38%	2.22%	2.50%	9
862.2	362	Special Collecting Structures	4.00%	2.50%	2.70%	2.50%			4.00%		2.50%	2.70%	2.50%	2.50%	2.60%	2.93%	2.50%	3.03%	8
863.2	363	Services to Customers	2.63%	2.63%	2.63%	2.63%	2.86%	2.86%	2.86%		2.63%	2.86%	2.63%	2.63%	2.63%	2.72%	2.63%	2.86%	10
864.2	364	Flow Measuring Devices	20.00%	20.00%		20.00%			20.00%	20.00%		5.88%	20.00%	10.00%	20.00%	17.98%	20.00%	20.00%	7
865.2	365	Flow Measuring Installations		2.63%		2.63%							2.63%	5.96%	2.63%	2.63%	2.63%	2.63%	3
866.6	366	Reuse Services		2.50%		2.50%							2.50%	3.64%	2.50%	2.50%	2.50%	2.50%	3
867.6	367	Reuse Meters and Meter Installations		5.00%		5.00%							5.00%	6.67%	5.00%	5.00%	5.00%	5.00%	3
870.3	370	Receiving Wells		3.33%	3.33%	3.33%	4.00%	4.00%	5.56%			5.56%	3.33%	3.33%	3.67%	4.06%	3.33%	4.39%	8
871.3	371	Pumping Equipment	5.56%	5.56%	5.00%	5.56%	6.67%	5.88%		5.56%	4.00%		5.56%	5.00%	5.56%	5.48%	5.56%	5.56%	9
874.5	374	Reuse Distribution Reservoirs	2.70%											2.70%	2.70%	2.70%	2.70%	2.70%	1
875.6	375	Reuse Transmission and Distribution System	4.55%	2.33%		2.33%							2.33%	2.33%	2.33%	2.89%	2.33%	2.89%	4
880.4	380	Treatment and Disposal Equipment	3.70%	5.56%	5.56%	5.56%	6.67%	6.67%			5.56%	6.67%	5.56%	3.75%	5.56%	5.72%	5.56%	6.67%	9
881.4	381	Plant Sewers		2.86%		2.86%							2.86%	3.10%	2.86%	2.86%	2.86%	2.86%	3
882.4	382	Outfall Sewer Lines		3.33%	3.33%	3.33%						6.67%	3.33%	3.57%	3.33%	4.00%	3.33%	3.33%	5
889.2	389	Other Plant / Miscellaneous Equipment		5.56%	5.56%	5.56%	10.00%		6.67%	5.56%	5.56%	2.86%	10.00%	6.25%	5.56%	6.37%	5.56%	6.67%	9
890.71	390	Office Furniture and Equipment - Computers												20.00%					
890.72	390	Office Furniture and Equipment	16.67%	6.67%		6.67%	6.67%			6.67%	6.67%	16.67%	6.67%	4.00%	6.67%	9.17%	6.67%	9.17%	8
891.7	391	Transportation Equipment	16.67%	20.00%		20.00%	16.67%		16.67%	16.67%			20.00%	7.50%	16.67%	18.10%	16.67%	20.00%	7
892.7	392	Stores Equipment		5.56%		5.56%							5.56%	5.39%	5.56%	5.56%	5.56%	5.56%	3
893.7	393	Tools, Shop and Garage Equipment		6.25%		6.25%	7.14%		6.25%	6.25%		6.67%	6.25%	6.69%	6.25%	6.44%	6.25%	6.46%	7
894.7	394	Laboratory Equipment	6.67%	6.67%		6.67%				6.67%			6.67%	4.00%	6.67%	6.67%	6.67%	6.67%	5
895.7	395	Power Operated Equipment	6.67%	8.33%		8.33%	10.00%				8.33%	10.00%	8.33%	6.63%	8.33%	8.57%	8.33%	9.17%	7
896.7	396	Communication Equipment		10.00%		10.00%							10.00%	6.66%	10.00%	10.00%	10.00%	10.00%	3
897.7	397	Miscellaneous Equipment		6.67%		6.67%				6.67%			6.67%	4.00%	6.67%	6.67%	6.67%	6.67%	4
898.7	398	Other Tangible Plant		10.00%	3.03%	10.00%				10.00%	10.00%		10.00%	0.00%	10.00%	8.84%	10.00%	10.00%	6

***Data from the Florida Public Service Commission Website 2018 Annual Reports**

Table A-4 – Chilled Water Utility Depreciation Rate Survey Findings

Account Number	Chilled Water Account Name	Orlando Utilities Commission (FL)	Citizen's Thermal (IN)	JEA (Existing)
303	CW Intangible Software - DES	20.00%		10.00%
361	CW Structures and Improvements	2.84%	1.79%	4.00%
362	CW Station Equipment	5.00%	2.13%	4.19%
365	CW Overhead Conductor and Devices			4.00%
366	CW UG Conduit	2.64%	2.92%	4.00%
369	CW Services	2.61%	3.19%	3.87%
370	CW Meters	5.00%	2.97%	5.00%
	Total Distribution			
	General Plant			
382	Computer Hardware	20.00%	20.00%	20.00%
383	Computer Software	20.00%	20.00%	20.00%
390	CW Structures and Improvements	4.62%		4.15%
391	CW Office Furniture and Equipment	14.29%	4.00%	4.00%
394	CW Tools, Shop, and Garage Equipment		3.87%	6.69%
396	CW Mobile Equipment	20.00%	3.27%	6.63%
397	CW Communications Equipment	33.33%	6.39%	6.66%
	Total General Plant			

	Electric Actual 16	Electric Actual 17	Electric Actual 18
SALARIES	107,277,578	108,665,251	117,802,856
TEMPORARY SALARIES	171,461	201,811	169,904
SALARIES REGULAR AND TEMP	107,449,039	108,867,062	117,972,760
OVERTIME	9,651,265	16,625,237	12,679,214
EMPLOYEE BENEFITS & OTHER COMP.- ACCRUAL	419,644	185,771	(289,001)
OTHER COMPENSATION AND BENEFITS	1,356,852	1,351,078	1,376,246
HEALTH INSURANCE	13,315,113	10,451,993	11,248,601
PENSION CONTRIBUTION	32,400,291	36,993,581	27,803,101
INCENTIVE PAY	1,027,309	3,779,893	2,469,947
401A CONTRIBUTION	598,914	701,287	712,252
TERMINAL LEAVE	1,066,107	1,072,634	840,913
LEAVE ROLLBACK,SELLBACK	1,867,730	1,786,604	1,960,511
EMPLOYER SOCIAL SECURITY AND MEDICARE	1,201,864	1,771,147	1,868,580
LIFE INSURANCE	489,117	511,187	397,782
EDUCATIONAL ASSISTANCE	208,601	206,188	155,137
OTHER POST EMPLOYMENT BENEFITS	3,213,633	3,301,543	2,528,505
UNEMPLOYMENT TAXES	7,887	4,051	12,565
EMPLOYER 457 CONTRIBUTION	1,768	2,676	3,580
BENEFIT BURDEN ACCOUNT	(266,597)	(251,164)	(274,153)
EMPLOYEE BENEFITS	56,908,233	61,868,470	50,814,565
SALARIES, OT AND BENEFITS	174,008,537	187,360,769	181,466,539

*All Salaries and Benefits are Gross of Capitalization and exclude accrual adjustments

** High Salaries OT and Benefits for FY17 & FY18 due to Hurricanes Matthew and Irma

*** Pension Reform effective FY 18

	Water/WW Actual 16	Water/WW Actual 17	Water/WW Actual 18
SALARIES	37,533,779	38,832,637	42,991,167
TEMPORARY SALARIES	17,312	14,682	-
SALARIES REGULAR AND TEMP	37,551,090	38,847,319	42,991,167
OVERTIME	6,148,441	8,681,434	7,732,378
EMPLOYEE BENEFITS & OTHER COMP.- ACCRUAL	167,772	89,418	(103,001)
OTHER COMPENSATION AND BENEFITS	200,851	212,622	249,363
HEALTH INSURANCE	5,829,780	3,986,846	4,844,577
PENSION CONTRIBUTION	11,467,002	13,342,819	10,094,343
INCENTIVE PAY	444,226	1,094,862	567,764
401A CONTRIBUTION	89,320	101,431	116,589
TERMINAL LEAVE	239,598	348,318	471,643
LEAVE ROLLBACK,SELLBACK	848,574	733,451	811,239
EMPLOYER SOCIAL SECURITY AND MEDICARE	441,168	679,752	719,762
LIFE INSURANCE	167,538	178,728	157,574
EDUCATIONAL ASSISTANCE	138	-	-
OTHER POST EMPLOYMENT BENEFITS	1,887,371	1,939,002	1,549,729
BENEFIT BURDEN ACCOUNT	239,293	207,782	246,849
EMPLOYEE BENEFITS	22,022,631	22,915,030	19,726,432
SALARIES, OT AND BENEFITS	65,722,162	70,443,783	70,449,976

*All Salaries and Benefits are Gross of Capitalization and exclude accrual adjustments

** High Salaries OT and Benefits for FY17 & FY18 due to Hurricanes Matthew and Irma

*** Pension Reform effective FY 18

	District Energy Actual 16	District Energy Actual 17	District Energy Actual 18
SALARIES	333,810	332,685	390,282
TEMPORARY SALARIES	-	-	-
SALARIES REGULAR AND TEMP	333,810	332,685	390,282
OVERTIME	18,506	20,121	16,827
EMPLOYEE BENEFITS & OTHER COMP.- ACCRUAL	-	-	5,344
OTHER COMPENSATION AND BENEFITS	2,450	3,350	3,600
HEALTH INSURANCE	38,666	34,011	44,813
PENSION CONTRIBUTION	118,822	116,620	84,164
INCENTIVE PAY	3,724	11,238	2,582
401A CONTRIBUTION	1,370	1,394	1,895
TERMINAL LEAVE	11,743	-	19,268
LEAVE ROLLBACK,SELLBACK	37	-	-
EMPLOYER SOCIAL SECURITY AND MEDICARE	4,143	4,934	5,731
LIFE INSURANCE	1,087	819	768
BENEFIT BURDEN ACCOUNT	373	3,352	1,771
EMPLOYEE BENEFITS	182,415	175,718	169,936
SALARIES, OT AND BENEFITS	534,731	528,524	577,046

*All Salaries and Benefits are Gross of Capitalization and exclude accrual adjustments

IRS Department of the Treasury
Internal Revenue Service

ATLANTA GA 39901-0001

In reply refer to: 0752153593
Jan. 02, 2018 LTR 4076C 0
59-2983007 000000 00
00027788
BODC: SB

JEA
% ALAN GOLDMAN
21 WEST CHURCH ST
JACKSONVILLE FL 32202-3155

13680

Federal Identification Number: 59-2983007
Person to Contact: Mr. Reis
Toll Free Telephone Number: 1-877-829-5500

Dear JEA:

This responds to your request for information about your federal tax status. Our records do not specify your federal tax status. However, the following general information about the tax treatment of state and local governments and affiliated organizations may be of interest to you.

GOVERNMENTAL UNITS
Governmental units, such as States and their political subdivisions, are not generally subject to federal income tax. Political subdivisions of a State are entities with one or more of the sovereign powers of the State such as the power to tax. Typically they include counties or municipalities and their agencies or departments. Charitable contributions to governmental units are tax-deductible under section 170(c)(1) of the Internal Revenue Code if made for a public purpose.

ENTITIES MEETING THE REQUIREMENTS OF SECTION 115(1)
An entity that is not a governmental unit but that performs an essential government function may not be subject to federal income tax, pursuant to Code section 115(1). The income of such entities is excluded from the definition of gross income as long as the income (1) is derived from a public utility or the exercise of an essential government function, and (2) accrues to a State, a political subdivision of a State, or the District of Columbia. Contributions made to entities whose income is excluded income under section 115 may not be tax deductible to contributors.

TAX-EXEMPT CHARITABLE ORGANIZATIONS
An organization affiliated with a State, county, or municipal government may qualify for exemption from federal income tax under section 501(c)(3) of the Code, if (1) it is not an integral part of the government, and (2) it does not have governmental powers inconsistent with exemption (such as the power to tax or to exercise enforcement or regulatory powers). Note that entities may meet the requirements of both sections 501(c)(3) and 115 under certain circumstances. See Revenue Procedure 2003-12, 2003-1 C.B. 316.

FLORIDA

Consumer's Certificate of Exemption

Issued Pursuant to Chapter 212, Florida Statutes

DR-14
R. 10/15

Certificate Number	Effective Date	Expiration Date	Exemption Category
85-8012753002C-9	02/28/2018	02/28/2023	MUNICIPAL GOVERNMENT

This certifies that

JEA INC
21 W CHURCH ST
JACKSONVILLE FL 32202-3155

is exempt from the payment of Florida sales and use tax on real property rented, transient rental property rented, tangible personal property purchased or rented, or services purchased.

FLORIDA

Important Information for Exempt Organizations

DR-14
R. 10/15

1. You must provide all vendors and suppliers with an exemption certificate before making tax-exempt purchases. See Rule 12A-1.038, Florida Administrative Code (F.A.C.).

2. Your *Consumer's Certificate of Exemption* is to be used solely by your organization for your organization's customary nonprofit activities.

3. Purchases made by an individual on behalf of the organization are taxable, even if the individual will be reimbursed by the organization.

4. This exemption applies only to purchases your organization makes. The sale or lease to others of tangible personal property, sleeping accommodations, or other real property is taxable. Your organization must register, and collect and remit sales and use tax on such taxable transactions. Note: Churches are exempt from this requirement except when they are the lessor of real property (Rule 12A-1.070, F.A.C.).

5. It is a criminal offense to fraudulently present this certificate to evade the payment of sales tax. Under no circumstances should this certificate be used for the personal benefit of any individual. Violators will be liable for payment of the sales tax plus a penalty of 200% of the tax, and may be subject to conviction of a third-degree felony. Any violation will require the revocation of this certificate.

6. If you have questions regarding your exemption certificate, please contact the Exemption Unit of Account Management at 800-352-3671. From the available options, select "Registration of Taxes," then "Registration Information," and finally "Exemption Certificates and Nonprofit Entities." The mailing address is PO Box 6480, Tallahassee, FL 32314-6480.

JEA WATER, WASTEWATER, AND RECLAIMED RATE HISTORY

Residential @ 6 Kgal	Oct-01	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08	Oct-09	Oct-10
Water	$ 13.10	$ 13.13	$ 13.13	$ 14.02	$ 15.01	$ 15.65	$ 17.26	$ 19.15
Wastewater	$ 26.66	$ 26.68	$ 28.54	$ 30.53	$ 32.67	$ 33.98	$ 37.58	$ 41.36
Total Water & Sewer Charges w/out Taxes & Fees	**$ 39.76**	**$ 39.81**	**$ 41.67**	**$ 44.55**	**$ 47.68**	**$ 49.63**	**$ 54.84**	**$ 60.51**

Rates	Oct-01	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08	Oct-09	Oct-10
WATER SYSTEM								
Service Availability Charges								
Residential Potable								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78		
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55		
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68		
10" Meter	$ 516.25	$ 516.25	$ 971.75	$ 1,039.77	$ 1,112.56	$ 1,158.17		
12" Meter	$ 961.60	$ 961.60	$ 1,816.75	$ 1,943.92	$ 2,080.00	$ 2,165.28		
20" Meter	$ 2,009.30	$ 2,009.30	$ 3,802.50	$ 4,068.68	$ 4,353.48	$ 4,531.97		
Residential Irrigation								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78		
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55		
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68		
Multi-Family Potable								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 14.26	$ 17.10
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 21.39	$ 25.65
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 35.65	$ 42.75
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 71.30	$ 85.50
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 114.08	$ 136.80
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 228.16	$ 273.60
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78	$ 356.50	$ 427.50
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55	$ 713.00	$ 855.00
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68	$ 1,140.80	$ 1,368.00
10" Meter	$ 516.25	$ 516.25	$ 971.75	$ 1,039.77	$ 1,112.56	$ 1,158.17	$ 1,639.90	$ 1,966.50
12" Meter	$ 961.60	$ 961.60	$ 1,816.75	$ 1,943.92	$ 2,080.00	$ 2,165.28	$ 3,065.90	$ 3,676.50
20" Meter	$ 2,009.30	$ 2,009.30	$ 3,802.50	$ 4,068.68	$ 4,353.48	$ 4,531.97	$ 6,417.00	$ 7,695.00
Commercial Potable								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78	$ 277.00	$ 304.75
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55	$ 554.00	$ 609.50
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68	$ 886.40	$ 975.20
10" Meter	$ 516.25	$ 516.25	$ 971.75	$ 1,039.77	$ 1,112.56	$ 1,158.17	$ 1,836.55	$ 1,925.10
12" Meter	$ 961.60	$ 961.60	$ 1,816.75	$ 1,943.92	$ 2,080.00	$ 2,165.28	$ 3,433.55	$ 3,599.10
20" Meter	$ 2,009.30	$ 2,009.30	$ 3,802.50	$ 4,068.68	$ 4,353.48	$ 4,531.97	$ 7,186.50	$ 7,533.00
Commercial & Multi-Family Irrigation								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78	$ 277.00	$ 304.75
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55	$ 554.00	$ 609.50
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68	$ 886.40	$ 975.20
Commodity Charges per Thousand Gallons								
Residential								
1-11 Kgal	$ 0.78	$ 0.78	$ 0.78	$ 0.83	$ 0.89	$ 0.93		
12-22 Kgal	$ 0.98	$ 0.97	$ 0.97	$ 1.04	$ 1.11	$ 1.16		
> 22 Kgal	$ 1.28	$ 4.00	$ 4.00	$ 4.28	$ 4.58	$ 4.77		
1-6 Kgal							$ 0.93	$ 0.93
7-20 Kgal							$ 1.45	$ 1.82
> 20 Kgal							$ 4.96	$ 5.15
Residential Irrigation								
1-22 Kgal	$ 0.98							
> 22 Kgal	$ 1.28							
1-15 Kgal		$ 0.97	$ 0.97	$ 1.04	$ 1.11	$ 1.16		
16-30 Kgal		$ 1.56	$ 1.56	$ 1.67	$ 1.79	$ 1.86		
> 30 Kgal		$ 4.00	$ 4.00	$ 4.28	$ 4.58	$ 4.77		
1-14 Kgal							$ 1.45	$ 1.82
> 14 Kgal							$ 4.96	$ 5.15
Multi-Family - 8" Meters and Smaller								
All Metered Water Use	$ 0.84	$ 0.84	$ 0.84	$ 0.90	$ 0.96	$ 1.00	$ 1.00	$ 1.00
Multi-Family - 10" Meters and Greater								
All Metered Water Use	$ 0.63	$ 0.63	$ 0.63	$ 0.67	$ 0.72	$ 0.75	$ 1.00	$ 1.00
Commercial - 8" Meters and Smaller								
All Metered Water Use	$ 0.84	$ 0.84	$ 0.84	$ 0.90	$ 0.96	$ 1.00	$ 1.31	$ 1.43
Commercial - 10" Meters and Greater								
All Metered Water Use	$ 0.63	$ 0.63	$ 0.63	$ 0.67	$ 0.72	$ 0.75	$ 1.06	$ 1.18
Commercial & Multi-Family Irrigation								
1-22 Kgal	$ 0.98	$ 0.97	$ 0.97	$ 1.04	$ 1.11	$ 1.16		
> 22 Kgal	$ 1.28	$ 1.28	$ 1.28	$ 1.37	$ 1.47	$ 1.53		
1-14 Kgal							$ 1.73	$ 2.30
> 14 Kgal							$ 2.14	$ 2.75
Fire Protection Charges								
Unmetered Connections (Annual Charge)								
≤ 4" Meter	$ 49.00	$ 49.00	$ 49.00	$ 49.00	$ 49.00	$ 51.00	$ 58.00	$ 64.00
6" Meter	$ 97.00	$ 97.00	$ 97.00	$ 97.00	$ 97.00	$ 101.00	$ 115.00	$ 127.00
8" Meter	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 208.00	$ 236.00	$ 262.00
≥ 10" Meter	$ 356.00	$ 356.00	$ 356.00	$ 356.00	$ 356.00	$ 371.00	$ 421.00	$ 467.00
Metered Connections (Monthly Charge)								
≤ 4" Meter	$ 15.00	$ 15.00	$ 15.00	$ 15.00	$ 15.00	$ 16.00	$ 18.00	$ 20.00
6" Meter	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 21.00	$ 24.00	$ 26.00
8" Meter	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 30.00	$ 32.00	$ 36.00	$ 40.00
≥ 10" Meter	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 40.00	$ 42.00	$ 48.00	$ 53.00

JEA WATER, WASTEWATER, AND RECLAIMED RATE HISTORY

Residential @ 6 Kgal	Oct-01	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08	Oct-09	Oct-10
Water	$ 13.10	$ 13.13	$ 13.13	$ 14.02	$ 15.01	$ 15.65	$ 17.26	$ 19.15
Wastewater	$ 26.66	$ 26.68	$ 28.54	$ 30.53	$ 32.67	$ 33.98	$ 37.58	$ 41.36
Total Water & Sewer Charges w/out Taxes & Fees	**$ 39.76**	**$ 39.81**	**$ 41.67**	**$ 44.55**	**$ 47.68**	**$ 49.63**	**$ 54.84**	**$ 60.51**

Rates	Oct-01	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08	Oct-09	Oct-10
WASTEWATER SYSTEM								
Service Availability Charges								
Residential								
5/8" Meter	$ 3.40	$ 3.40	$ 3.64	$ 3.89	$ 4.17	$ 4.34	$ 7.34	$ 10.34
3/4" Meter	$ 5.15	$ 5.15	$ 5.51	$ 5.90	$ 6.31	$ 6.57	$ 11.01	$ 15.51
1" Meter	$ 8.55	$ 8.55	$ 9.15	$ 9.79	$ 10.47	$ 10.90	$ 18.35	$ 25.85
1 1/2" Meter	$ 17.10	$ 17.10	$ 18.30	$ 19.58	$ 20.95	$ 21.81	$ 36.70	$ 51.70
2" Meter	$ 27.30	$ 27.30	$ 29.21	$ 31.26	$ 33.44	$ 34.81	$ 58.72	$ 82.72
3" Meter	$ 54.50	$ 54.50	$ 58.32	$ 62.40	$ 66.76	$ 69.50	$ 117.44	$ 165.44
4" Meter	$ 85.15	$ 85.15	$ 91.11	$ 97.49	$ 104.31	$ 108.59		
6" Meter	$ 170.45	$ 170.45	$ 182.38	$ 195.15	$ 208.81	$ 217.37		
8" Meter	$ 272.60	$ 272.60	$ 291.68	$ 312.10	$ 333.95	$ 347.64		
10" Meter	$ 391.90	$ 391.90	$ 419.33	$ 448.69	$ 480.09	$ 499.77		
12" Meter	$ 732.55	$ 732.55	$ 783.83	$ 838.75	$ 897.41	$ 934.20		
20" Meter	$ 1,533.20	$ 1,533.20	$ 1,640.52	$ 1,755.36	$ 1,878.24	$ 1,955.25		
Multi-Family								
5/8" Meter	$ 3.40	$ 3.40	$ 3.64	$ 3.89	$ 4.17	$ 4.34	$ 12.85	$ 18.10
3/4" Meter	$ 5.15	$ 5.15	$ 5.51	$ 5.90	$ 6.31	$ 6.57	$ 19.27	$ 27.14
1" Meter	$ 8.55	$ 8.55	$ 9.15	$ 9.79	$ 10.47	$ 10.90	$ 32.11	$ 45.24
1 1/2" Meter	$ 17.10	$ 17.10	$ 18.30	$ 19.58	$ 20.95	$ 21.81	$ 64.23	$ 90.48
2" Meter	$ 27.30	$ 27.30	$ 29.21	$ 31.26	$ 33.44	$ 34.81	$ 102.76	$ 144.76
3" Meter	$ 54.50	$ 54.50	$ 58.32	$ 62.40	$ 66.76	$ 69.50	$ 205.52	$ 289.52
4" Meter	$ 85.15	$ 85.15	$ 91.11	$ 97.49	$ 104.31	$ 108.59	$ 321.13	$ 452.38
6" Meter	$ 170.45	$ 170.45	$ 182.38	$ 195.15	$ 208.81	$ 217.37	$ 642.25	$ 904.75
8" Meter	$ 272.60	$ 272.60	$ 291.68	$ 312.10	$ 333.95	$ 347.64	$ 1,027.60	$ 1,447.60
10" Meter	$ 391.90	$ 391.90	$ 419.33	$ 448.69	$ 480.09	$ 499.77	$ 1,477.18	$ 2,080.93
12" Meter	$ 732.55	$ 732.55	$ 783.83	$ 838.75	$ 897.41	$ 934.20	$ 2,761.68	$ 3,890.43
20" Meter	$ 1,533.20	$ 1,533.20	$ 1,640.52	$ 1,755.36	$ 1,878.24	$ 1,955.25	$ 5,780.25	$ 8,142.75
Commercial								
5/8" Meter	$ 3.40	$ 3.40	$ 3.64	$ 3.89	$ 4.17	$ 4.34	$ 11.01	$ 15.51
3/4" Meter	$ 5.15	$ 5.15	$ 5.51	$ 5.90	$ 6.31	$ 6.57	$ 16.52	$ 23.27
1" Meter	$ 8.55	$ 8.55	$ 9.15	$ 9.79	$ 10.47	$ 10.90	$ 27.53	$ 38.78
1 1/2" Meter	$ 17.10	$ 17.10	$ 18.30	$ 19.58	$ 20.95	$ 21.81	$ 55.05	$ 77.55
2" Meter	$ 27.30	$ 27.30	$ 29.21	$ 31.26	$ 33.44	$ 34.81	$ 88.08	$ 124.08
3" Meter	$ 54.50	$ 54.50	$ 58.32	$ 62.40	$ 66.76	$ 69.50	$ 176.16	$ 248.16
4" Meter	$ 85.15	$ 85.15	$ 91.11	$ 97.49	$ 104.31	$ 108.59	$ 275.25	$ 387.75
6" Meter	$ 170.45	$ 170.45	$ 182.38	$ 195.15	$ 208.81	$ 217.37	$ 550.50	$ 775.50
8" Meter	$ 272.60	$ 272.60	$ 291.68	$ 312.10	$ 333.95	$ 347.64	$ 880.80	$ 1,240.80
10" Meter	$ 391.90	$ 391.90	$ 419.33	$ 448.69	$ 480.09	$ 499.77	$ 1,266.15	$ 1,783.65
12" Meter	$ 732.55	$ 732.55	$ 783.83	$ 838.75	$ 897.41	$ 934.20	$ 2,367.15	$ 3,334.65
20" Meter	$ 1,533.20	$ 1,533.20	$ 1,640.52	$ 1,755.36	$ 1,878.24	$ 1,955.25	$ 4,954.50	$ 6,979.50
Commodity Charges per Thousand Gallons								
Residential								
1-22 Kgal	$ 3.88	$ 3.88	$ 4.15	$ 4.44	$ 4.75	$ 4.94		
> 22 Kgal								
1-6 Kgal							$ 4.94	$ 4.94
7-20 Kgal							$ 5.19	$ 5.45
> 20 Kgal								
Multi-Family								
All Metered Water Use	$ 3.88	$ 3.88	$ 4.15	$ 4.44	$ 4.75	$ 4.94	$ 5.19	$ 5.45
Commercial								
All Metered Water Use	$ 3.88	$ 3.88	$ 4.15	$ 4.44	$ 4.75	$ 4.94	$ 5.19	$ 5.45
Limited Sewer								
All Metered Water Use	$ 2.33	$ 2.33	$ 2.49	$ 2.67	$ 2.85	$ 2.97	$ 3.35	$ 3.80
RECLAIMED WATER SYSTEM								
Service Availability Charges								
Residential (1)								
5/8" Meter		$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter		$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter		$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter		$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter		$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter		$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter		$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78		
6" Meter		$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55		
8" Meter		$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68		
Commercial & Multi-Family (1)								
5/8" Meter	$ 8.45	$ 8.45	$ 8.45	$ 9.04	$ 9.67	$ 10.07	$ 11.08	$ 12.19
3/4" Meter	$ 10.65	$ 10.65	$ 12.68	$ 13.56	$ 14.51	$ 15.10	$ 16.62	$ 18.29
1" Meter	$ 15.20	$ 15.20	$ 21.13	$ 22.60	$ 24.19	$ 25.18	$ 27.70	$ 30.48
1 1/2" Meter	$ 26.35	$ 26.35	$ 42.25	$ 45.21	$ 48.37	$ 50.35	$ 55.40	$ 60.95
2" Meter	$ 39.70	$ 39.70	$ 67.60	$ 72.33	$ 77.40	$ 80.57	$ 88.64	$ 97.52
3" Meter	$ 75.35	$ 75.35	$ 135.20	$ 144.66	$ 154.79	$ 161.14	$ 177.28	$ 195.04
4" Meter	$ 115.35	$ 115.35	$ 211.25	$ 226.04	$ 241.86	$ 251.78	$ 277.00	$ 304.75
6" Meter	$ 226.85	$ 226.85	$ 422.50	$ 452.08	$ 483.72	$ 503.55	$ 554.00	$ 609.50
8" Meter	$ 360.35	$ 360.35	$ 676.00	$ 723.32	$ 773.95	$ 805.68	$ 886.40	$ 975.20
Commodity Charges per Thousand Gallons								
Residential								
1-15 Kgal		$ 0.97	$ 0.97	$ 1.04	$ 1.11	$ 1.16		
16-30 Kgal		$ 1.56	$ 1.56	$ 1.67	$ 1.79	$ 1.86		
> 30 Kgal		$ 4.00	$ 4.00	$ 4.28	$ 4.58	$ 4.77		
1-14 Kgal							$ 1.45	$ 1.82
> 14 Kgal							$ 4.96	$ 5.15
Commercial & Multi-Family								
1-15 Kgal		$ 0.97	$ 0.97	$ 1.04				
16-30 Kgal		$ 1.56	$ 1.56	$ 1.67				
> 30 Kgal		$ 4.00	$ 4.00	$ 4.28				
1-22 Kgal					$ 1.11	$ 1.16		
> 22 Kgal					$ 1.47	$ 1.53		
1-14 Kgal							$ 1.73	$ 2.30
> 14 Kgal							$ 2.14	$ 2.75
Bulk Reclaimed								
All Kgal (2)	$ 0.19	$ 0.13	$ 0.13	$ 0.13	$ 0.13	$ 0.14	$ 0.14	$ 0.14
All Kgal (3)	$ 0.27	$ 0.27	$ 0.27	$ 0.27	$ 0.27	$ 0.28	$ 0.28	$ 0.28
Environmental Charge								
Water System - per Thousand Gallons							$ 0.10	$ 0.23	$ 0.37	$ 0.50
Irrigation - per Thousand Gallons							$ 0.10	$ 0.23	$ 0.37	$ 0.50
Wastewater System - per Thousand Gallons							$ 0.10	$ 0.23	$ 0.37	$ 0.50
Reclaimed Water System - per Thousand Gallons not including bulk							$ 0.10	$ 0.23	$ 0.37	$ 0.50

Notes:
(1) Non-bulk reclaimed customers in a DRI will be charged an additional $6.00 regardless of meter size to cover costs due to regulatory requirements.
(2) Bulk Reclaimed rater per kgal for bulk reclaimed irrigation customers that are relinquishing, suspending, or foregoing an application for a Consumptive Use Permit or ground water withdrawals from SJRWMD. Rates apply in accordance with JEA standard bulk reclaimed water service agreement until such time as JEA may no longer offer reclaimed water service under such agreement.
(3) Bulk Reclaimed rate per kgal for all other bulk reclaimed irrigation customers. Rates apply in accordance with JEA standard bulk reclaimed water service agreement until such time as JEA may no longer offer reclaimed water service under such agreement.

JEA WATER, WASTEWATER, AND RECLAIMED RATE HISTORY

NO WATER, WASTEWATER AND RECLAIMED RATE CHANGES SINCE OCTOBER 2011

Residential @ 6 Kgal	Oct-11	Oct-12	Oct-13	Oct-14	Oct-15	Oct-16	Oct-17	Oct-18
Water	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40
Wastewater	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96
Total Water & Sewer Charges w/out Taxes & Fees	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**

Rates	Oct-11	Oct-12	Oct-13	Oct-14	Oct-15	Oct-16	Oct-17	Oct-18
WATER SYSTEM								
Service Availability Charges								
Residential Potable								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
Residential Irrigation								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
Multi-Family Potable								
5/8" Meter	$ 18.41	$ 18.41	$ 18.41	$ 18.41	$ 18.41	$ 18.41	$ 18.41	$ 18.41
3/4" Meter	$ 27.62	$ 27.62	$ 27.62	$ 27.62	$ 27.62	$ 27.62	$ 27.62	$ 27.62
1" Meter	$ 46.03	$ 46.03	$ 46.03	$ 46.03	$ 46.03	$ 46.03	$ 46.03	$ 46.03
1 1/2" Meter	$ 92.05	$ 92.05	$ 92.05	$ 92.05	$ 92.05	$ 92.05	$ 92.05	$ 92.05
2" Meter	$ 147.28	$ 147.28	$ 147.28	$ 147.28	$ 147.28	$ 147.28	$ 147.28	$ 147.28
3" Meter	$ 294.56	$ 294.56	$ 294.56	$ 294.56	$ 294.56	$ 294.56	$ 294.56	$ 294.56
4" Meter	$ 460.25	$ 460.25	$ 460.25	$ 460.25	$ 460.25	$ 460.25	$ 460.25	$ 460.25
6" Meter	$ 920.50	$ 920.50	$ 920.50	$ 920.50	$ 920.50	$ 920.50	$ 920.50	$ 920.50
8" Meter	$ 1,472.80	$ 1,472.80	$ 1,472.80	$ 1,472.80	$ 1,472.80	$ 1,472.80	$ 1,472.80	$ 1,472.80
10" Meter	$ 2,117.15	$ 2,117.15	$ 2,117.15	$ 2,117.15	$ 2,117.15	$ 2,117.15	$ 2,117.15	$ 2,117.15
12" Meter	$ 3,958.15	$ 3,958.15	$ 3,958.15	$ 3,958.15	$ 3,958.15	$ 3,958.15	$ 3,958.15	$ 3,958.15
20" Meter	$ 8,284.50	$ 8,284.50	$ 8,284.50	$ 8,284.50	$ 8,284.50	$ 8,284.50	$ 8,284.50	$ 8,284.50
Commercial Potable								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
4" Meter	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00
6" Meter	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00
8" Meter	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00
10" Meter	$ 1,974.55	$ 1,974.55	$ 1,974.55	$ 1,974.55	$ 1,974.55	$ 1,974.55	$ 1,974.55	$ 1,974.55
12" Meter	$ 3,691.55	$ 3,691.55	$ 3,691.55	$ 3,691.55	$ 3,691.55	$ 3,691.55	$ 3,691.55	$ 3,691.55
20" Meter	$ 7,726.50	$ 7,726.50	$ 7,726.50	$ 7,726.50	$ 7,726.50	$ 7,726.50	$ 7,726.50	$ 7,726.50
Commercial & Multi-Family Irrigation								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
4" Meter	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00
6" Meter	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00
8" Meter	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00
Commodity Charges per Thousand Gallons								
Residential								
1-6 Kgal	$ 0.93	$ 0.93	$ 0.93	$ 0.93	$ 0.93	$ 0.93	$ 0.93	$ 0.93
7-20 Kgal	$ 2.28	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60
> 20 Kgal	$ 5.35	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60
Residential Irrigation								
1-14 Kgal	$ 2.28	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60
> 14 Kgal	$ 5.35	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60
Multi-Family - 8" Meters and Smaller								
All Metered Water Use	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00
Multi-Family - 10" Meters and Greater								
All Metered Water Use	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00
Commercial - 8" Meters and Smaller								
All Metered Water Use	$ 1.48	$ 1.49	$ 1.49	$ 1.49	$ 1.49	$ 1.49	$ 1.49	$ 1.49
Commercial - 10" Meters and Greater								
All Metered Water Use	$ 1.23	$ 1.24	$ 1.24	$ 1.24	$ 1.24	$ 1.24	$ 1.24	$ 1.24
Commercial & Multi-Family Irrigation								
1-14 Kgal	$ 2.87	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44
> 14 Kgal	$ 3.36	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96
Fire Protection Charges								
Unmetered Connections (Annual Charge)								
≤ 4" Meter	$ 67.00	$ 67.00	$ 67.00	$ 67.00	$ 67.00	$ 67.00	$ 67.00	$ 67.00
6" Meter	$ 133.00	$ 133.00	$ 133.00	$ 133.00	$ 133.00	$ 133.00	$ 133.00	$ 133.00
8" Meter	$ 274.00	$ 274.00	$ 274.00	$ 274.00	$ 274.00	$ 274.00	$ 274.00	$ 274.00
≥ 10" Meter	$ 488.00	$ 488.00	$ 488.00	$ 488.00	$ 488.00	$ 488.00	$ 488.00	$ 488.00
Metered Connections (Monthly Charge)								
≤ 4" Meter	$ 21.00	$ 21.00	$ 21.00	$ 21.00	$ 21.00	$ 21.00	$ 21.00	$ 21.00
6" Meter	$ 28.00	$ 28.00	$ 28.00	$ 28.00	$ 28.00	$ 28.00	$ 28.00	$ 28.00
8" Meter	$ 42.00	$ 42.00	$ 42.00	$ 42.00	$ 42.00	$ 42.00	$ 42.00	$ 42.00
≥ 10" Meter	$ 55.00	$ 55.00	$ 55.00	$ 55.00	$ 55.00	$ 55.00	$ 55.00	$ 55.00
WASTEWATER SYSTEM								
Service Availability Charges								
Residential								
5/8" Meter	$ 14.10	$ 14.10	$ 14.10	$ 14.10	$ 14.10	$ 14.10	$ 14.10	$ 14.10
3/4" Meter	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15
1" Meter	$ 35.25	$ 35.25	$ 35.25	$ 35.25	$ 35.25	$ 35.25	$ 35.25	$ 35.25
1 1/2" Meter	$ 70.50	$ 70.50	$ 70.50	$ 70.50	$ 70.50	$ 70.50	$ 70.50	$ 70.50
2" Meter	$ 112.80	$ 112.80	$ 112.80	$ 112.80	$ 112.80	$ 112.80	$ 112.80	$ 112.80

JEA WATER, WASTEWATER, AND RECLAIMED RATE HISTORY

NO WATER, WASTEWATER AND RECLAIMED RATE CHANGES SINCE OCTOBER 2011

Residential @ 6 Kgal	Oct-11	Oct-12	Oct-13	Oct-14	Oct-15	Oct-16	Oct-17	Oct-18
Water	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40	$ 20.40
Wastewater	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96	$ 45.96
Total Water & Sewer Charges w/out Taxes & Fees	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**	**$ 66.36**
3" Meter	$ 225.60	$ 225.60	$ 225.60	$ 225.60	$ 225.60	$ 225.60	$ 225.60	$ 225.60
Multi-Family								
5/8" Meter	$ 24.68	$ 24.68	$ 24.68	$ 24.68	$ 24.68	$ 24.68	$ 24.68	$ 24.68
3/4" Meter	$ 37.01	$ 37.01	$ 37.01	$ 37.01	$ 37.01	$ 37.01	$ 37.01	$ 37.01
1" Meter	$ 61.69	$ 61.69	$ 61.69	$ 61.69	$ 61.69	$ 61.69	$ 61.69	$ 61.69
1 1/2" Meter	$ 123.38	$ 123.38	$ 123.38	$ 123.38	$ 123.38	$ 123.38	$ 123.38	$ 123.38
2" Meter	$ 197.40	$ 197.40	$ 197.40	$ 197.40	$ 197.40	$ 197.40	$ 197.40	$ 197.40
3" Meter	$ 394.80	$ 394.80	$ 394.80	$ 394.80	$ 394.80	$ 394.80	$ 394.80	$ 394.80
4" Meter	$ 616.88	$ 616.88	$ 616.88	$ 616.88	$ 616.88	$ 616.88	$ 616.88	$ 616.88
6" Meter	$ 1,233.75	$ 1,233.75	$ 1,233.75	$ 1,233.75	$ 1,233.75	$ 1,233.75	$ 1,233.75	$ 1,233.75
8" Meter	$ 1,974.00	$ 1,974.00	$ 1,974.00	$ 1,974.00	$ 1,974.00	$ 1,974.00	$ 1,974.00	$ 1,974.00
10" Meter	$ 2,837.63	$ 2,837.63	$ 2,837.63	$ 2,837.63	$ 2,837.63	$ 2,837.63	$ 2,837.63	$ 2,837.63
12" Meter	$ 5,305.13	$ 5,305.13	$ 5,305.13	$ 5,305.13	$ 5,305.13	$ 5,305.13	$ 5,305.13	$ 5,305.13
20" Meter	$ 11,103.75	$ 11,103.75	$ 11,103.75	$ 11,103.75	$ 11,103.75	$ 11,103.75	$ 11,103.75	$ 11,103.75
Commercial								
5/8" Meter	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15	$ 21.15
3/4" Meter	$ 31.73	$ 31.73	$ 31.73	$ 31.73	$ 31.73	$ 31.73	$ 31.73	$ 31.73
1" Meter	$ 52.88	$ 52.88	$ 52.88	$ 52.88	$ 52.88	$ 52.88	$ 52.88	$ 52.88
1 1/2" Meter	$ 105.75	$ 105.75	$ 105.75	$ 105.75	$ 105.75	$ 105.75	$ 105.75	$ 105.75
2" Meter	$ 169.20	$ 169.20	$ 169.20	$ 169.20	$ 169.20	$ 169.20	$ 169.20	$ 169.20
3" Meter	$ 338.40	$ 338.40	$ 338.40	$ 338.40	$ 338.40	$ 338.40	$ 338.40	$ 338.40
4" Meter	$ 528.75	$ 528.75	$ 528.75	$ 528.75	$ 528.75	$ 528.75	$ 528.75	$ 528.75
6" Meter	$ 1,057.50	$ 1,057.50	$ 1,057.50	$ 1,057.50	$ 1,057.50	$ 1,057.50	$ 1,057.50	$ 1,057.50
8" Meter	$ 1,692.00	$ 1,692.00	$ 1,692.00	$ 1,692.00	$ 1,692.00	$ 1,692.00	$ 1,692.00	$ 1,692.00
10" Meter	$ 2,432.25	$ 2,432.25	$ 2,432.25	$ 2,432.25	$ 2,432.25	$ 2,432.25	$ 2,432.25	$ 2,432.25
12" Meter	$ 4,547.25	$ 4,547.25	$ 4,547.25	$ 4,547.25	$ 4,547.25	$ 4,547.25	$ 4,547.25	$ 4,547.25
20" Meter	$ 9,517.50	$ 9,517.50	$ 9,517.50	$ 9,517.50	$ 9,517.50	$ 9,517.50	$ 9,517.50	$ 9,517.50
Commodity Charges per Thousand Gallons								
Residential								
1-6 Kgal	$ 4.94	$ 4.94	$ 4.94	$ 4.94	$ 4.94	$ 4.94	$ 4.94	$ 4.94
7-20 Kgal	$ 5.73	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02
Multi-Family								
All kgal	$ 5.73	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02
Commercial								
All kgal	$ 5.73	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02	$ 6.02
Limited Sewer								
All kgal	$ 4.30	$ 4.74	$ 4.74	$ 4.74	$ 4.74	$ 4.74	$ 4.74	$ 4.74

RECLAIMED WATER SYSTEM

Service Availability Charges

Residential (1)								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
Commercial & Multi-Family (1)								
5/8" Meter	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60	$ 12.60
3/4" Meter	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90	$ 18.90
1" Meter	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50	$ 31.50
1 1/2" Meter	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00	$ 63.00
2" Meter	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80	$ 100.80
3" Meter	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60	$ 201.60
4" Meter	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00	$ 315.00
6" Meter	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00	$ 630.00
8" Meter	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00	$ 1,008.00

Commodity Charges per Thousand Gallons

Residential								
1-14 Kgal	$ 2.28	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60	$ 2.60
> 14 Kgal	$ 5.35	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60	$ 5.60
Commercial & Multi-Family								
1-14 Kgal	$ 2.87	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44	$ 3.44
> 14 Kgal	$ 3.36	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96	$ 3.96
Bulk Reclaimed								
All Kgal (2)	$ 0.14	$ 0.14	$ 0.14	$ 0.14	$ 0.14	$ 0.14	$ 0.14	$ 0.14
All Kgal (3)	$ 0.28	$ 0.28	$ 0.28	$ 0.28	$ 0.28	$ 0.28	$ 0.28	$ 0.28

Environmental Charge

Water System - per kgal	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37
Irrigation - per kgal	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37
Wastewater - Residential 1-20 kgal - Other All kgal	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37
Reclaimed Water System - per kgal not including bulk	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37	$ 0.37

Notes:
(1) Non-bulk reclaimed customers in a DRI will be charged an additional $6.00 regardless of meter size to cover costs due to regulatory requirements.
(2) Bulk Reclaimed rater per kgal for bulk reclaimed irrigation customers that are relinquishing, suspending, or foregoing an application for a Consumptive Use Permit or ground water withdrawals from SJRWMD. Rates apply in accordance with JEA standard bulk reclaimed water service agreement until such time as JEA may no longer offer reclaimed water service under such agreement.
(3) Bulk Reclaimed rate per kgal for all other bulk reclaimed irrigation customers. Rates apply in accordance with JEA standard bulk reclaimed water service agreement until such time as JEA may no longer offer reclaimed water service under such agreement.

FINAL REPORT

Integrated Water Resource Planning Project

JEA

February 2013

CDM Smith

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Appendices

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Executive Summary

JEA has completed the Integrated Water Resource Planning (IWRP) Project incorporating the potable water, sewer and reclaimed water systems in a long-term planning tool to analyze the current system, identify water resource challenges and opportunities, and develop a method for assessing future water resources investments and policies. At the start of the IWRP Project, the following mission statement was developed to guide the study:

> *"The project team will develop an integrated water resource planning process that is designed to provide a road map for assessing future investments and developing policies to sustainably meet water needs through year 2035. The project will develop processes and tools for ongoing assessment and adaptive management."*

A systems model was developed as part of this study in order to answer the following types of questions:

- When will water demand outpace existing water supply?
- What supply alternatives will offer the most cost-effective and reliable solutions?
- How can supply-side and demand-side management be used together cost-effectively?
- How should new infrastructure and facilities be phased?

In addition to the systems model, an evaluation framework and decision tool was also developed. The decision tool incorporates performance metrics from the systems model along with other qualitative metrics, in order to rank alternatives against multiple criteria. To demonstrate the systems model and decision tool, several illustrative alternatives were created. While these illustrative alternatives utilize reasonable information, they assume certain conditions which will likely change. Therefore, these alternatives should in no way be construed as alternatives that JEA is pursuing at this time. Rather, they were developed to demonstrate how the systems model, evaluation framework and decision tool can be used by JEA to evaluate future water resources and develop an appropriate long-term strategy.

The IWRP process starts by defining planning objectives and performance measures that are important to the utility, customers, regulators and other stakeholders. These guiding objectives were outlined at the first workshop with JEA's Planning Team, then reviewed and modified by the broader group of JEA staff and leadership. Each objective and its related performance measures are listed in **Table ES-1** along with the weights assigned to each used in scoring and analyzing the illustrative alternatives. The performance measures are either quantitative, and calculated within the integrated model, or qualitative, and determined outside the model based on experience and professional judgment.

Table ES-1 Objectives, Performance Measures and Weights

Objective	Weight	Performance Measure	Sub-Weight	Units	Better Scores Are:
Maximize Cost-Effectiveness	0.167	Total customer lifecycle costs	0.4	2012 dollars (billions)	lower
		JEA levelized costs	0.4	2012 dollars per million gallon	lower
		Ratio of JEA fixed costs to JEA total costs	0.2	Fixed costs/total costs	lower
Reliably Meet Water Demands	0.167	Magnitude of water shortage	0.6	Million gallons	lower
		Time of water shortage	0.4	% of months showing deficit > 5%	lower
Maximize Flexibility	0.167	Operational flexibility	0.5	% of months showing South Grid deficit >5%	lower
		Diversity of supply	0.5	% supply remaining after removing top source	higher
Promote Environmental Sustainability	0.167	Aquifer sustainability	0.5	% supplies not from Floridan Aquifer	higher
		Water use efficiency	0.4	% demand reduced by conservation/reuse	higher
		River impacts	0.1	% supply from surface water	lower
Maximize Implementation	0.167	Reliance on proven technology	0.4	Qualitative score of 1 to 5, 1 - unproven technology, 5 - common technology	higher
		Ability to permit	0.4	Qualitative score of 1 to 5, 1 - difficult to permit, 5 - no permitting hurdles	higher
		Public acceptance	0.2	Qualitative score of 1 to 5, 1 - unlikely public acceptance, 5 - no new public acceptance needed	higher
Meet Customer Water Quality	0.167	Water quality blending/secondary water quality	1	Qualitative score of 1 to 5, 1 - difficult to blend sources, 5 - no blending challenges	higher

The next step in the IWRP process is the identification and characterization of various supply and demand-side options. A full list of options modeled is listed in **Table ES-2**. Each of these options has been previously studied and information concerning the configuration, potential yield, constraints and costs were taken from previous reports for incorporation into the model.

Table ES-2 Modeled Options within the System Planning Tool

Water Supply Options	Water Reuse Options	Demand Management Options
▪ CUP Allocations ▪ Regional Surface Water Reservoirs on either Ortega River, Big Davis Creek, or Durbin Creek ▪ Non-Floridan Private Irrigation Promotion for either current self supply customers or for wider adoptions ▪ Desalination of either brackish groundwater, brackish St. Johns River water, lower St. Johns River water or the ocean. ▪ Intermediate Aquifer Wells	▪ Indirect Potable Reuse ▪ Keystone Lake Regional Reuse ▪ Regional Reuse throughout the whole St. Johns River Water Management District ▪ Targeted Reuse focusing on either the Stone Container Corporation, creation of a South Grid Salinity barrier, or providing reclaimed water to identified 'Water Hogs'.	▪ Conservation ▪ Reduction of unaccounted for water

Because no single option is likely able to meet all of the specified planning objectives, options are combined into complete alternatives. During a JEA workshop, several themed-alternatives were initially developed and then expanded into the five listed below. These alternatives are NOT intended to represent actual plans or recommendations – rather, they were formulated solely to demonstrate the comparison process with the IWRP tools.

1. No Options – Water is supplied solely from the Floridan Aquifer by way of the CUP.
2. Low Cost – In addition to the planned North to South Grid transfer capacity, up to an additional 5 mgd of supply is provided from intermediate aquifer supply wells (IAS wells). Targeted reuse expansion options are included to offset potable demand. This alternative results in future deficits.
3. High Reliability with Groundwater Desalination – All options in the Low Cost alternative (IAS wells and targeted reuse) are included, along with a 30 mgd brackish groundwater desalination plant.
4. High Reliability with Surface Water Desalination - All options in the Low Cost alternative (IAS wells and targeted reuse) are included, along with a 30 mgd brackish St. Johns River water desalination plant.
5. High Reliability with Indirect Potable Reuse (IPR) – All options in the Low Cost alternative (IAS wells and targeted reuse) are included, along with up to 30 mgd of indirect potable reuse capacity in the South Grid.

The alternatives are then evaluated using an integrated systems model that simulates system constraints, supply reliability, lifecycle costs, water quality and other metrics.

To facilitate the programming of the systems model, a conceptual schematic of JEA's water system was developed (see **Figure ES-1**). In this figure, the size of the circles represents the relative size of water demand and CUP allocation in the year 2036. As shown in the figure, the North and South Grids represent the majority of the system water demands. A range of low, medium and high demand

projections are included for each grid. These demands are met by the CUP allocation allowed per grid and then by any of the selected additional supply options or demand management options.

The systems model is run for a 25-year planning period from 2012 to 2035 allowing factors such as demand or the availability of supply sources to change over time. The model was created using the software STELLA and can be operated through a set of user-friendly interface management panels. From these panels all options can be turned on or off to build the alternatives for investigation. Navigation buttons easily allow changes and updates to any of the project data or assumptions included within the model structure. Additionally, the user can adjust the priority order in which the water supply options are utilized. The model utilizes the water from one source to meet demand until it is exhausted and then moves on to the next source on the priority list until the demand is satisfied or no additional water supply options remain.

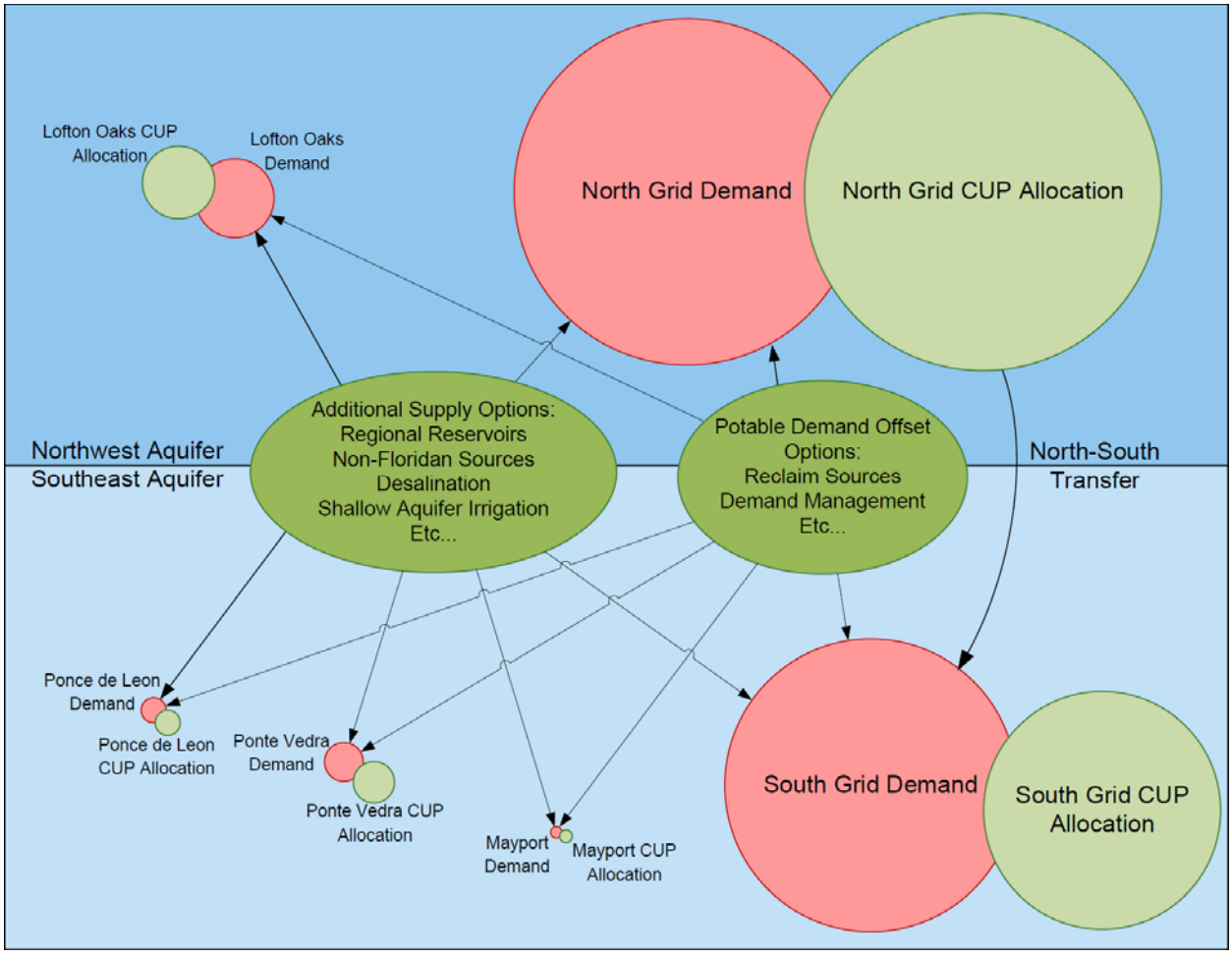


Figure ES-1
Modeled System Schematic, Based on 2036 Demands and CUP Allocation

The systems model will produce raw output for the various quantitative metrics. To facilitate the ranking of alternatives, a decision software tool called Criterium Decision Plus (CDP), was utilized. CDP uses a method called multi-attribute rating to convert raw performance metrics (both quantitative and qualitative) into standardized scores (removing units such as dollars for cost or mgd for water supply), and then applies the relative weights in order to compare and rank alternatives.

The scoring of the illustrative alternatives produces the following scores and ranking (Table ES-3 and Figure ES-2). The score is a composite of the sum of the normalized scores for each objective category; theoretically, an alternative that scores perfectly in all objective categories would have a composite score of 1.0.

Table ES-3 Results of Illustrative Alternative Ranking

Alternative	Composite Score	Rank
High Reliability with Groundwater Desalination	0.67	1
High Reliability with Surface Water Desalination	0.63	2
High Reliability with Indirect Potable Reuse	0.59	3
Low Cost	0.57	4
No Options	0.55	5

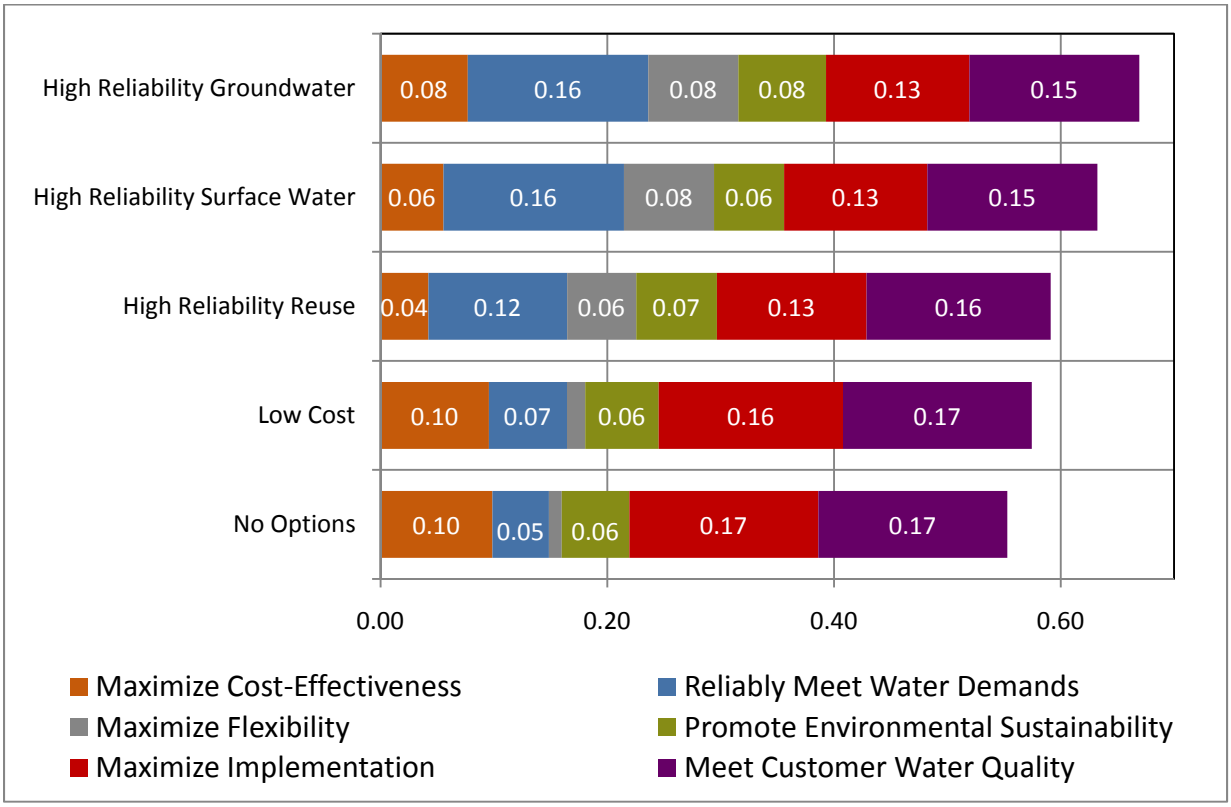


Figure ES-2
Illustrative Alternative Scores

The groundwater desalination alternative scored the best because, despite having a higher cost, the supply options chosen resulted in higher supply reliability when compared to lower cost alternatives. A sensitivity analysis on the weights of the objectives—which were weighted equally at 17 percent each in the baseline scenario—showed that as the weight of the cost objective is increased beyond 75 percent, the less expensive and less reliable alternatives rank higher.

This report demonstrated how the current systems model can be used to compare alternatives with respect to supply reliability, economic viability, and other criteria. The report and the planning process were not intended to yield a recommended plan for future water supply. However, there are some important observations that can be made from this study, these being:

- While an overall future water supply deficit is predicted for the JEA system if no new options are selected, this deficit is largely present only in the South Grid and Lofton Oaks Grid. The CUP allocation is sufficient to meet the currently projected North Grid demands and those of many of the smaller grids through 2035. Thus the focus on alternative supplies should remain on those with a potential impact for the South Grid system.
- Significant water supply deficits (i.e., greater than 5 mgd) do not occur until after 2025 under a low population forecast scenario, and not until after 2015 under current or high population forecast scenarios.
- There is not always the need to move the full flow capacity through the interconnect between the North and South Grids. The optimal timing for the use of the interconnect depends on the time of year and options selected. Future optimization of the best way to utilize this infrastructure should be considered and could be performed using the system model with some modest refinement.
- The final rankings of the illustrative example were found to be fairly sensitive to cost. Thus, as JEA continues to use the model, specific attention should be paid to continuing to refine the cost of selected alternatives.

Moving forward, JEA can use the model in two ways:

- **Planning Mode:** The model can be used exactly as demonstrated in this report to formulate alternative combinations of supply and demand management options, simulate their performance over the planning period, and compare cost, reliability, and other factors. It can also be used to form hybrid alternatives with options that seem to address or satisfy many of the specified planning objectives. In this way, a preferred plan can be formulated by studying tradeoffs, combining the options that satisfy the objectives broadly, and tuning them to appropriate yield levels.
- **Operations Mode:** The model can also be used (with its accompanying output spreadsheet) to formulate an annual operating plan at any point in time, given the infrastructure that would be currently available. For example, JEA could use the model to formulate an operating plan for 2013 by enabling the current supply options and experimenting with demand management alternatives to see how they might offset potable demand, and what the economic implications would be. In future years, when additional supply sources are brought online, JEA can experiment with alternative prioritization strategies for the suite of installed supplies to help optimize for cost.

As recently discussed with JEA at the project completion workshop, JEA may want to consider the following suggestions for ways to expand and improve the system model:

- **Create more refined alternatives.** The options included in the systems model were all summarized from previous reports and studies. As certain options and combinations of options become favored, the costs and yields should be revisited and refined. More attention to the scaling or phasing of infrastructure can also be considered and modeled.
- **Enhance the financial output.** The current systems model has a significant economic component set up to compute levelized cost and total lifecycle costs. However, an additional export spreadsheet could be created to calculate additional financial output that can feed into a more comprehensive JEA financial analysis for rate making and bonding analysis.
- **Continue model maintenance.** The systems model relies on multiple future projections out to the year 2035. These will need to be updated regularly to remain relevant with current conditions and changing planning activities.
- **Invest in staff training.** JEA may want to consider additional staff to fully utilize both the systems model and CDP decision software.

Section 1
Introduction

JEA operates as an integrated utility providing water, sewer and power to customers in the Jacksonville, Florida area in addition to operating a reclaimed water system. Operating these systems together, JEA inherently understands their connectivity and the need for considering the full system holistically when planning their long-term water resources strategy. To accomplish this goal, JEA's planning group commissioned an Integrated Water Resource Planning (IWRP) Project to analyze the current system, identify water resource challenges and opportunities, and develop a tool for assessing future water resources investments and policies.

1.1 JEA Service Area

In order to assess JEA's water resources challenges and opportunities, it is important to understand JEA's three water resource systems: water, wastewater and reclaimed water.

1.1.1 Water

The water distribution system serves approximately 305,000 customers, and is divided into two major interconnected grids (North Grid and South Grid) as well as four smaller discrete grids. The North Grid and South Grid are interconnected through a pipeline river crossing that allows for the transfer of water from the North Grid to the South Grid. The four smaller grids include the Ponce de Leon systems in St. Johns County, Lofton Oaks in Nassau County, and Mayport in Duval County (see **Figure 1-1**).

All grids use deep wells to draw water from the Floridan Aquifer. Raw water is pumped to small scale water treatment plants for disinfection and ultimately into the water distribution systems.

Population within the JEA service area is projected to grow 43 percent by 2035, with especially high growth in the Lofton Oaks area. This is projected to increase water demands

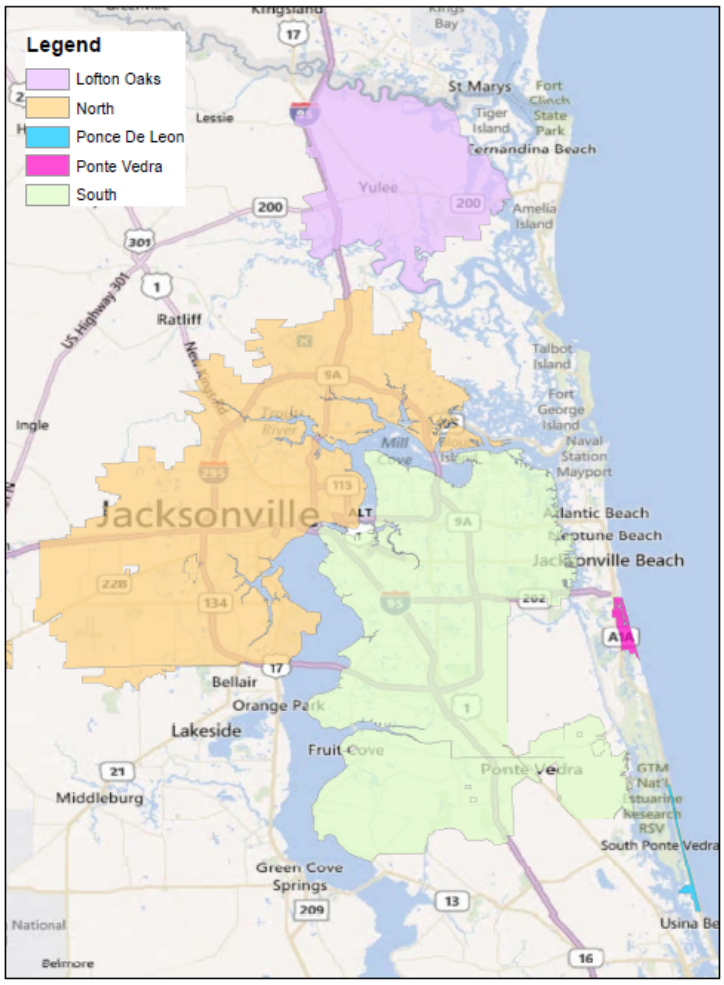


Figure 1-1
JEA Water Grid Geographical Extents

in the region by the same proportion. As of September 2011 the average daily flow of the water system was 124 million gallons per day (mgd) with maximum daily flow reaching 172 mgd.[1]

1.1.2 Wastewater

The wastewater system is broken into service areas that do not align directly with the water distribution grids. JEA's wastewater system serves approximately 230,000 customers. The majority of the wastewater treatment plants discharge into the St. Johns River. JEA is already meeting 2013 TMDL nutrient requirements through the phase-out of smaller facilities and the increased distribution of reclaimed water. Following the completion of all phase-outs, three wastewater treatment plants will remain in the north grid area (Buckman, District II/Cedar Bay, and Southwest), four treatment plants within the South Grid (Arlington East, Blacks Ford, Monterey, and Mandarin), and one plant each within the Ponte Vedra, Ponce De Leon and Lofton Oaks grids. These plants are not simulated explicitly in the IWRP model, but the reclaimed water derived from wastewater plants throughout the system is included.

The peak capacity for the sewer system as of September 2011 was 246 mgd with an average daily flow of 64 mgd and maximum daily flow of 101 mgd. By 2035, the end of the project planning period, average daily wastewater flow is projected to be 103 mgd.

1.1.3 Reclaimed Water

JEA currently has 11 reclaimed water production facilities with a total capacity of 30.8 mgd to serve an average daily flow of 13 mgd. Demand for reclaimed water is projected to more than triple by 2035.

Current reclaimed capacity is split between the North Grid, South Grid and satellite grids. The South Grid currently has the capacity to deliver 14.7 mgd to a customer distribution system where the water is used predominately for irrigation. However, in the North Grid the available capacity of 13.5 mgd is currently non-public access reclaimed water for reuse within the treatment facilities and one transmission pipeline to three industrial customers. The smaller satellite grids currently have combined reclaimed water capacity of 2.6 mgd, which includes transmission pipelines from the treatment facilities mainly to specifically identified customers.

1.2 Water Resources Challenges

JEA's 20-year Consumptive Use Permit (CUP) was approved in May 2011 and revised in August 2012 to include 142.26 mgd of groundwater from the Floridan aquifer, which can be increased to 162.6 mgd provided JEA can replace/offset other permitted Floridan aquifer uses with expanded utilization of reclaimed water.

While the current CUP allocation is able to provide for customer water demands, as population in the region rises, JEA may need to turn to alternative water supply options and expanded demand management. **Figure 1-2** shows the potential gap between the CUP allocation and water demand based on varying population projections. More detail about this analysis and assumptions made in determining population increases and water demand are found in **Appendix A**.

[1] JEA (2011) *2012 Annual Water Resource Master Plan: Water – Wastewater – Reclaimed*. Corporate Planning Department, Water/Sewer System Planning. September 2011.

Withdrawals from some South Grid wellfields have been leading to increasing saline water intrusion. Because of this, CUP allocations in the South Grid are scheduled to decrease over time instead of rise as in other areas. This strengthens the need to investigate alternative water supplies within the South Grid geographical area. JEA carefully monitors the salinity at the wells as well as the potentiometric surface of the aquifer. While there is a confining layer between the Floridan aquifer and the upper surficial aquifers, there continues to be concern over the effect of groundwater pumping on local lakes and wetlands in the area that could put further restrictions on groundwater pumping in the future.

Another water resource challenge is improving the water quality of the St. Johns River. A revised Total Maximum Daily Load (TMDL) effective October 2013 sets the total nitrogen limit at 720 tons/yr or 7 parts per million (ppm) for all wastewater treatment facilities in aggregate, which is a drop from the previous limit of 1,536 tons/yr or 15 ppm. Besides improving the wastewater treatment facilities, expanding the reclaimed water system not only provides a reduction to the potable water demand but reduces nitrogen released to the river.

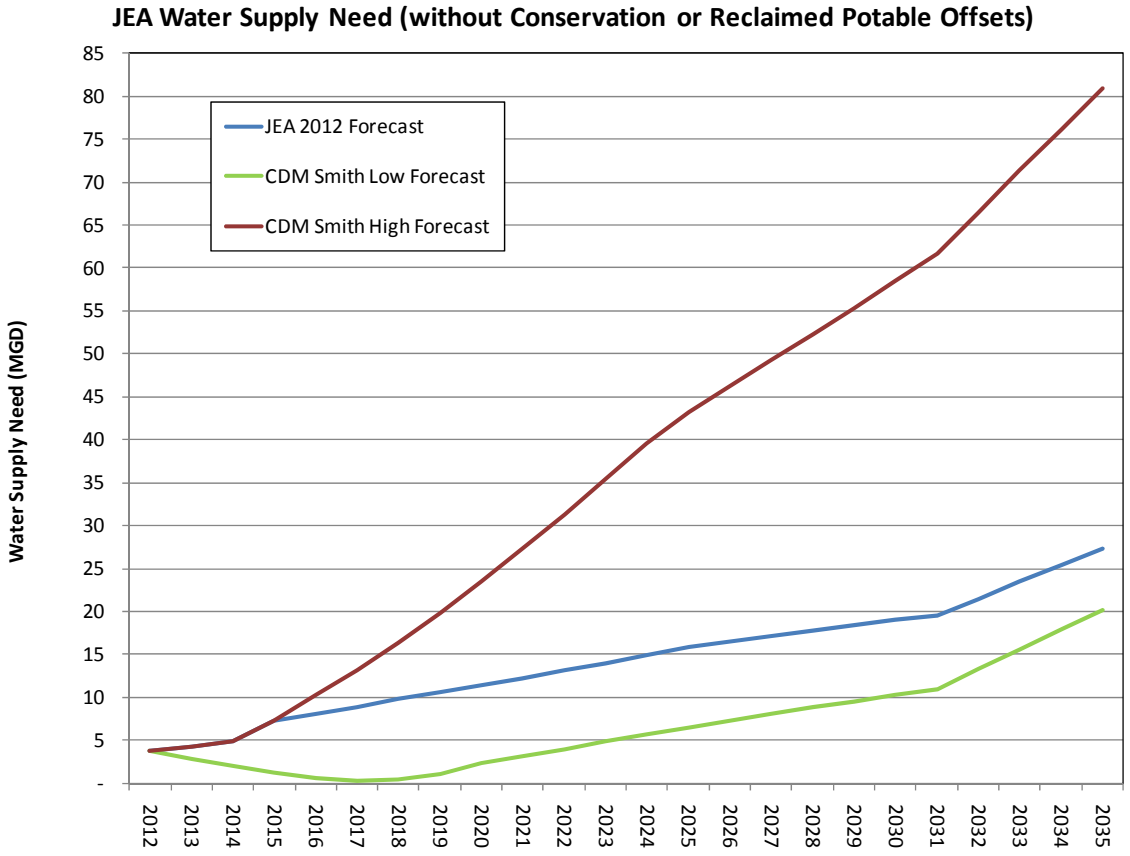


Figure 1-2
Range of Water Supply Need

1.3 Purpose of the Study

At the start of the IWRP Project, the following mission statement was developed to guide the study:

> *"The project team will develop an integrated water resource planning process that is designed to provide a road map for assessing future investments and developing policies to sustainably meet water needs through year 2035. The project will develop processes and tools for ongoing assessment and adaptive management."*

A systems model was developed as part of this study in order to answer the following types of questions:

- When will water demand outpace existing water supply?
- What supply alternatives will offer the most cost-effective and reliable solutions?
- How can supply-side and demand-side management be used together cost-effectively?
- How should new infrastructure and facilities be phased?

In addition to the systems model, an evaluation framework and decision tool was also developed. The decision tool incorporates performance metrics from the systems model along with other qualitative metrics, in order to rank alternatives against multiple criteria. To demonstrate the systems model and decision tool, several illustrative alternatives were created. While these illustrative alternatives utilize reasonable information, they assume certain conditions which will likely change. Therefore, these alternatives should in no way be construed as alternatives that JEA is pursuing at this time. Rather, they were developed to demonstrate how the systems model, evaluation framework and decision tool can be used by JEA to evaluate future water resources and develop an appropriate long-term strategy.

Section 2
IWRP Evaluation Framework

2.1 IWRP Process and Terms

The main purpose of the IWRP Project is to develop a framework and set of tools for JEA in order to evaluate alternatives and develop a long-term, sustainable water resources strategy. The outcome is a high-level, strategic planning tool that can illustrate key interrelationships and trade-offs between water resources alternatives. This will allow JEA to make informed decisions and adaptively manage their resources and infrastructure in the face of future uncertainty.

Terms commonly used within this IWRP process include:

- **Objectives:** Represent major goals of plan, defined in broad, understandable terms (e.g., ensure water reliability).
- **Metrics/Performance Measures:** Indicate how well an objective is being achieved (e.g., frequency and magnitude of water shortages). Objectives combined with their corresponding metrics represent the criteria by which alternatives are compared against.
- **Options:** Represent individual projects or demand management measures.
- **Alternatives:** Represent combinations of options designed to best meet the stated objectives, and will be evaluated against the criteria (objectives and metrics).

The IWRP process starts by defining planning objectives and performance measures that are important to the utility, customers, regulators and other stakeholders. Then the process continues with the identification and characterization of various supply and demand-side options. Because no single option is likely able to meet all of the specified planning objectives, options are combined in various ways into complete alternatives. The alternatives are then evaluated using an integrated systems model that simulates system constraints, supply reliability, lifecycle costs, water quality and other metrics. The output from the systems model, along with some qualitative metrics, is summarized in a decision tool to facilitate ranking of alternatives. **Figure 2-1** presents the overall IWRP process for JEA.

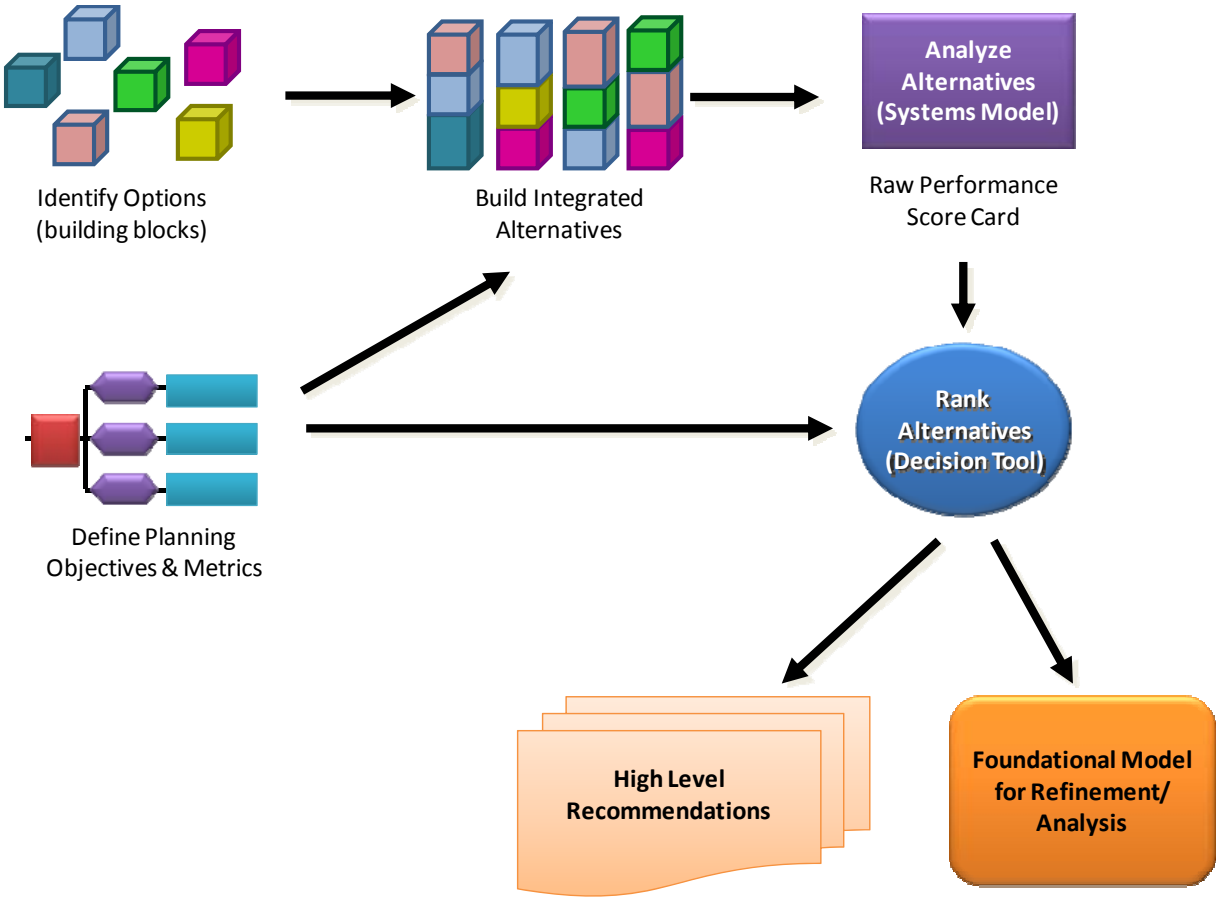


Figure 2-1
IWRP Process

2.2 Objectives and Performance Measures

The first workshop with JEA's Planning Team identified the guiding objectives for the IWRP. Associated with each objective are performance measures, which were reviewed and modified by the broader group of JEA staff and leadership at the kickoff meeting. One of the expectations of the integrated model is that it will provide numerical output in the form of the performance measures that are deemed to be quantitative, as opposed to qualitative. These will then be used in a scorecard along with any qualitative scores to provide balanced, broad-based comparisons of alternatives. The objectives and performance measures are listed in **Table 2-1** with more detail on their use provided in Section 4.

Table 2-1 Objectives and Performance Measures

Objective	Performance Measure
Maximize Cost-Effectiveness	Total customer lifecycle costs JEA levelized costs Ratio of JEA fixed costs to JEA total costs
Reliably Meet Water Demands	Magnitude of water shortage Time of water shortage
Maximize Flexibility	Operational flexibility Diversity of supply
Promote Environmental Sustainability	Aquifer sustainability Water use efficiency River impacts
Maximize Implementation	Reliance on proven technology Ability to permit Public acceptance
Meet Customer Water Quality	Water quality blending/secondary water quality

2.3 Integrated Systems Model

An important aspect of any IWRP study is the ability to analyze alternatives in an integrated, interconnected manner. This is especially important when water, wastewater, and reclaimed water intersect in decision making. While there are numerous models and tools that can be used to evaluate IWRP alternatives, "systems models" have several advantages, including the following:

- Extremely customizable and integrated, allowing for all of the most pertinent systems or parts of systems to be accounted for
- Ability to simulate demands, supplies, major system constraints, costs and other metrics in a comprehensive manner
- Highly visual, with built-in graphics, and performance indicators for on-the-fly simulations
- Quick run time, facilitating systems learning and exploration of "what-if" analyses

2.3.1 Systems Model Software Selection

At the beginning of the IWRP Project, a thorough evaluation of various systems models and customized spreadsheet tools were evaluated for JEA. Based on the needs of the project, software cost, and flexibility, the systems model STELLA (Systems Thinking Experimental Learning Laboratory with Animation) was selected for this project. STELLA is a dynamic and graphical systems model that uses object-oriented programming to develop virtually any type of system (e.g., physical, biological, financial, facilities) or multiple systems. It is frequently used in environmental engineering studies to better understand the implications of decisions across a broad array of physical, social and environmental sectors that are essential for integrated water resource planning.

STELLA allows users to model physical flow systems with operations or planning level resolution. An on-screen control interface is then developed that facilitates rapid adjustments of system variables for alternatives and sensitivity analysis. STELLA does not make decisions, but is used to generate information and promote more informed and balanced decisions via rapid comparison of the performance of alternatives using physical, environmental, and economic metrics. Its ability to include multi-sectoral interests in an analytical framework is what distinguishes it from more traditional hydraulic or numeric groundwater models, which evaluate systems in a purely one-dimensional physical setting. While systems models are not typically used to model detailed hydraulics or complex water allocations and surface hydrology, they excel at quickly simulating multiple systems in a very comprehensive manner. The model selection process is outlined in **Appendix B** and the economic modeling methodology is documented in **Appendix C**.

2.3.2 System Attributes

To facilitate the programming of the systems model, a conceptual schematic of JEA's water system was developed (see **Figure 2-2**). In this figure, the size of the circles represents the relative size of water demand and CUP allocation in 2036. As shown in the figure, the North and South Grids represent the majority of the system water demands. A range of low, medium and high demand projections are included for each grid. These demands are met first by the CUP allocation allowed per grid and then by any of the selected additional supply options or demand management options.

The systems model is run for a 25-year planning period from 2012 to 2035, allowing factors such as demand or the availability of supply sources to change over time. Generally, data are input into the model as annual numbers, with seasonal factors applied to generate monthly values (the seasonal peaking factors are described in **Appendix D)**.

The planned capacity and projected use of the reclaimed water system is also tracked within the model and constrained by the total wastewater available. **Table 2-2** shows the current and future projections for this system.

Table 2-2 Wastewater and Reclaimed Water System Projections

	Year	North Grid	South Grid	Ponce de Leon	Ponte Vedra	Nassau
Wastewater Projections (mgd)	2012	42.29	30.21	0.62	0.09	0.87
	2035	60.41	39.85	0.63	0.14	1.47
Reclaimed Plant Capacity (mgd)	2012	13.5	14.7	0.24	0.8	1.55
	2035	17.5	38.7	0.24	0.8	1.55
Reclaimed Demand Projections (mgd)	2012	5.44	6.5	0.08	0.53	0.89
	2035	12.69	30.06	0.08	0.53	0.89

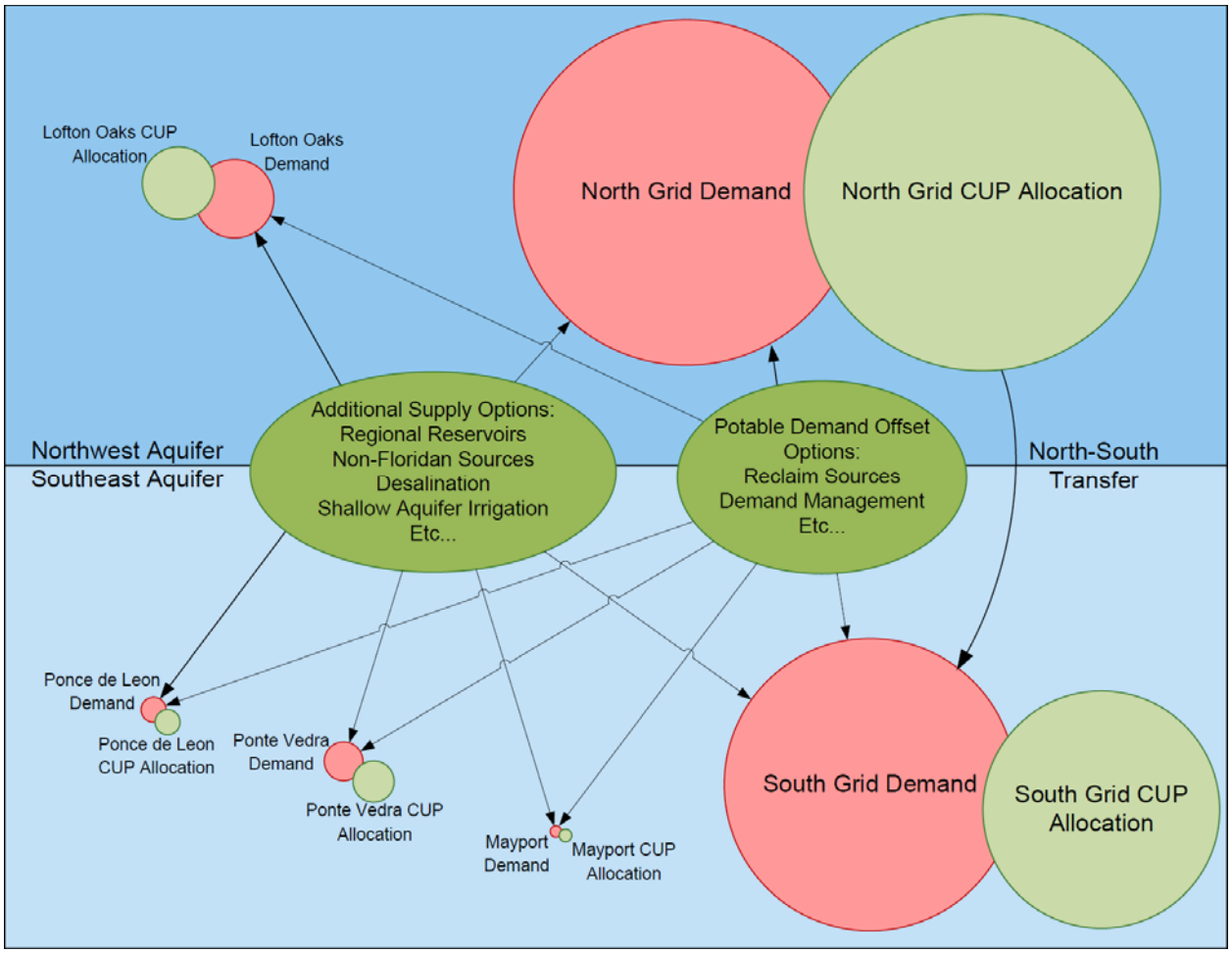


Figure 2-2
Modeled System Schematic, Based on Demands and CUP Allocations in 2036

The systems model is set-up to be operated through a set of user-friendly interface management panels (see **Figure 2-3** for an example). From these panels all options can be turned on or off to build the alternatives for investigation. The navigation buttons also easily allow changes and updates to any of the project data or assumptions included within the model structure. Additionally, the user can adjust the priority order in which the water supply options are utilized. The model utilizes the water from one source to meet demand until it is exhausted and then moves on to the next source on the priority list until the demand is satisfied or no additional water supply options remain.

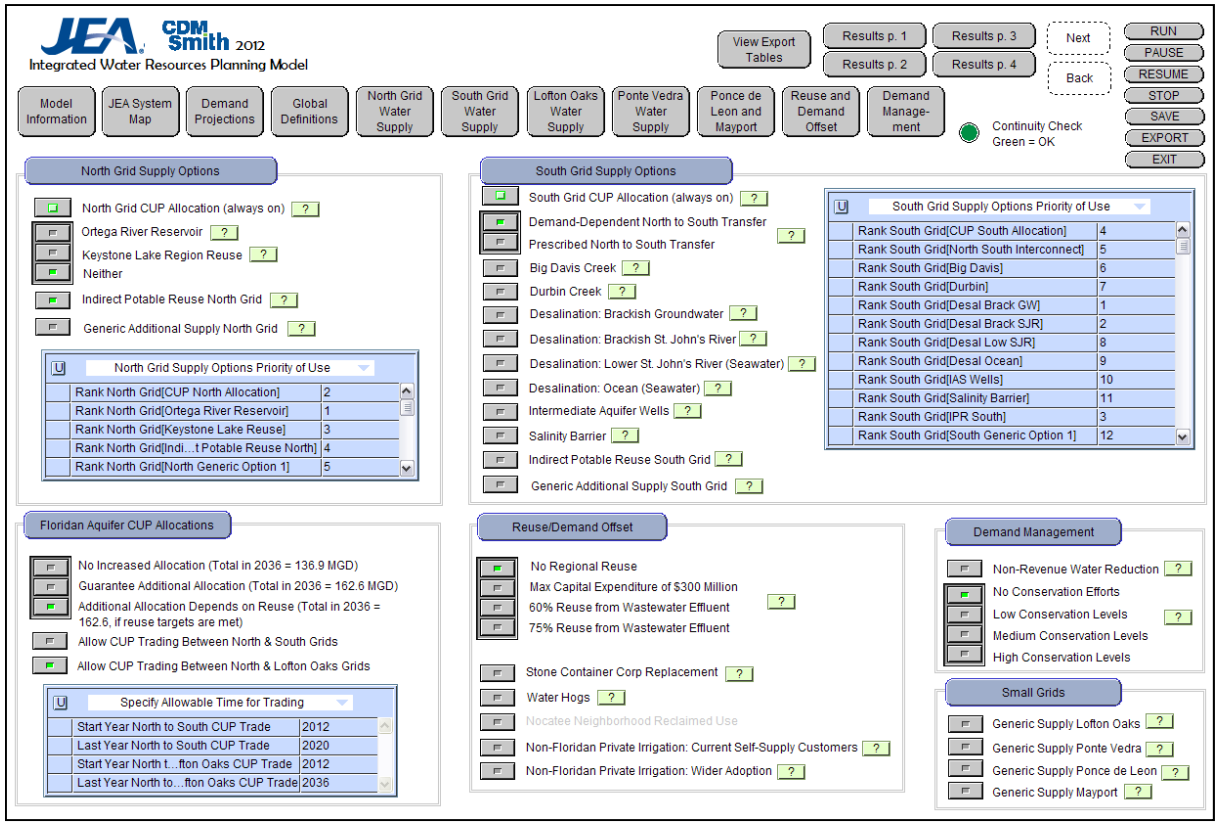


Figure 2-3
Systems Model Interface Panel

2.4 Cost Analysis Methodology

To help evaluate the projects and alternatives, an economic modeling approach was programmed into the STELLA model allowing for the tracking of all costs and reporting out in standard economic terms. Within the model, each potential option is assigned a capital costs, fixed O&M cost per year, and variable O&M cost in dollars per million gallons of water delivered. These costs came from the many planning studies JEA has conducted over the past several years on the various modeled options with all costs brought forward to 2012 dollars. Additional general economic factors used within the model are listed in **Table 2-3**. These are the starting default values based on the last 10 years of historical trends but can be easily updated within the model as desired.

Table 2-3 Default Economic Constants

Economic Factor	Value
Interest Rate	5%
Discount Rate	5%
Escalation Rate	3%
Percent of Capital Financed	50%

Within the model, the main economic tool used to compare options and alternatives is levelized cost along with the total lifecycle cost. Total lifecycle cost represents the sum of future capital costs (plus financing) and O&M costs brought back to present value terms using a discount rate. Levelized cost takes into account both the time value of money and the beneficial water supply that is provided by JEA, and is expressed as a unit cost (dollars per million gallons). Beneficial water supply is the amount of water that is needed as opposed to just the capacity of supply that can be produced. Levelized costs are a proxy for potential rate impacts to JEA's customers. Additional details regarding the cost analysis methodology can be found in Appendix C.

2.5 Ranking Methodology

The systems model will produce raw output of various quantitative metrics. In addition, there are qualitative metrics that are important to consider in the overall ranking of alternatives. Both of these types of metrics are rolled up to the primary objectives shown in Table 2-1. Tying these metrics and objectives together are weightings of relative importance. To facilitate the ranking of alternatives, a decision software tool called Criterium Decision Plus (CDP), developed by InfoHarvest, was utilized. CDP uses a method called multi-attribute rating to convert raw performance metrics (both quantitative and qualitative) into standardized scores (removing units such as dollars for cost or mgd for water supply), and then applies relative weights in order to compare and rank alternatives. **Figure 2-4** summarizes the multi-attribute rating approach used by CDP, which is summarized below.

- Step 1 compares the raw performance metric of a given objective for all the alternatives being evaluated. In this example, Alternative 6 has a raw cost (or performance) of $10 million.
- Step 2 standardizes the raw performance metric for each objective into comparable numeric scores (the higher the score the better the performance). In this example, Alternative 6 has relatively high costs when compared to the other alternatives, so the standardized score for this objective (between 0 and 10) is 3.4, a fairly low performance.
- Steps 3 and 4 calculate the partial score for the alternative, based on the standardized score and the relative weight for the objective being calculated. In this example, the cost objective was given a weight of 9 percent (out of a possible 100 percent). The partial score for this objective represents the standardized score (3.4) multiplied by the objective weight (0.09), which equals 0.306.
- Step 5 plots the partial score of 0.306 for Alternative 6, and this procedure repeats for all of the other objectives for Alternative 6 until a total score for the project is calculated [see Step 6]. The process is repeated for all alternatives so they can be compared and ranked.

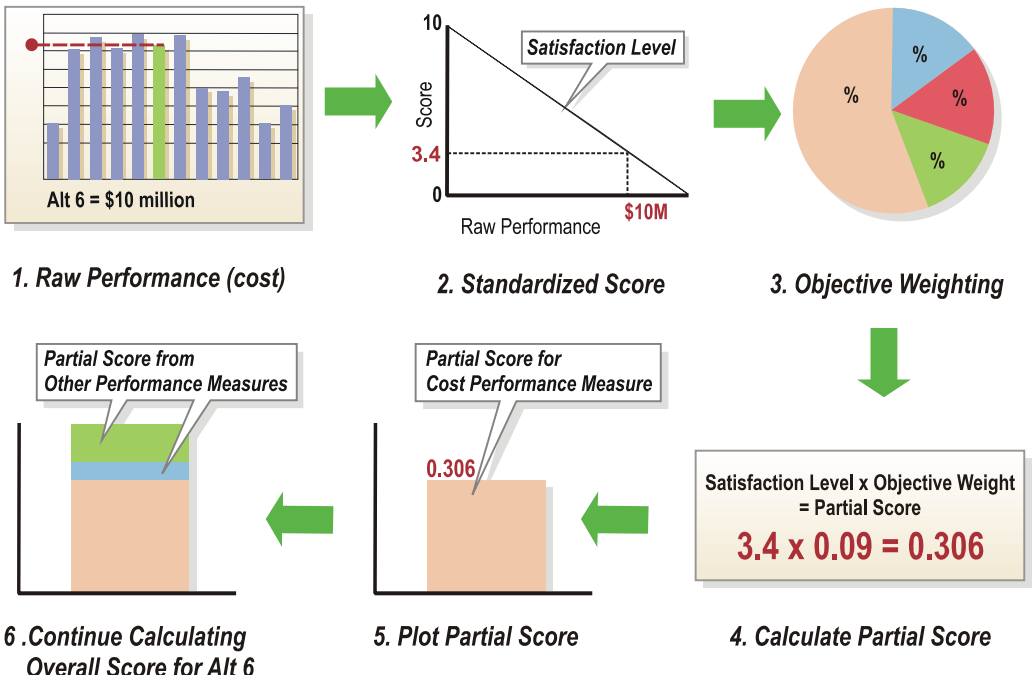


Figure 2-4
Multi-Attribute Rating Method

Section 3
Potential Options and Projects

Potential options to meet future water demands were split into the three broad categories: (1) water supply options, (2) water reuse options, and (3) demand management options. The options modeled within each of these categories are listed in **Table 3-1** and are described in the following sections, along with assumptions made about the current system operations. Each of these options has been previously studied and information concerning the configuration, potential yield, constraints and costs were taken from previous reports for incorporation into the model. Additional detail on all the options and references to the source reports can be found in Appendix D.

Table 3-1 Summary of Options for JEA IWRP Project

Water Supply Options	Water Reuse Options	Demand Management Options
▪ CUP Allocations ▪ Regional Surface Water Reservoirs on either Ortega River, Big Davis Creek, or Durbin Creek ▪ Non-Floridan Private Irrigation Promotion for either current self supply customers or for wider adoptions ▪ Desalination of either brackish groundwater, brackish St. Johns River water, lower St. Johns River water or the ocean. ▪ Intermediate Aquifer Wells	▪ Indirect Potable Reuse ▪ Keystone Lake Regional Reuse ▪ Regional Reuse throughout the whole St. Johns River Water Management District ▪ Targeted Reuse focusing on either the Stone Container Corporation, creation of a South Grid Salinity barrier, or providing reclaimed water to identified 'Water Hogs'.	▪ Conservation ▪ Reduction of unaccounted for water

As an additional way to assess future supply options, generic projects were programmed into the systems model. Each generic option is treated as a new supply options. The user can specify the amount of supply yield, capital cost, fixed O&M cost, variable O&M cost, start year, project life, and finance terms.

The generic supply options, however, are stand alone and do not currently interact with other model features (such as reliance on other facilities or system constraints). For example, the supply will not be checked against reclaimed capacity nor will the supply go toward meeting the reclaimed requirements to increase the CUP allocation. This can be updated later as additional options become better defined.

3.1 JEA Current System Assumptions

Within the model, options selected build upon JEA's current water supply system. It was important to accurately represent the constraints of this system as well as the operating costs to understand the best way alternatives compare to the baseline condition of no action. Assumptions used in modeling the current JEA system are described below.

- The CUP outlines the total volume which can be withdrawn from the Floridan aquifer each year. However, within the permit are a series of conditions affecting the CUP allocation. Values within the CUP provide the total volume allowable per year per wellfield. The values provided for 2011 through 2021 are used as the baseline allocation for each grid. After 2021 the allocation is held constant pursuant to condition 12 of the permit which does not allow for an increase in the allocation unless additional requirements are met. One of these requirements is the amount of reclaimed water provided for reuse. An exemption to meeting these reclaimed water targets is provided in condition 38: "except to the extent the permittee demonstrates that some portion of the amount of reuse required below is not economically, environmentally, or technologically feasible." To account for these conditions and exceptions, the model has a series of choices for how the CUP allocations can be handled:
  - **No increased allocation**: This option can be selected to maintain the allocation at the baseline conditions.
  - **Guarantee additional allocation**: This option automatically provides the increase in allocation independent of reclaimed water availability and usage.
  - **Additional allocation depends on reuse**: Within this option the amount of reclaimed water made available by JEA is compared to the targets and the CUP allocation is not increased until the targets are met.
- Another condition of the CUP allows for individual wellfields to surpass their allocation by 20 percent as long as the total system allocation is not exceeded. Within the model, there is an option to allow this internal system trading between the North and South Grids or between the North and Lofton Oaks Grids between specified years to help meet grid specific deficits. There is no cost assigned to this option.
- The amount of groundwater supplied to each grid is constrained by the CUP allocation but also by the physical limits of the system either at the wellfields or the water treatment plants. Constraints used within the model can be found in the CUP Allocation Factsheet within Appendix D. Under the currently modeled conditions, the CUP allocations remain more restrictive than any of the physical system constraints.
- It is assumed that 30 percent of JEA's total reported operating costs for water and sewer are spent on water withdrawal, treatment and distribution. A higher percentage of the costs were attributed to sewer over water due to an assumed higher cost for wastewater treatment compared to treatment of a relatively clean groundwater source to drinking water quality. Based on an average of 2010 and 2011 data this equates to $74,355,000 in O&M per year for the water system. Within the model $0.43 per 1000 gallons (or $430 per million gallons) is assumed to be variable O&M based on the total water produced. This leaves $55,484,000 per year as a fixed O&M cost for running the existing water system.
- It was assumed that 50 percent of JEA's current debt financing could be attributed to the water system. Taking the average of annual debt service for 2010 and 2011 this was $62,000,000 per year.
- Another component of the current system is the ability to move water from the North Grid to the South Grid through a pipeline river crossing. The flow through this interconnect can be handled in the model in two different ways. It can either be assigned volume per year or the

model can determine the amount needed based on the remaining demand in the South Grid but with the constraint of not exceeding the hydraulic capacity of the pipeline. Based on JEA provided data, the cost for utilizing the interconnect is $132 per million gallons for average annual transfers less than or equal to 15 mgd and $148 per million gallons for average annual transfers above 15 mgd.

3.2 Water Supply Options

An overview of the water supply options is provided in **Table 3-2** with a short summary of the options in the following subsections and additional detail available in Appendix D.

Table 3-2 Water Supply Options

Option	Sub-Options	Included Items	Yield (mgd)	Capital (total)	Fixed O&M per Year	Variable O&M ($/MG)
Regional Surface Water Reservoirs	Ortega	River diversion, dam, reservoir, treatment plant, land, connection to distribution system	6.7	$56,000,000	$2,100,000	$572
	Big Davis		1.3	$23,000,000	$660,000	$927
	Durbin		3.4	$38,700,000	$1,260,000	$677
Non-Floridan Private Irrigation	Current Self Supply	Subsidized shallow wells	4.4	$2,130,000	$0	$0
	Wider Adoption	Partially subsidized shallow wells	15	$18,500,000	$0	$0
Desalination	Brackish Groundwater	Intake, Treatment, Concentrate Disposal, Connection to the Distribution System	5	$43,100,000	$520,000	$1,140
			15	$88,800,000	$1,160,000	$847
			30	$136,000,000	$1,940,000	$709
			50	$207,000,000	$2,840,000	$622
	Brackish St. John's River Water		5	$85,500,000	$640,000	$1,403
			15	$160,000,000	$1,540,000	$1,125
			30	$238,000,000	$2,700,000	$986
			50	$335,000,000	$4,060,000	$890
	Lower St. John's River (Seawater)		5	$173,000,000	$1,120,000	$2,455
			15	$352,000,000	$2,800,000	$2,046
			30	$562,000,000	$5,320,000	$1,943
			50	$795,000,000	$8,680,000	$1,902
	Ocean (Seawater)		5	$185,000,000	$1,120,000	$2,455
			15	$376,000,000	$2,800,000	$2,046
			30	$590,000,000	$5,320,000	$1,943
			50	$825,000,000	$8,680,000	$1,902
Intermediate Aquifer Wells		New wells co-located at existing wellfields	5	$1,950,000	$28,000	$61

Note: Costs from 2010 AWS Study were escalated to 2012 dollars

3.2.1 Regional Surface Water Reservoirs

This option consists of construction of an off-line storage reservoir on a tributary to the St. Johns River to store wet weather flow to be treated and used as potable supply. Three locations have been carried forward for consideration including Ortega River, Big Davis Creek, and Durbin Creek. Using the Ortega

River location has the potential to provide 6.7 mgd to the North Grid, the Big Davis Creek location can provide 1.3 mgd to the South Grid, and the Durbin Creek location can provide 3.4 mgd also to the South Grid.

3.2.2 Non-Floridan Private Irrigation

This option consists of construction of groundwater wells either in the surficial aquifer or the intermediate aquifer in order to supply irrigation water to private residences. This use would replace the Floridan aquifer supply currently being used to meet those demands. Two options are proposed: (1) converting those already on self-supply from the Floridan aquifer to a different aquifer, and (2) wider scale adoption by moving current JEA customers to private irrigation wells. This supply source is available within the model to all grids.

3.2.3 Desalination

This option consists of desalination to produce a new source of potable water supply. Four different desalination options are considered: (1) extraction of brackish groundwater from the Lower Floridan aquifer, (2) withdrawing brackish river water from the upper St. Johns River, (3) withdrawing seawater-quality influent from the lower St. Johns River, or (4) withdrawing seawater from the ocean. All options could be sized to accommodate various treatment capacities. Options of 5, 15, 30 and 50 mgd are provided with costing within the model. All options are modeled to meet demand in the South Grid only.

3.2.4 Intermediate Aquifer Wells

This option consists of construction of wells or a wellfield targeting the intermediate aquifer as the source of supply for potable or irrigation use. The intermediate aquifer is a hydrogeologic unit that separates the higher surficial aquifer system from the Floridan aquifer system where currently the majority of water is withdrawn. The middle of the South Grid area was determined to be the best target for exploration of this source and new wells could hopefully be co-located at existing wellfields to diminish additional piping needs. A total yield of 5 mgd ramping up over time as the new source is investigated is included as a supply option within the model for the South Grid.

3.3 Water Reuse Options

An overview of the water reuse options is provided in **Table 3-3** with a short summary of the options in the following subsections and additional detail available in Appendix D.

Table 3-3 Water Reuse Options

Option	Sub-Options	Included Items	Yield (mgd)	Capital (total)	Fixed O&M per Year	Variable O&M ($/MG)
Indirect Potable Reuse	North Grid	Direct injection wells and process upgrades to wastewater treatment plants	5	$98,000,000	$1,280,000	$1,052
			15	$175,700,000	$3,080,000	$844
			30	$295,800,000	$5,400,000	$740
			50	$587,800,000	$8,120,000	$667
	South Grid		5	$101,600,000	$1,280,000	$1,052
			15	$182,700,000	$3,080,000	$844
			30	$309,800,000	$5,400,000	$740
			50	$498,300,000	$8,120,000	$667
Keystone Lake Region Reuse		Direct injection wells, process upgrades to wastewater treatment plant, Ortega Reservoir Construction with surface water treatment plant	15	$177,500,000	$2,000,000	$365
Regional Reuse	$300 Mil Max	Treatment plant expansions, pump stations, pipeline, storage, rapid infiltration basins	23	$157,400,000	$2,200,000	$262
	60% Reuse		41	$302,200,000	$3,700,000	$247
	75% Reuse		56	$479,000,000	$4,950,000	$242
Targeted Reuse	Stone Container Corp	new reclaimed water line	3.3	$27,600,000	$250,000	$232
	Salinity Barrier	new reclaimed water line and injection wells	5	$94,000,000	$276,000	$227
	Water Hogs	Install new reclaimed water infrastructure	1.05	$20,000,000	$300,000	$78

3.3.1 Indirect Potable Reuse

This option consists of treating wastewater effluent from one or more of JEA's large wastewater treatment facilities to meet the requirements for indirect potable reuse or groundwater recharge. The reclaimed water produced from this type of facility would be used to directly recharge the Floridan aquifer. Treatment capacities of 5, 15, 30, and 50 mgd are included within the model for both the north and South Grids.

3.3.2 Keystone Lake Regional Reuse

This option consists of using reclaimed water from the Southwest WWTP to directly recharge the Floridan aquifer through direct injection. It is likely that there may not be sufficient reclaimed water available for recharge exclusively from the Southwest WWTP since average wastewater flows at this facility (as of December 2010) were approximately 8.8 mgd. Therefore, it may be possible to augment the reclaimed water supply with surface water from the Ortega River, which is located in close proximity to this facility to increase the total available reuse to 15 mgd. Within the model, this option is only available to the North Grid and cannot be combined with the regional surface water reservoir on the Ortega River.

3.3.3 Regional Reuse

This option increases the supply of available reclaimed water throughout the entire St. Johns River Water Management District. Three different scales of options are considered: (1) increasing reclaimed water availability with a max capital expenditure of $300 million; (2) achieving 60 percent reuse from wastewater effluent; and (3) achieving 75 percent reuse from wastewater effluent.

3.3.4 Targeted Reuse

This option consists of using available reclaimed water for the specific targeted uses such as:

- Replacing the Stone Container Corporation use of potable water for reclaimed water in their commercial processes. The nearest reclaimed water pipeline is served from the Cedar Bay facility, which currently has 3.3 mgd potentially available for use. This option is modeled to provide a potable offset of 3.3 mgd in the North Grid.
- Use of reclaimed water from the Arlington East Water Reclamation Facility for groundwater salinity management in the South Grid. This option is modeled to provide a potable offset of 5 mgd.
- Providing reclaimed water to large residential users or 'water hogs' in the South Grid for irrigation. Bringing reclaimed water to the four high use areas of Queen's Harbor, Deerwood, Hidden Hills and Glen Kernan would provide a potable offset of 1.05 mgd in the South Grid.

3.4 Demand Management Options

An overview of the demand management options is provided in **Table 3-4** with a short summary of the options in the following subsections and additional detail available in Appendix D.

Table 3-4 Demand Management Options

Option	Sub-Options	Included Items	Yield (mgd)	Capital (total)	Fixed O&M per Year	Variable O&M ($/MG)
Conservation	Low	Lost revenue	6.74	$0	$500,000	$0
	Medium		10.22	$0	$750,000	$0
	High		13.47	$0	$1,000,000	$0
Reduce Unaccounted for Water		Leak detection Program, repairs	8.9	$5,000,000	$1,000,000	$0

3.4.1 Conservation

This option involves reducing demand through conservation efforts. Within the model the proposed conservation targets in the CUP were taken as the medium conservation scenario, with lower and higher conservation options created as sub-options. Conservation is split proportionately across all grids based on demand. It should be noted, while conservation reduces demand, and therefore total lifecycle costs, it also reduces revenues for JEA. Thus, when growth is high and the marginal cost of new water supplies is also high, conservation will have a net positive on levelized costs (dollars per million gallons of water sold by JEA). But when growth is not high or the marginal cost of new water is lower, conservation will have a net negative impact on levelized cost.

3.4.2 Reduce Unaccounted for Water

This option reduces unaccounted for water within the current system through a leak reduction program. Data from 2011 show 17.9 mgd of system losses. Assuming that half of the losses can be addressed through leak reduction programs, there would be 8.9 mgd in water savings. However, 5 mgd was considered a more reasonable goal and is the initial default value within the model. Currently this value is split with 80 percent of the savings in the North Grid and 20 percent of the savings in the South Grid.

Section 4
Evaluation of Illustrative Alternatives

In order to demonstrate the IWRP process, illustrative alternatives were developed. These illustrative alternatives should not be interpreted as recommendations being made or accepted by CDM Smith Inc. or JEA. Rather, they were developed for the sole purpose of testing the systems model, analysis approach and ranking method. While they may offer JEA insights as to which options may have merits, they are for illustrative purposes only.

4.1 Developing Illustrative Alternatives

To develop these illustrative alternatives, several options were chosen from the list of projects described in Section 3. During a JEA workshop, several themed-alternatives were initially developed and then expanded to include the following:

1. No New Options – This is the status quo or baseline alternative. Water is supplied solely from the Floridan Aquifer by way of the CUP. The planned North to South Grid transfer capacity and costs are included in this alternative.

2. Low Cost – In addition to the planned North to South Grid transfer capacity, up to an additional 5 mgd of supply is provided from intermediate aquifer supply wells (IAS wells). Targeted reuse expansion options and additional water conservation are included to offset potable water demand.

3. High Reliability with Groundwater Desalination – This alternative includes all options included in the Low Cost alternative, and adds the construction of a 30 mgd desalination plant to treat brackish groundwater.

4. High Reliability with Surface Water Desalination - This alternative is similar to No. 3 above, but uses Brackish St. Johns River as the source for desalination to test the scoring mechanism's sensitivity to surface water versus groundwater sources.

5. High Reliability with Indirect Potable Reuse (IPR) – This alternative is similar to No. 3 and No. 4 above, but relies on IPR in the South Grid instead of a desalination source.

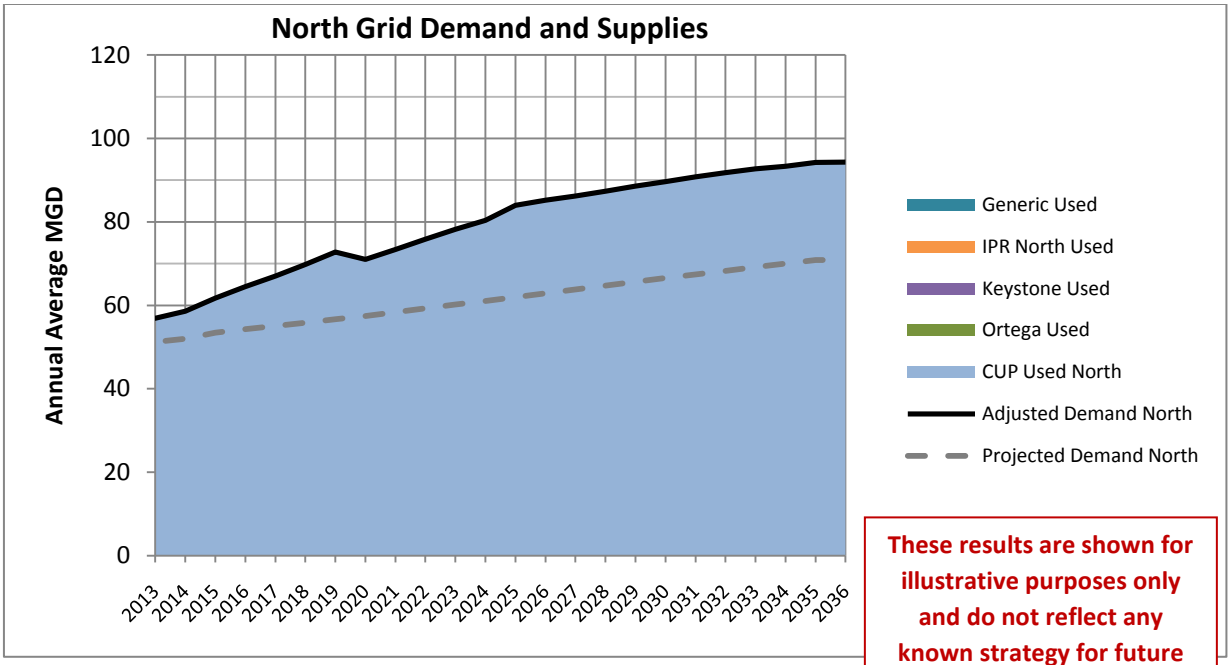
Table 4-1 lists the options that are included in each of the illustrative alternatives.

Table 4-1 Illustrative Alternatives

Alternative Name	Options Included
No Options	CUP Allocations
	Planned North to South Grid Transfer Capacity
	Baseline Conservation
Low Cost	CUP Allocations
	Planned North to South Grid Transfer Capacity
	Baseline Conservation
	Intermediate Aquifer Supply Wells
	Targeted Reuse (Stone Container Corp. and Water Hogs Program)
High Reliability with Groundwater Desalination	CUP Allocations
	Planned North to South Grid Transfer Capacity
	Baseline Conservation
	Intermediate Aquifer Supply Wells
	Targeted Reuse (Stone Container Corp. and Water Hogs Program)
	Brackish Groundwater Desalination
High Reliability with Surface Water Desalination	CUP Allocations
	Planned North to South Grid Transfer Capacity
	Baseline Conservation
	Intermediate Aquifer Supply Wells
	Targeted Reuse (Stone Container Corp. and Water Hogs Program)
	Brackish St. Johns River Desalination
High Reliability with Indirect Potable Reuse	CUP Allocations
	Planned North to South Grid Transfer Capacity
	Baseline Conservation
	Intermediate Aquifer Supply Wells
	Targeted Reuse (Stone Container Corp. and Water Hogs Program)
	Indirect Potable Reuse in South Grid

Any of the options described in Section 3 can be combined into an alternative and modeled. Within the model interface, the user can see traces of surpluses and deficits, volumes of supplies provided from each source, and statistics describing the reliability and cost of the alternative model run. The model results can also be exported to a spreadsheet that is set up to display the annual supply volume by source, the 12-month running average supply volume by source, and the scoring results described in the next section. The export spreadsheet displays a plot of the annual supply used from each source through the planning period. **Figure 4-1** shows an example of these plots for the High Reliability with Indirect Potable Reuse alternative, for the North and South Grids. The projected demand is shown with a dashed gray line. The adjusted demand, after conservation, potable offsets, or additional demands added, is shown as a solid black line. Each supply source is shown in a different color and the supply volumes are stacked to show how the total of all supplies meets or falls short of demand. The North to South Grid transfer volume is shown as a demand on the North Grid, causing the adjusted demand to be significantly greater than the projected demand. The transfer volume—which is effectively North Grid CUP supply moved to the South Grid—is shown in green on the South Grid plot.

These plots show that, for the illustrative alternative with indirect potable reuse in the South Grid, demands are met until 2024, when competing uses for reuse water result in a decrease of available indirect potable reuse.



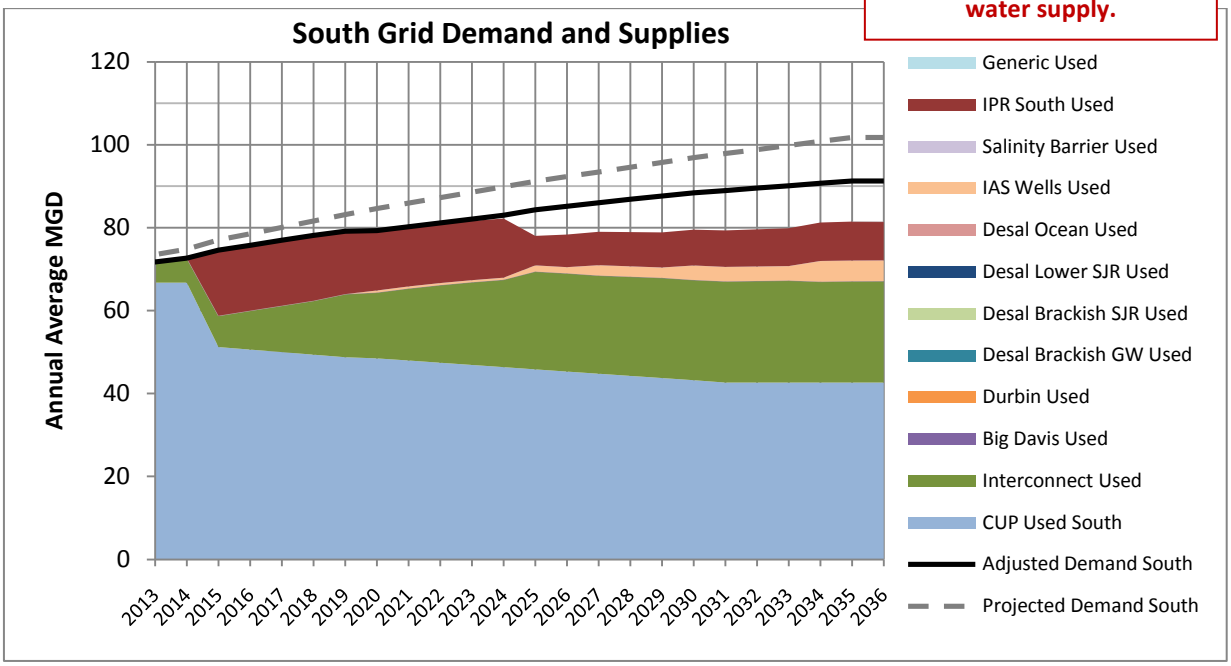


Figure 4-1
Example Model Export for Illustrative Alternative

4.2 Summary of Performance Measures

Performance measures were assigned to each IWRP Project objective to evaluate numerically how each illustrative alternative met the objective. The performance measures were either scored quantitatively using the integrated system model, or qualitatively by comparatively ranking project options. Each performance measure receives two weights: one reflecting the relative importance of its associated objective, and a second reflecting the relative importance of the performance measure compared with others associated with the same objective. The baseline scenario for scoring the illustrative alternatives used equal weights for all of the objectives (although subweights for the performance measures varied). Below is a description of each performance measure.

4.2.1 Quantitative Performance Measures

Table 4-2 lists the performance measures that were evaluated quantitatively using the integrated system model. The table lists the associated objective, the weight of the performance measure within its objective, the units by which to measure the objective, if a better score is higher or lower, and the range of expected scores.

Table 4-2 Quantitative Performance Measures

Objective	Weight	Performance Measure	Sub-Weight	Units	Better Scores Are	Range
Maximize Cost-Effectiveness	0.167	Total customer lifecycle costs	0.4	2012 dollars (billions)	lower	3.5 – 4.5
		JEA levelized costs	0.4	2012 dollars per million gallon	lower	3,000-4,000
		Ratio of JEA fixed costs to JEA total costs	0.2	Fixed costs/total costs	lower	0.0-1.0
Reliably Meet Water Demands	0.167	Magnitude of water shortage	0.6	Million gallons	lower	0-140,000
		Time of water shortage	0.4	% of months showing deficit > 5%	lower	0-100
Maximize Flexibility	0.167	Operational flexibility	0.5	% of months showing South Grid deficit >5%	lower	0-100
		Diversity of supply	0.5	% supply remaining after removing top source	higher	0-100
Promote Environmental Sustainability	0.167	Aquifer sustainability	0.5	% supplies not from Floridan Aquifer	higher	0-50
		Water use efficiency	0.4	% demand reduced by conservation/reuse	higher	0-50
		River impacts	0.1	% supply from surface water	lower	0-50

4.2.2 Qualitative Performance Measures

The qualitative performance measures could not be scored using the integrated system model. In order to dynamically score any alternative (beyond the five illustrative examples presented herein) each option was given a qualitative score, and a composite score was calculated based on the volume of supply for the option. The qualitative scores all range from one to five, with five being the best score. An example of the qualitative scoring procedure is shown on **Figure 4-2**.

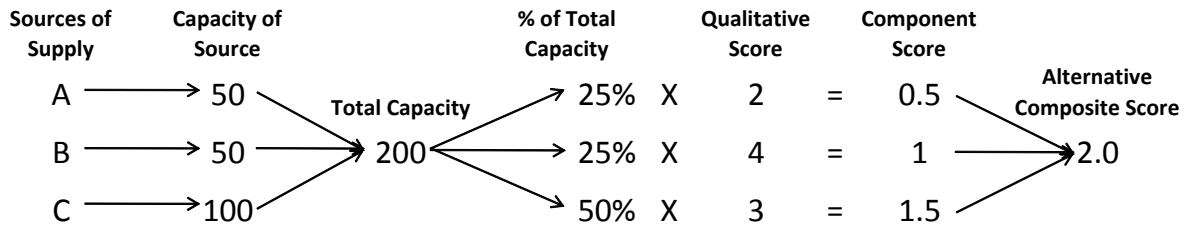


Figure 4-2
Example Qualitative Scoring Procedure for a Single Performance Measure

Table 4-3 lists the performance measures that were evaluated qualitatively. The table lists the associated objective, the weight of the performance measure within its objective, the units by which to measure the objective, if a better score is higher or lower, and the range of expected scores.

Table 4-3 Qualitative Performance Measures

Objective	Weight	Performance Measure	Sub-Weight	Units	Better Scores Are	Range
Maximize Implementation	0.167	Reliance on proven technology[1]	0.4	Qualitative score of 1 to 5, 1 - unproven technology, 5 - common technology	higher	1-5
		Ability to permit[1]	0.4	Qualitative score of 1 to 5, 1 - difficult to permit, 5 - no permitting hurdles	higher	1-5
		Public acceptance[1]	0.2	Qualitative score of 1 to 5, 1 - unlikely public acceptance, 5 - no new public acceptance needed	higher	1-5
Meet Customer Water Quality	0.167	Water quality blending/secondary water quality[2]	1.0	Qualitative score of 1 to 5, 1 - difficult to blend sources 5 - no blending challenges	higher	1-5

1 – Uses total available supply capacity for calculation of composite performance measure

2 – Uses only volume that is used for supply for calculation of composite performance measure

Table 4-4 lists all of the assigned qualitative scores for the water supply options.

Table 4-4 Qualitative Scores for Supply Options

Option	Reliance on Proven Technology	Ability to Permit	Public Acceptance	Water Quality Blending/Secondary Water Quality
North Grid Supplies				
CUP North Grid	5	5	5	5
Ortega River Reservoir	4	3	3	4
Keystone Lake Reuse	2	1	1	4
Indirect Potable Reuse North Grid	2	1	1	3
South Grid Supplies				
CUP South Grid	5	5	5	5
Big Davis Creek Reservoir	4	3	3	4
Durbin Creek Reservoir	4	3	3	4
Desalination Brackish Groundwater	2	1	5	2
Desalination Brackish St. Johns River	2	1	5	2
Desalination Lower St. Johns River	2	1	5	1
Desalination Ocean Supply	2	1	5	1
Intermediate Aquifer Supply Wells	3	3	3	5
Salinity Barrier	4	3	1	5
Indirect Potable Reuse South Grid	2	1	1	5
Lofton Oaks Supplies				
CUP Lofton Oaks Grid	5	5	5	5
Ponte Vedra Grid Supplies				
CUP Ponte Vedra Grid	5	5	5	5
Ponce de Leon Grid Supplies				
CUP Ponce de Leon Grid	5	5	5	5
Mayport Grid Supplies				
CUP Mayport Grid	5	5	5	5

Table 4-5 summarizes all of the performance metrics for each alternative.

Table 4-5 Performance Measure Scores for Illustrative Alternatives

Objective	Performance Measure	Units	Better Scores Are:	Range	No Options	Low Cost	High Reliability + Ground-water Desal	High Reliability + Surface Water Desal	High Reliability + Reuse
Maximize Cost-Effectiveness	Total customer lifecycle costs	2012 dollars (billions)	lower	3.5-4.5	$3.56	$3.61	$3.83	$4.00	$4.07
	JEA levelized costs	2012 dollars per million gallon	lower	3,000-4,000	$3,572	$3,568	$3,628	$3,784	$3,900
	Ratio of JEA fixed costs to JEA total costs	Fixed costs/total costs	lower	0.0-1.0	0.774	0.779	0.774	0.768	0.793
Reliably Meet Water Demands	Magnitude of water shortage	Million gallons	lower	0-140,000	111,283	91,578	10,186	10,186	39,048
	Time of water shortage	% of months showing deficit > 5%	lower	0-100	56.1	48.5	0.3	0.3	24.6
Maximize Flexibility	Operational flexibility	% of months showing South Grid deficit >5%	lower	0-100	86.4	81.7	19.6	19.6	34.9
	Diversity of supply	% supply remaining after removing top source	higher	0-100	0	1	15	15	8
Promote Environmental Sustainability	Aquifer sustainability	% supplies not from Floridan Aquifer	higher	0-50	0.0	3.0	14.2	14.2	8.7
	Water use efficiency	% demand reduced by conservation/reuse	higher	0-50	3.7	5.4	5.4	5.4	5.4
	River impacts	% supply from surface water	lower	0-50	0	0	0	14	0
Maximize Implementation	*Reliance on proven technology*	Qualitative score of 1 to 5	higher	1-5	5.0	4.9	3.8	3.8	4.3
	Ability to permit	Qualitative score of 1 to 5	higher	1-5	5.0	4.9	3.4	3.4	4.1
	Public acceptance	Qualitative score of 1 to 5	higher	1-5	5.0	4.9	4.9	4.9	4.1
Meet Customer Water Quality	*Water quality blending/secondary water quality*	Qualitative score of 1 to 5	higher	1-5	5.0	5.0	4.6	4.6	4.9

4.3 Ranking of Illustrative Alternatives

4.3.1 Ranking Procedure

The performance measures listed in **Tables 4-2** and **4-3** were scored for each illustrative alternative. The decision software program CDP was used to perform the scorecard analysis, which involves standardizing the raw performance measure scores, applying the objective weights and performance measure sub-weights, and ranking the alternatives based on the aggregate scores across all objectives. CDP is a visual tool with multiple ways of displaying results.

Goals, objectives, performance measures, and weights are input into CDP. To rank alternatives raw portfolio scores for each performance measure are also input to CDP. Each score is standardized on a linear scale from 0 to 1, with the best possible score translating to 1 and the worst possible score translating to 0. In this way, the various units in which the performance measures are quantified are eliminated, and it is possible to compare all scores. **Figure 4-3** shows an example of how the cost of an alternative is translated into a unit-less score.

A composite score for each objective was determined based on the sum of scores of its performance measures, and this score was multiplied by the weight of that objective. These values were then summed for comparison across all alternatives.

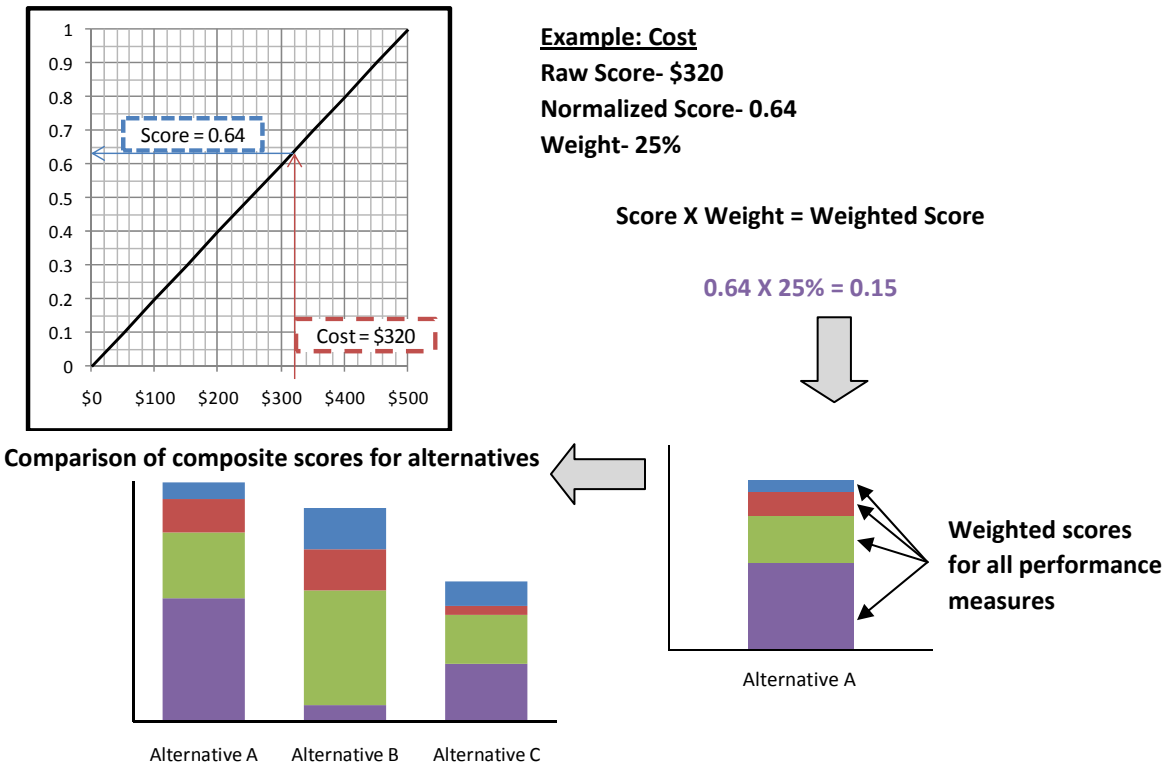


Figure 4-3
Alternative Scoring Procedure

4.3.2 Ranking Results

The five illustrative alternatives were scored using the performance measures and procedures described above. In addition to scoring the alternatives with equal weights for all objectives, various weighting scenarios were also scored to test the sensitivity of the results to objective weighting. **Figure 4-4** shows the composite scores of the illustrative alternatives. Each stacked bar represents the total score for the alternative, with the colored components representing how each alternative scores in each objective category. Theoretically, an alternative that scored perfectly in all objective categories would have a composite score of 1.0.

Based on the weights, performance measures, and model assumptions developed as part of the IWRP process, the "High Reliability with Groundwater Desalination" alternative scores the highest. The groundwater desalination scores better than surface water desalination in the cost and environmental sustainability objectives. The indirect potable reuse alternative does not score well because it is more expensive than desalination and does not achieve the same level of reliability. The "No Options" and "Low Cost" alternatives fall short in reliability and score poorly in the flexibility category. Those illustrative alternatives are less flexible because they assume JEA relies almost exclusively on the CUP allocation. Flexibility in sources is generally considered desirable in case of an unforeseen event that eliminates a major source of water.

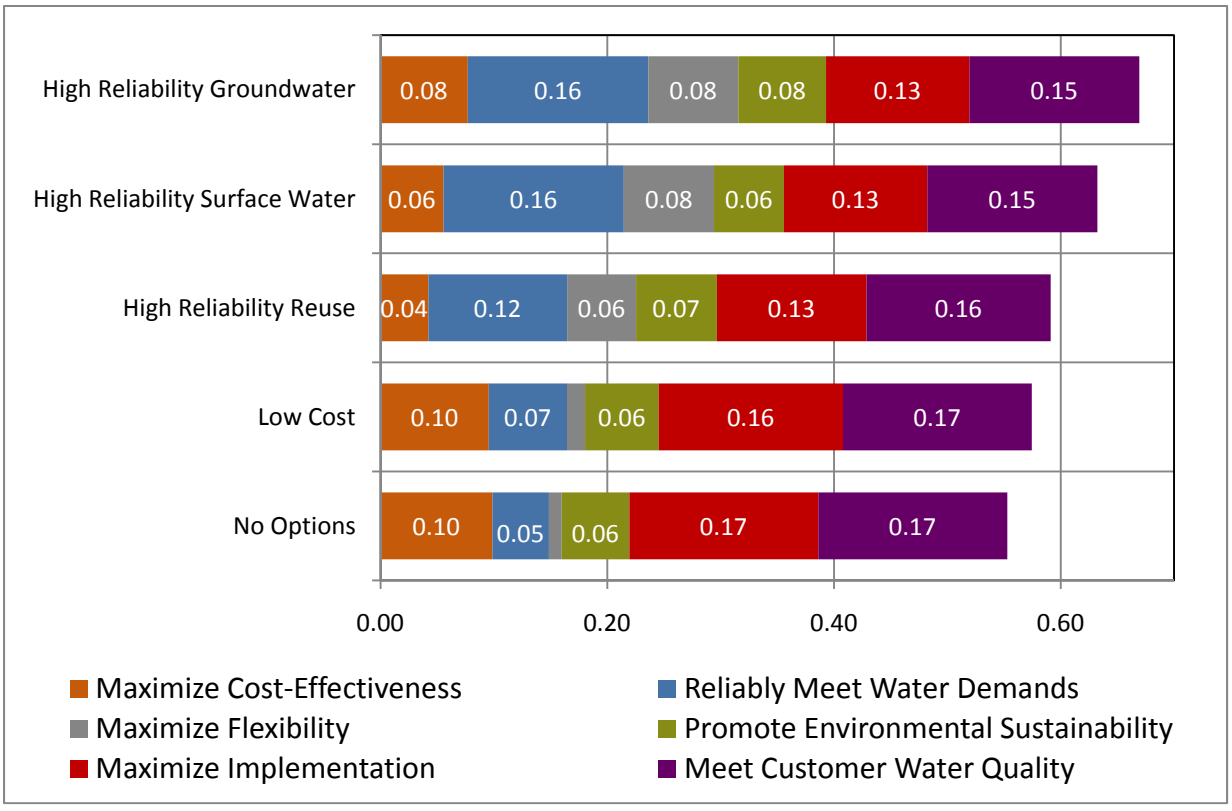


Figure 4-4
Illustrative Alternatives Scores

The objective weights were varied to study the sensitivity of the analysis to the importance placed on the top objectives: cost and reliability. **Table 4-6** shows the ranking of the illustrative alternatives using the original, equal weights, and various other weighting scenarios.

Table 4-6 Ranking of Alternatives with Different Objective Weightings (Rank of 1 is best, while Rank of 5 is worst)

Scenario	High Reliability Groundwater	High Reliability Surface Water	High Reliability Reuse	Low Cost	No Options
Baseline (equal weights, 17% each)	1	2	3	4	5
Cost = 75%, others equal	3	4	5	2	1
Reliability = 75%, others equal	1	2	3	4	5
75/25% between Cost/Reliability	1	4	5	2	3

The sensitivity analysis shows that the ranking is most sensitive to the weight of the cost effectiveness objective. The rankings change considerably when the weight of cost is increased to 75 percent of the total weight. The rank of the alternatives using this weighting scheme follows the cost of the alternative, with the No Options ranking first, following by Low Cost, then the High Reliability alternatives in order of least expensive to most. The same sensitivity test on the reliability objective, however, leaves the rankings unchanged from the baseline condition. If only cost and reliability are considered, with 75 percent of the weight going to cost and 25 percent going to reliability, the top ranking alternative remains High Reliability with Groundwater, but the Low Cost alternative jumps to second place and No Options to third (versus fourth and fifth in the baseline equal weights scenario).

The sensitivity analysis shows that the scoring algorithm—which consists of the weights, the performance measures, and the model assumptions—is most sensitive to cost. Therefore, additional efforts should be taken to establish robust cost estimates as JEA moves forward using this tool to determine a long-term water resources strategy.

Section 5
Summary and Next Steps

5.1 Summary

As the main purpose of the study was the creation of an IWRP planning process and set of tools to be used by JEA going forward, only limited conclusions could be made about the evaluation of the current system and potential future options. However, there are some important observations that can be made from this study, these being:

- While an overall future water supply deficit is predicted for the JEA system if no new options are selected, this deficit is largely present only in the South Grid and Lofton Oaks Grid. The CUP allocation is sufficient to meet the currently projected North Grid demands and those of many of the smaller grids through 2035. Thus the focus on alternative supplies should remain on those with a potential impact for the South Grid system.
- Significant water supply deficits (i.e., greater than 5 mgd) do not occur until after 2025 under a low population forecast scenario, and not until after 2015 under current or high population forecast scenarios.
- There is not always the need to move the full flow capacity through the interconnect between the North and South Grids. The optimal timing for the use of the interconnect depends on the time of year and options selected. Future optimization of the best way to utilize this infrastructure should be considered and could be performed using the system model with some modest refinement.
- The final rankings of the illustrative example were found to be fairly sensitive to cost. Thus, as JEA continues to use the model, specific attention should be paid to continuing to refine the cost of selected alternatives.
- The benefits and trade-offs between demand-side management and new supply sources greatly depend on population growth scenarios and the marginal cost of new supplies.
- The current systems model and the CDP ranking tool are an effective combination of tools to compare future water supply sources and system configurations.

5.2 Using the Model

This report demonstrated how the current systems model can be used to compare alternatives with respect to supply reliability, economic viability, and other criteria. However, the report and the planning process were not intended to yield a recommended plan for future water supply. Moving forward, JEA can use the model in two ways:

- **Planning Mode:** The model can be used exactly as demonstrated in this report to formulate alternative combinations of supply and demand management options, simulate their performance over the planning period, and compare cost, reliability, and other factors. It can also be used to form hybrid alternatives with options that seem to address or satisfy many of

the specified planning objectives. In this way, a preferred plan can be formulated by studying tradeoffs, combining the options that satisfy the objectives broadly, and tuning them to appropriate yield levels.

- **Operations Mode:** The model can also be used (with its accompanying output spreadsheet) to formulate an annual operating plan at any point in time, given the infrastructure that would be currently available. For example, JEA could use the model to formulate an operating plan for 2013 by enabling the current supply options and experimenting with demand management alternatives to see how they might offset potable demand, and what the economic implications would be. In future years, when additional supply sources are brought online, JEA can experiment with alternative prioritization strategies for the suite of installed supplies to help optimize for cost.

5.3 Next Steps

As recently discussed with JEA at the project completion workshop, JEA may want to consider the following suggestions:

- **Create more refined alternatives.** The options included in the systems model were all summarized from previous reports and studies. As certain options and combinations of options become favored, the costs and yields should be revisited and refined. More attention to the scaling or phasing of infrastructure can also be considered and modeled.
- **Enhance the financial output.** The current systems model has a significant economic component set up to compute levelized cost and total lifecycle costs. However, an additional export spreadsheet could be created to calculate additional financial output that can feed into a more comprehensive JEA financial analysis for rate making and bonding analysis.
- **Continue model maintenance.** The systems model relies on multiple future projections out to the year 2035. These will need to be updated regularly to remain relevant with current conditions and changing planning activities.
- **Invest in staff training.** JEA may want to consider additional staff to fully utilize both the systems model and CDP decision software.

Appendix A

Water Demand Forecast & Gap Analysis

WATER DEMAND FORECAST & GAP ANALYSIS

Task 1 Water Demand Forecast and Gap Analysis for the
JEA Integrated Water Resource Planning (IWRP) Project

This document summarizes the following CDM Smith Inc. (CDM Smith) activities:

- *Review of JEA's water, wastewater and reclaimed water demand forecasts as well as the Consumptive Use Permit (CUP) Tracking and Prediction Tool.*
- *Development of water demand forecast scenarios and determining the range of water supply need (gap between forecasted water demands and JEA's Consumptive Use Permit).*
- *Assessment of JEA's unbilled water using a top-down approach.*

1.0 REVIEW OF JEA'S DEMAND FORECASTS

The purpose of the Integrated Water Resource Planning (IWRP) project is to holistically evaluate the long-term water management options available to JEA. Central to this effort is the development of a modeling tool to compare future alternative facilities, configurations, and management of JEA's water, wastewater and reclaimed water systems as an integrated resource. A critical input to this model is the future demand projections, particularly the water demand forecast, as comparing how combinations of supply options meet the projected demand will be a central focus of the model.

CDM Smith reviewed JEA's water demand, wastewater flow and reclaimed water forecasts for their appropriateness of use for the IWRP project as well as the CUP Tracking and Prediction Tool. The source documents used for this review included the ***Water/Sewer System Planning (WSSP) System Service Demand Forecasting Procedure*** (version 1.03, dated June 21, 2011), and the detailed spreadsheets for water, wastewater and reclaimed water provided to CDM Smith by JEA staff.

1.1 Water Demand Forecast

CDM Smith's understanding of JEA's water demand forecasting method is as follows:

1. Obtain median population projections at a county level from University of Florida's Bureau of Economic and Business Research (BEBR).

2. Using GIS and historical information, county population projections are disaggregated into JEA's water service areas.

3. Historical per capita water use is examined for each JEA service area and averaged to determine a projected water use factor

(gallons per capita per day or gpcd). For some water service areas, this factor is reduced very slightly over the planning period.

4. For each JEA water service area, the projected population is multiplied by the projected water use factor (gpcd) to obtain the forecast of water demands. For two water service areas, North Grid and South Grid, adjustments are made to account for transfers and bulk water sales to SJCUD.

5. Some adjustments are made for large commercial/industrial customers, as it is assumed that their water demands are not affected by future population growth.

Figure 1 summarizes JEA's water demand forecasts made over the last few years, based on different population projections and water use factors. It can be seen that all demand projections are greater than the current CUP allocation, which supports the need to further evaluate future water supply alternatives.

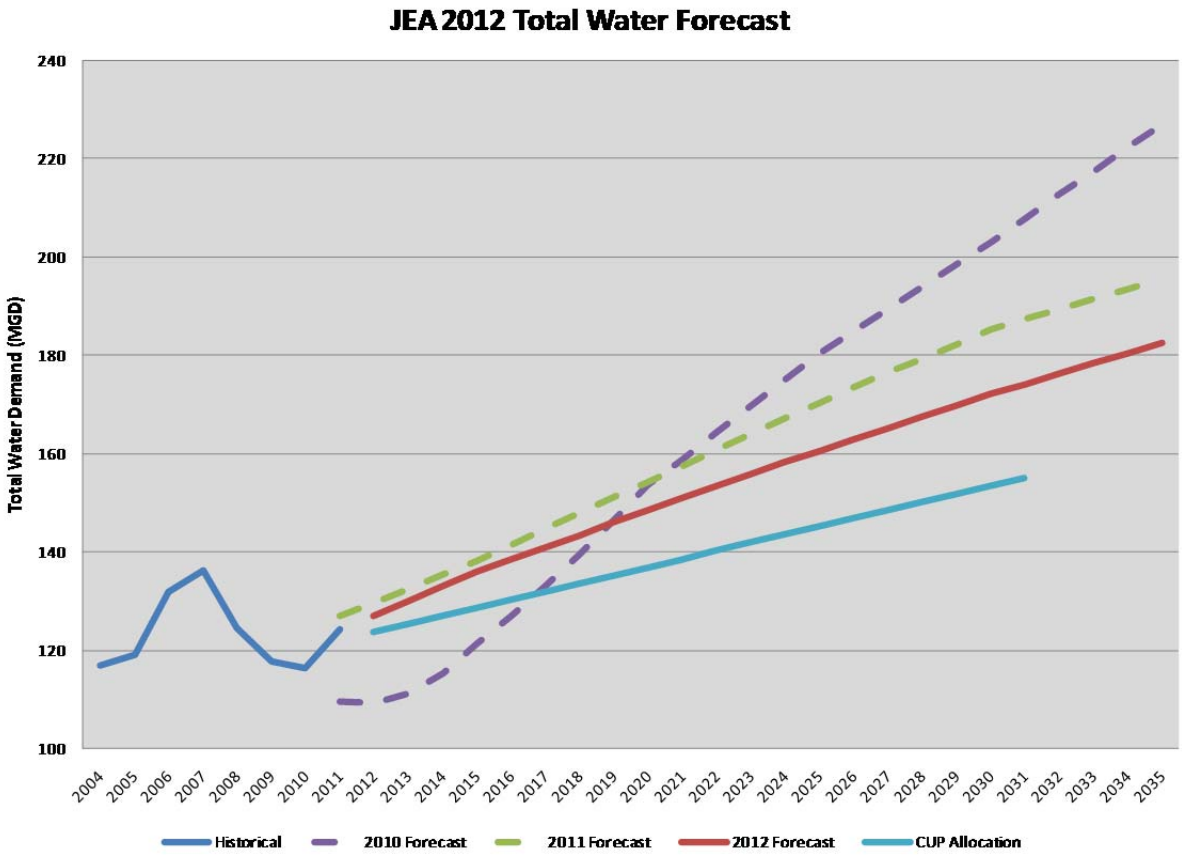


Figure 1. JEA's Water Demand Forecasts

The per capita water use method is one of the more common approaches for projecting urban water demands. While it has some drawbacks in being able to explain all of the factors that impact water use (socioeconomic, demographic, weather, and climate), it also has advantages and is often used when detailed historical data are not available.

One of the strengths of JEA's per capita water use method is the fact that the historical data and projection data are disaggregated into JEA's water service areas. This allows for much of the demographic and socioeconomic variability to be captured. For example, the North Grid service area has a historical average per capita water use of 161 gpcd, while the Ponce De Leon service area has a historical average per capita water use of 296 gpcd (approximately 84 percent greater). This is due to the fact that Ponce De Leon has larger, more affluent homes than North Grid. By examining historical per capita water use and by forecasting population at these service area levels results in a more refined per capita method.

Because of this disaggregated use of the per capita water use forecast method, and the fact that JEA maintains its different iterations of its water demand forecasts, CDM Smith concluded that this water demand forecast is appropriate for use in the JEA IRWP project.

Suggested Improvements

As time goes forward, JEA will have more historical water use and population data. Given this, JEA may wish to consider conducting a statistical analysis of historical monthly water production, population, weather, and unemployment rate. CDM Smith has successfully used this technique to improve per capita water use forecasts, as this approach allows utilities to understand the year to year variations in per capita water use, and therefore, provide more accurate projections of future values. For example, if per capita water use in the last few years was significantly lower than previous years and it could be statistically verified that the economy drove this condition, JEA may see per capita water use increase when the economy improves. Similarly, if weather in one year caused per capita water use to increase over the prior year, JEA could normalize the historical years taking out the impacts of weather. This statistical approach is not costly to perform, but does require at least 10 or more years of good monthly water use data. While these improvements could help refine the demand projections in the future, they are not critical for the current IWRP analysis.

1.2 Wastewater Flow Forecast

The wastewater flow forecasts are highly related to the water demand forecasts within each service area, as the majority of sewer flow originates as JEA provided water. Thus the two forecasts should follow similar trends. To project wastewater demands, JEA used a similar approach to

the water demand forecast, whereby projected population (this time by wastewater service areas) is multiplied by a per capita wastewater flow generation factor. The contribution for infiltration and inflow (I&I) is implicit into the average wastewater demand factors as the demand factors are based on the flow received at each wastewater facility and this flow includes base sewer flow along with any I&I added during transport.

JEA's method to forecast wastewater demands is a standard approach used by most wastewater utilities, although many utilities incorporate an explicit factor for I&I. One difference between the water and wastewater demand forecasts is that the service areas do not overlap exactly and JEA has more total water customers than sewer customers. In the future, through phaseout of septic tank systems and expansion of sewer services, wastewater is projected to grow at a slightly faster rate than the water demand. **Figure 2** shows the wastewater demand forecasts as currently included in the model for the North and South grid. The North Grid values are a combination of the projected flows from the Buckman, District II, and Southwest facilities. The South Grid values are a combination of the projected flows from the Arlington East, Blacks Ford, and Mandarin facilities. Projections are also included within the model for the smaller grids of Ponce de Leon, Ponte Vedra, and Lofton Oaks/Nassau.

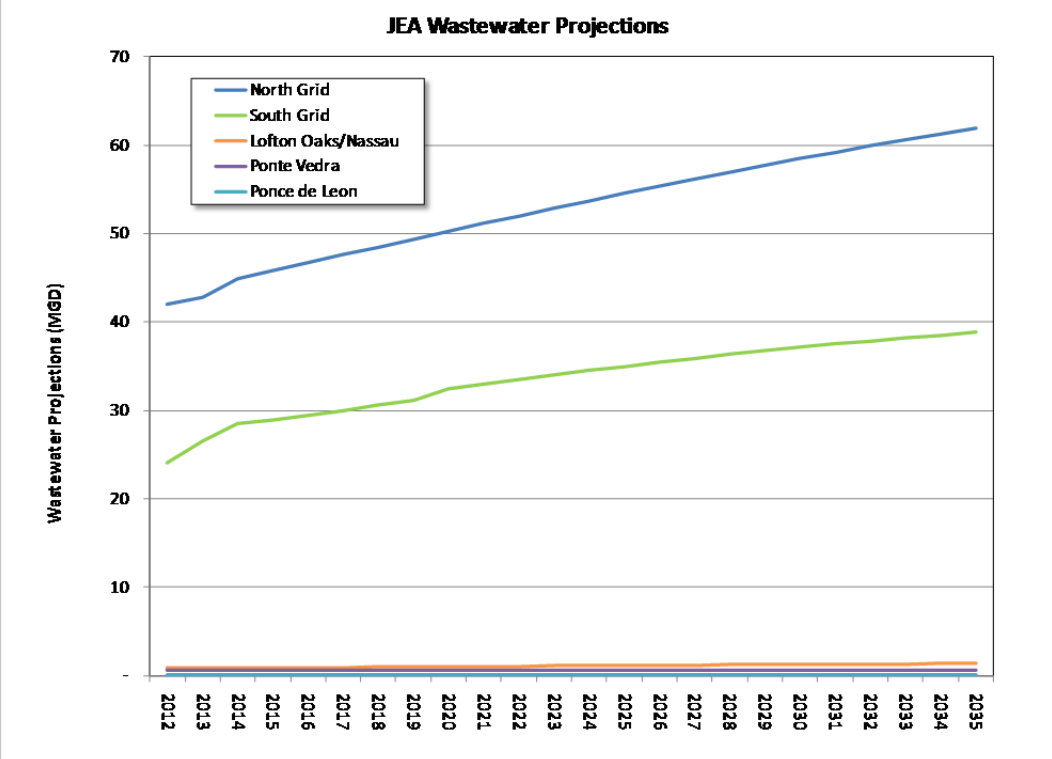


Figure 2. Wastewater Projections for IWRP Project

Many supply options within the model involve reclaimed water usage, which is dependent on wastewater flows. The model checks to ensure that the combination of options selected utilizing reclaimed water is constrained by the total wastewater projections per grid.

1.3 Reclaimed Water Demand Forecast

To project reclaimed water demands, JEA examines current and potential future users of reclaimed water that are adjacent to current and proposed reclaimed water facilities. JEA also analyzes monthly water patterns for these customers in order to analyze system needs such as diurnal storage.

This method is appropriate for IWRP use. The base projections are built upon within the model for reclaimed water options that expand the system for additional uses. For some options, additional reclaimed water is only utilized if there is available additional capacity at the reclaimed water plants. For other options, additional reclaimed water production capacity will be added to ensure available water within the constraints of wastewater projections. **Figure 3** shows the baseline reclaimed water demand projections per grid.

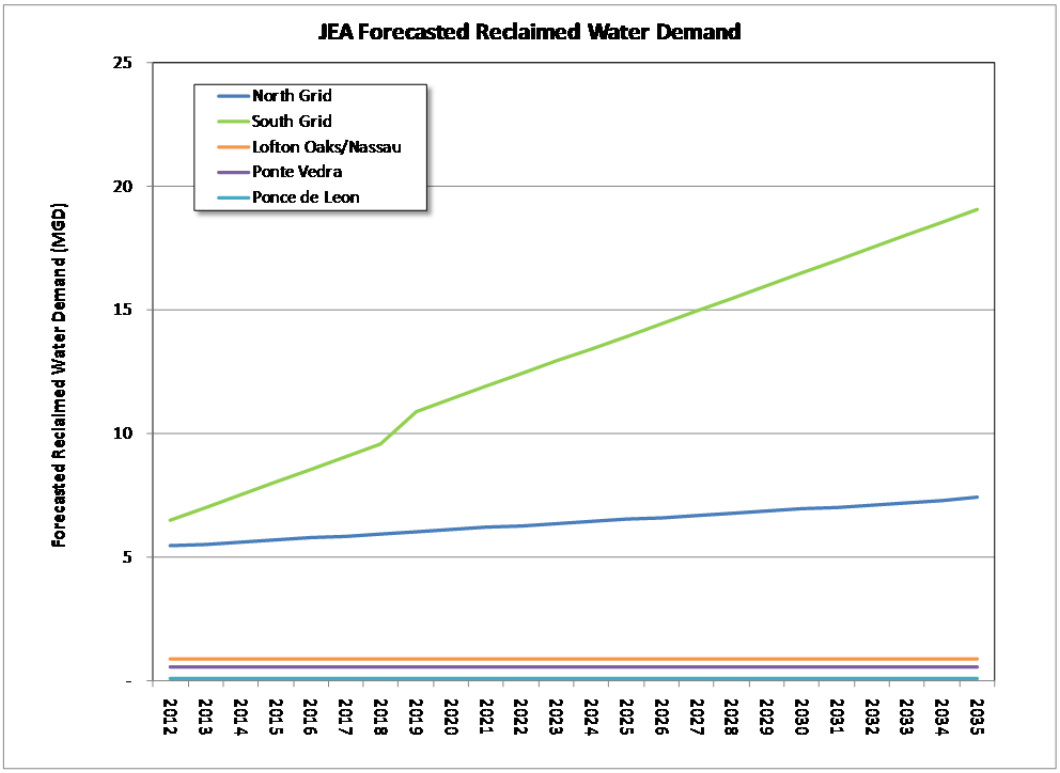


Figure 3. Forecasted Reclaimed Water Demand for IWRP Project

1.4 CUP Tracking and Prediction Tool

The CUP Tracking and Prediction Tool was developed to predict the probability of compliance with JEA's consumptive use permit in the short term. The tool evaluates factors such as forecasted population,

conservation, potable offsets from reclaimed water, unbilled water, and weather conditions. A statistical approach is then used to determine a range and most likely distribution for future aquifer demands.

This approach is well suited for its specific use in short-term forecasting. However, because the IWRP model is being developed to evaluate and assist with long term planning, using inputs from the CUP Tracking and Prediction Tool for the model development will not be required.

2.0 DEVELOPMENT OF WATER DEMAND FORECAST SCENARIOS AND DETERMINING THE RANGE OF WATER SUPPLY NEED

Based on JEA's water demand forecast and historical data, CDM Smith developed three forecast scenarios for use in the IWRP project:

1. Baseline Scenario
2. High Scenario
3. Low Scenario

All three water demand forecast scenarios are presented without additional water conservation or reclaimed water potable offsets since these will be options that will be explored in the IWRP.

The baseline scenario will be the JEA 2012 water demand forecast. The baseline forecast (population, per capita water use, and water demand) was already disaggregated to each service area, so no additional calculations/modifications were necessary.

A high water demand forecast scenario was generated using the 2010 BEBR population projections for the total JEA service boundary. CDM Smith allocated the total 2010 population projections to each water service area based on the proportional split between each service area's population and total population from the baseline scenario. The higher population projections for each of the service areas were multiplied by the same per capita water use factors as in the baseline scenario, and the same transfer adjustments for North Grid and South Grid service areas were made.

To develop a low water demand scenario, CDM Smith calculated an annual population growth rate for each service area from 2007 to 2011, to account for slower growth due to the economic recession. This slower growth rate was applied to the 2012 population estimate made by JEA for the service areas through 2015. Then between 2015 and 2020, the growth rate was increased in order to parallel the actual baseline population projection. In other words, population growth would be minimal for the

next 3 years then rebound after that to match the baseline's growth rate by 2020. The lower population projections for each of the service areas were multiplied by the same per capita water use factors as in the baseline scenario, and the same transfer adjustments for North Grid and South Grid service areas were made.

Figure 4 and Figure 5 present the aggregate population projections and water demand forecasts for the three demand scenarios. The average annual growth rate for demand over the scenarios from low to high is 1.4 percent, 1.6 percent and 2.7 percent.

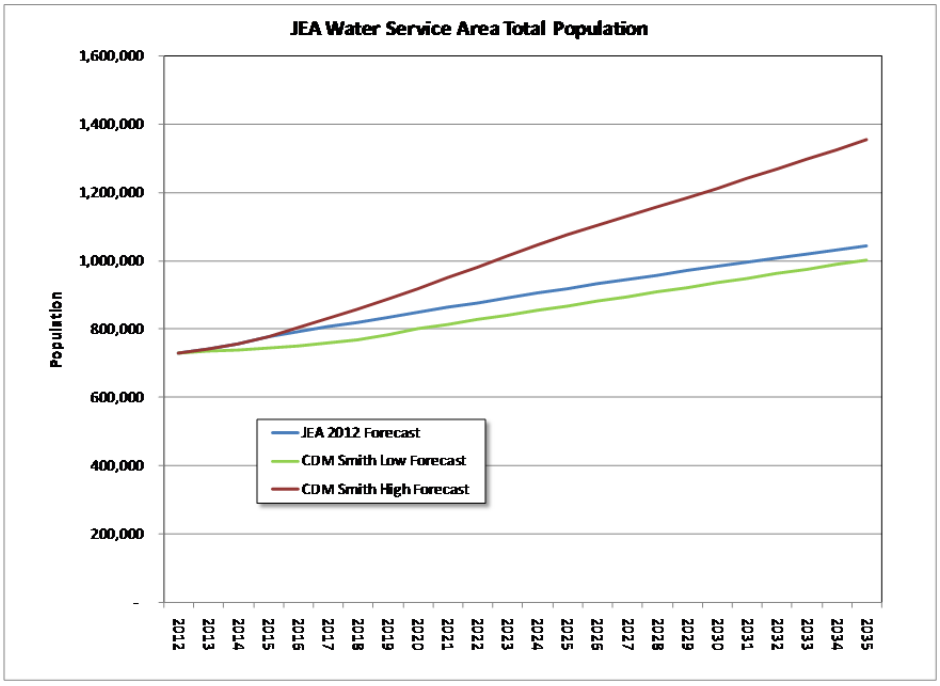


Figure 4. Population Scenarios for IWRP Project

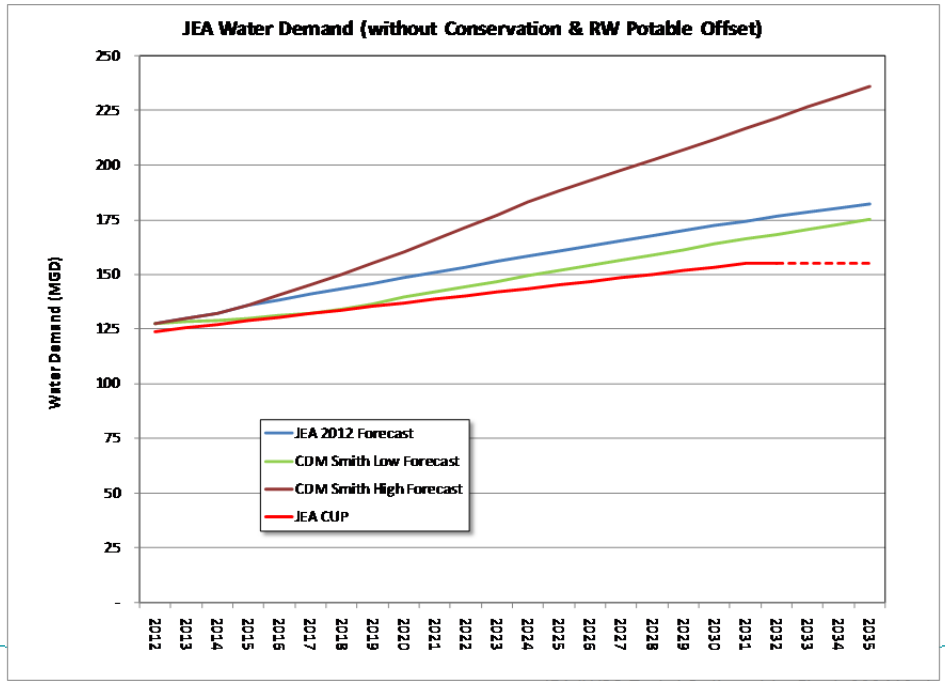


Figure 5. Water Demand Scenarios for IWRP Project

Subtracting JEA's CUP from the three scenarios of forecasted water demand results in a range of water supply need that the IWRP will need to address (**Figure 6**). The CUP allocation used for the calculation assumes the conditional increase in later years based on the reclaimed water conditions. It can be seen that under each growth scenario a need would exist to expand JEA's water supply beyond the CUP in order to meet the projected demand scenarios. This potential need is anywhere between 20 to 80 mgd by the end of the planning period depending on the demand projection scenario.

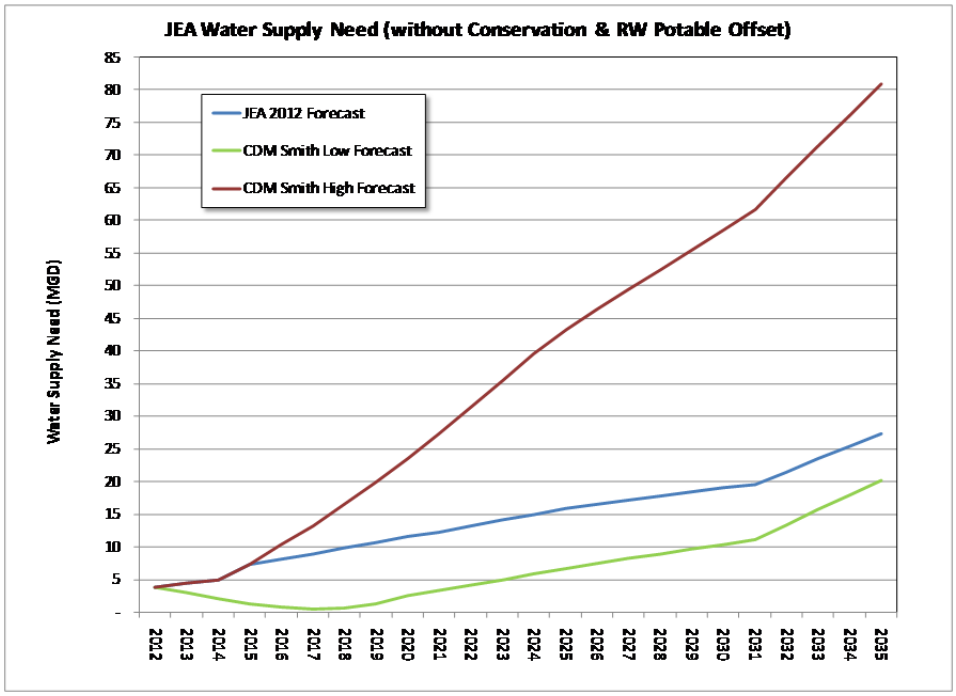


Figure 6. Range of Water Supply Need for IWRP Project

Upon review by JEA, the finalized water demand scenarios will be incorporated into the STELLA model so that various alternatives can be evaluated.

3.0 ASSESSMENT OF JEA'S UNBILLED WATER

CDM Smith assessed JEA's unbilled water from a top-down perspective to determine whether or not JEA should focus on this area as part of its overall water management strategy in the context of the IWRP Project.

CDM Smith reviewed JEA's historical accounting of unbilled water, as well as JEA's Water Audit (Final Report, 2011). To help assess JEA's unbilled water, information from the Water Audit and data provided by JEA were used by CDM Smith to calculate an industry standard (AWWA) benchmark.

3.1 Assessment of JEA Unbilled Data

CDM Smith reviewed JEA's historical unbilled data (MS Excel file provided by JEA) and has made the following observations:

a. The 2011 data show total production of 121.8 mgd, sales of 104.4 mgd, and the difference labeled as 'unbilled' of 17.4 mgd or 14.3 percent of production.

b. Note that 'Production' in this spreadsheet matches the value of finished water in the JEA report, rather than well production, and does not include purchased finished water as noted in the report.

c. The 'Sales' data by month is not adjusted for the lag in billing relative to the month of actual usage. However, on an annual basis these adjustments will average out and not affect the data.

d. This calculation of 'unbilled' water as a percent of production (14.3 percent) includes authorized unmetered uses, customer meter error and real system losses; and this conforms to the industry standard definition of non-revenue water (NRW).

e. The estimate of 'unbilled' or NRW in the spreadsheet is biased downward by the omission of purchased finished water. However, this bias is minimal as the total amount of potable water purchased by JEA for 2011 was only 0.105 mgd.

3.2 Assessment of JEA Water Audit

CDM Smith reviewed JEA's Water Audit (Final Report, 2011), and has made the following observations:

a. This report follows the estimation of water loss as prescribed by the SJRWMD water audit form. The calculations are performed for different grid networks.

b. The value calculated and reported as Unaccounted for Water (UFW) incorporates a number of parameters including: (1) differences between well meters and WTP master meters, (2) finished water purchased after the WTP master meter, (3) estimated adjustments for customer meter inaccuracies, (4) adjustments for meter reading lag, (5) estimated unmetered uses, and (6) estimated unavoidable annual real losses (UARL).

c. Because the difference between well meters and WTP master meters is negative, the resultant UFW percentage for the Major Grid appears to be biased downward.

d. Because the unavoidable real loss (UARL) is deducted from the calculated UFW, the resultant UFW value represents the portion of system losses that should be avoided, or could be controlled through a water loss control program. The calculated UFW is not comparable with standard metrics of system loss.

e. Before adjusting the UFW for the difference between well meters and WTP master meters, the interim UFW value is 14 percent of finished production. This value is a more commonly used definition of UFW.

3.3 Standard AWWA Benchmark

The JEA estimation of unavoidable annual real loss (UARL) uses a formula from the AWWA M36 manual of practice regarding water system loss. This manual provides a standardized format for classifying, calculating, and benchmarking water loss metrics.

CDM Smith used the 2011 data reported in the JEA 2011 Water Audit report to calculate the standardized water loss metrics in accordance with the AWWA format. These metrics are shown in **Table 1**, followed by notes on how data were used and converted.

The AWWA benchmarks use a ratio of the Real Loss to the UARL as a metric of a water system's Infrastructure Leakage Index (ILI). It is generally not economically or operationally feasible to reduce the ILI below a value of 2.0 or 3.0. This acknowledges that there are limits to the extent to which real losses can be eliminated within a system. The AWWA guidelines suggest that systems with an ILI in the range of 3.0 to 5.0 should evaluate the costs of water resources relative to the cost of a water loss control program that would reduce system losses. That is, if the unit value of water saved from leak detection and line replacement is less than the unit value of additional water supply, the utility could benefit from such a water loss control program. Generally speaking, for systems with an ILI between 5.0 and 8.0, the high level of real losses is only acceptable if water supply is inexpensive and relatively immune to supply shortages (i.e., the utility can afford to lose water). According to AWWA, an ILI greater than 8.0 is not an effective utilization of water resources.

Table 1. JEA Unbilled Water Benchmark Using AWWA/IWA Format

Water Supplied	Finished	44,456.39	MG
	Purchased	38.16	MG
		44,494.55	MG
Authorized Use	Metered	37,964.70	MG adjusted for billing lag
	unmetered	33.51	MG Fire flow
		14.81	MG Flushing
		11.65	MG Sewer cleaning
		38,024.67	MG
Losses (supply minus use)		6,469.88	MG
		14.54%	as Percent of Supplied
Apparent Loss	unauthorized use (theft)	0	MG
	billing error	0	MG
	customer meter inaccuracies	704.72	MG
		1.58%	as Percent of Supplied
Real Loss (RL)		5,765.16	MG
		12.96%	as Percent of Supplied
Non-Revenue Water		6,529.85	MG
(total loss + unmetered use)		14.68%	as Percent of Supplied
Unavoidable Real Loss (UARL)		1,414.3	MG
		3.18%	as Percent of Supplied
Infrastructure Leakage Index (RL/UARL)		4.07	

Notes on metric calculations:

a. Including purchased finished water in the water supplied into the distribution system increases the supply without changing the recorded use. Thus, the unbilled volume, or non-revenue water (NRW) volume increases to about 14.7% of supply.

b. The non-revenue water (NRW) volume is separated between unmetered authorized uses, apparent losses (i.e., customer meter slippage, theft and billing errors), and real losses (i.e., line breaks, major leaks, and unavoidable leakage). The unmetered authorized uses estimated by JEA amount to only 0.13% of total finished water supply. Customer meter inaccuracies estimated by JEA amount to 1.58% of supply. This leaves 13.0% of supply as real system loss.

c. Any pressurized system will lose water. The AWWA water audit format offers a methodology for estimating a water distribution system's unavoidable real loss (UARL) based on average operating pressure, number of service connections, lines of pipe and other parameters. However, many of the assumptions in this calculation are very generalized. Thus a conservative (i.e., safe) estimate is twice the calculated value. The JEA adjusted estimate of UARL is 1,414 MG, or 3.18% of total finished water supply.

Based on the analysis of JEA data reported in the JEA 2011 Water Audit report, it appears that JEA has an ILI of 4.07 and should evaluate the potential benefits from a program to reduce real loss in their system. JEA has recently formed a team to investigate such a program. The team has been tasked to develop and implement a leakage reduction program that will establish methodologies for assessment, prioritization and cost benefit analysis of the leak detection/reduction alternatives. Within the IWRP Project reducing unaccounted for water will continue to be an evaluated demand reduction alternative.

4.0 SUMMARY

The main conclusion of this technical memorandum is that the JEA demand projections are applicable to be used within the IWRP Project. The JEA provided baseline water demand forecast will be a key component within the developed model. An option will also be included to choose either a lower or higher demand projection for analysis utilizing the additional scenarios developed by CDM Smith as described in Section 2. These demand projections will form the base of the current analysis, but can always be updated within the model in the future if demand projections change.

The reclaimed water demand forecast will also be incorporated into the model, while the wastewater demand forecast will act as a constraint for the maximum level of reclaimed water capacity that can be developed.

While the CUP Tracking and Prediction Tool was reviewed and thought to be valid for its given usage, its ability to be incorporated into the IWRP model is limited due to the short time scale of its input data.

Unaccounted for water, and non-revenue water, within the JEA system were also analyzed and a loss reduction plan will be incorporated into the IWRP model.

Appendix B

Integrated Model Development Plan

INTEGRATED MODEL DEVELOPMENT PLAN

Task 3-1 Modeling Plan for the
JEA Integrated Water Resource Planning (IWRP) Project

This document is designed to be a guide for the formulation and development of a modeling tool for JEA that will accomplish two purposes:

- ***It will compare the performance, operating costs, and other characteristics of future alternative facilities, configurations, and management of JEA's water, wastewater, and reclaimed water systems, integrated as a single water resource and economic system. This will serve as the basis of IWRP evaluations.***
- ***It will be used going forward by JEA staff to develop and tune operating plans on a routine basis by simulated expected demand and testing alternative operating rules to help reduce costs.***

1.0 INTRODUCTION

The integrated systems model that will be developed as part of this project will compile information from other models/reports/studies, simplify relationships (such as groundwater drawdown as a function of pumping and recharge, saltwater upconing potential as a function of withdrawal rates, or conservation effectiveness as a function of investment and policy enforcement), and link the different subsystems together (water, wastewater, and reclaimed water) for comprehensive supply-demand, economic, and operational analysis of planned infrastructure and integrated operations.

As a guide, this document is malleable, and is not intended to serve as the basis for documenting final decisions at this early stage of the program. Rather, it is intended to function as a centralized collection of necessary inputs, outputs, formulation ideas, and functional requirements for the model, so that it can effectively address the questions that are driving its development. Workshops with CDM and JEA will help finalize the specific needs of the model. A separate document on the Economic Modeling Approach has been developed as a companion to this document.

2.0 FUNDAMENTAL QUESTIONS

The first workshop with the Core Planning Team identified the guiding objectives for the IWRP. Associated with each objective are performance

measures, which were reviewed and modified by the broader group of JEA staff and leadership at the JEA kickoff meeting on March 6, 2012. One of the expectations of the integrated model is that it will provide numerical output in the form of the performance measures that are deemed to be quantitative, as opposed to qualitative. These will then be used in a scorecard along with qualitative scores developed with JEA to provide balanced, broad-based comparisons of alternatives. The objectives and performance measures are listed in **Table 1** below, and the numeric performance measures (to be generated with the model, or supported by model outputs) are highlighted in red.

Table 1: Objectives and Performance Measures

Objective	Performance Measures
Maximize Cost-Effectiveness	-Total customer lifecycle costs -JEA levelized costs -Ratio of JEA fixed costs to JEA total costs
Reliably Meet Water Demands	-Risk for water shortage
Maximize Flexibility	-Operational flexibility -Diversity of supply
Protect Environmental Resources	-Aquifer sustainability -Water use efficiency - River Impacts (quality and quantity)
Maximize Implementation	-Reliance on proven technology -Ability to permit -Public acceptance
Meet Customer Water Quality	-Water quality blending/secondary water quality metric

As part of the process of evaluating tradeoffs between alternatives, the model will also be useful in answering broad questions about alternatives and their implementation. Some examples include:

- When will water demand outpace various levels of supply?

- What supply alternatives will offer the most cost-effective and reliable solutions?
- How can supply-side and demand-side management be used together cost-effectively?
- How can the system with future infrastructure improvements be operated in an integrated way for cost and energy efficiency?
- How should new infrastructure and facilities be phased?

Lastly, once alternatives are operational (or even for the existing system), the model may be employed regularly by JEA to assist in planning operations for an upcoming year. Given a current system configuration (at any point in the future), expected demand for the year, current energy prices, maintenance schedules for specific facilities, etc., JEA can use the model to identify preferred sources based on cost, impacts, reliability, diversity, or other metrics defined above. Examples of the types of near-term operational questions that can be answered for any future system configuration include: How can the system, in any existing state, be operated in an integrated way for cost and energy efficiency? What sources should be used when? What plants should take the highest load? How much reclaimed water should be distributed?

3.0 MODELING APPROACH: SIMULATION VS. OPTIMIZATION

Some of the fundamental questions of water planning are best addressed with dynamic system simulation models – high level tools that assimilate data and simplified relationships from other tools into a single platform in which multiple subsystems can be evaluated together. This is essentially an experimental platform, in which "What-If" questions can be asked and answered. Such analysis provides insight into the effectiveness of various water management options with the benefit of illuminating WHY they work or do not work as an effective part of a larger system. Because integrated system models incorporate so much information from other models, it doesn't need to be recreated or recomputed, and consequently, analysis is fast. This allows for rapid assessment of performance, trade-off studies, and tuning of a system toward peak performance for cost, reliability, or other metrics. It can been used effectively to "optimize" integrated systems by progressively building comprehensive plans that address a broad variety of goals.

Another approach to addressing integrated plans is explicit mathematical optimization – employing advance search algorithms to sort through all possible combinations of options and scales and conditions and identify those that best meet one or two specific objectives (cost, or reliability for example). However, these approaches usually are effective only in defining an upper bound of opportunity, and do not necessarily explain HOW to achieve the resultant benefits, or WHY the benefits are the way they are. In other words, optimization models can prescribe what to do, but they can also leave planners and operators "flying somewhat blind."

The choice of a modeling approach naturally depends on the fundamental questions driving a study, and the way the questions are articulated. Purely prescriptive questions ("What's the best way to do this?") can be effectively addressed with explicit optimization, but may not be terribly informative to decision makers. Descriptive questions ("What options most effectively address multiple needs, and why") are better analyzed using simulation models.

Because the framework of objectives and performance measures is broad, a **simulation model will be most effective for JEA's IWRP**. It can be used to provide information on cost, reliability, environmental impacts, and water quality so that alternatives can be evaluated in the context of their tradeoffs, and informed decisions can be made. More information on the selected tool is included in Section 5 of this memorandum.

4.0 MODES AND SCENARIOS

As listed above, there are two types of fundamental questions formulating the need for integrated planning:

- What long-term capital improvements and management strategies are needed, and when?
- How can annual operating plans be tuned for cost-effectiveness?

Because of the different focuses and scales of these questions, two modes will be developed. *They will be based on the same network configuration, input data, and calculations, but the time scales and specificity of demand and energy price structures will vary between the two modes.*

Both modes will run on a monthly timestep, which is appropriate for capturing the dynamics of seasonal variations in water availability and demand for planning purposes, but does not become too data-intensive by simulating finer time-scales in which the supply/demand/cost variations have little impact on planning. It may be necessary to incorporate daily peaking factors for within-month dynamics so that

infrastructure may be tested and sized appropriately.

Planning Mode: This mode will compare alternatives for the long-term integrated planning framework (Present – 2035) based on supply/demand analysis, operating cost, and other performance measures discussed above. CDM Smith will use this mode as part of the IWRP study to provide JEA with quantifiable tradeoffs between alternatives.

There are two options for how the planning mode could be arranged:

1. **One Year / Full Hydrology:** The model will look ahead to any single year between 2012 and 2035 based on demand projections developed in Task 1 of the study. It will superimpose historical periods of hydrologic record over a given demand year to obtain probabilistic results of water availability, operating costs, etc. for that year.

2. **25 Years / Representative Hydrology:** The model will run the full planning period of increasing demand with representative hydrology (wet, normal, or dry, for example) superimposed throughout.

Option 2 was selected for the JEA IWRP because the dependency of supply options on hydrology is not perceived to be as critical as understanding the long-term viability of supplies through periods of increasing demand. Options that depend on hydrology (river withdrawals, reuse demand as a function of rainfall, etc.) can still be tested by varying the hydrologic assumptions superimposed over the future 25-year planning period.

The information obtained from the model will be used to compare and prioritize options, group them into effective combinations ("alternatives"), and phase them appropriately. This planning mode will also allow experimentation with variations in demand projections, water availability, changes in regulations, etc.

The complete list of options defined by JEA in the initial workshops is listed in **Table 2** below. These are the options that can be selected and grouped into alternatives within the model.

Operations Mode: This mode will be used to formulate and/or tune annual operating plans by JEA. It will utilize the same modeling interface and network. However, unlike the Planning Mode, which looks up to 25 years into the future based on demand projections and hypothetical facilities and infrastructure, this mode will be used recurrently by JEA

based on actual configurations (in the ground at the time of model use) and projected needs for any immediately upcoming 3 year period, corresponding with current in-house near-term demand forecasting procedures.

It is envisioned that the tool will be used to input the current 3-year demands, CUPs, energy prices, available operating options (today's existing sources plus the implemented in-the-ground options from Table 2), and other constraints on availability (permits, facility maintenance, etc.). This mode will also allow the selection of hydrologic conditions (dry, wet, average, or possibly key percentiles) that can be run for the three-year planning period.

The primary goal of this mode will be to formulate three-year cost-effective operating plans for the entire water/wastewater system. Output will be provided in the form of the same metrics outlined above for long-term planning (cost, reliability, impacts, etc.).

Table 2: Options for Inclusion in the Integrated Model

Water Supply	Reuse Water	Demand Management
Desalination: St. Johns River near NSGS "seawater quality"	Indirect Potable Reuse via Groundwater Recharge	Increased conservation
Desalination: St. Johns River upstream "brackish quality"	Keystone Lake Region Reuse (RIBs, Injection, or Lake Recharge)	Reduce unaccounted for water
Desalination: Intracoastal Waterway/Ocean	Multi-County Regional Reuse	Drought rate structures
Desalination: Brackish Groundwater	Targeted Reuse/Source Replacement (Project by Project Basis)	O&M System Operations/Performance (Pressures)
Regional Surface Water Reservoir for Potable		
WTP Intermediate Aquifer Wells		
Local Surface Water Reservoir for Potable		
Non Floridan Source Private Irrigation		
Other Floridan Sources		

5.0 CANDIDATE MODELING TOOLS AND RECOMMENDATION

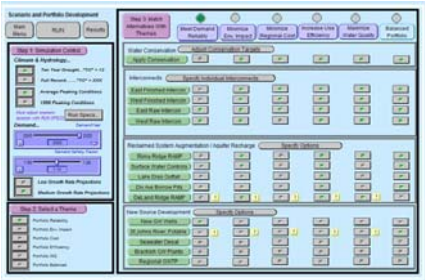
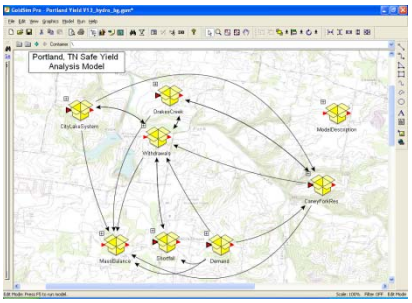
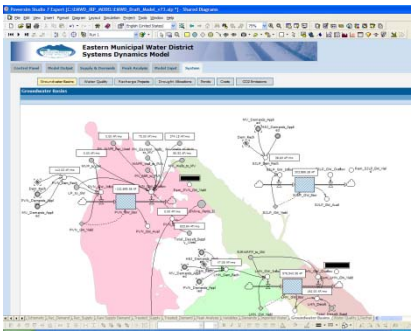
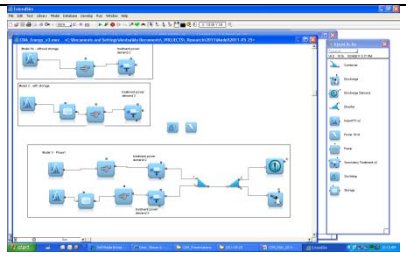
Integrated Model: **Table 3** lists the candidate models that CDM Smith has identified for the JEA IWRP. All of the tools can represent complex flow networks, and are mathematically capable of producing the necessary results for both proposed modes (Long-Term Planning, and Annual Operations). Likewise, all of these tools have been used for integrated and operational modeling. Their relative strengths and weaknesses are outlined in the table for comparative purposes.

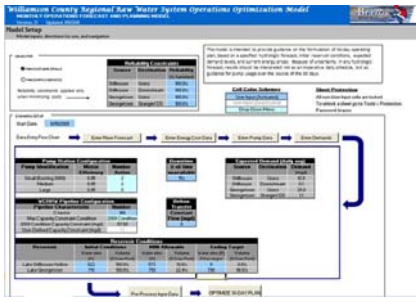
The most important aspect of selecting a model is to match it with the questions that are being asked, and with the intended usage of the model (in this case, both by CDM Smith for planning, and by JEA for annual operations). Based on the list of performance measures, the ease of programming and use, and its long and successful history at CDM Smith, **STELLA was selected as the most suitable option for JEA**.

Scorecard Tool: CDM Smith will utilize Criterion Decision Plus (CDP) to help rank alternatives in a comparative platform. CDP is a scorecard tool that compiles numeric scores (from the STELLA model) and qualitative assessments (poor – good – better – best) into composite scores for each alternative. The performance measures are assigned weights based on relative importance to overall planning objectives. Outputs help demonstrate the tradeoffs between alternatives, and illustrate which ones perform most effectively across the whole range of objectives. The tool is not used to make decisions, but rather to help support informed and defensible decisions.

Supplemental Templates: CDM Smith will develop supplemental templates in Microsoft Excel for the transferring of data to and from the model and scorecard tool, and possibly to help enhance graphical presentation of results.

TABLE 3: Candidate Models Evaluated for JEA IWRP

Software	Example	Description	Benefits for IRP	Shortcomings for IRP/Ops	Cost
STELLA		Graphical dynamic simulation model with interface that allows rapid adjustment of key variables. CDM and our clients have used STELLA extensively for IWRPs and Ops modeling.	-Intuitive interfaces for options and operating rules -Easy programming -Graphical depiction of the system -Long and successful history at CDM -Easy to modify	-Linking to external data is difficult -Output graphics are not great	$2,000
GOLDSIM		Statistically-based simulation model that facilitates uncertainty and Monte Carlo analysis	-Powerful algorithms for uncertainty analysis, Monte Carlo analysis, etc. -Subsystems contained in tiered modules for visual clarity	-Visual linkages are not clear or intuitive -Programming is more difficult than others -Can be difficult to modify	$4,000
POWERSIM		Graphical dynamic model with good interface and output graphics. Programming is higher level than most others in this comparison.	-Easy links to external databases -Intuitive interface and good output graphics -Graphical flexibility within the model -More powerful/ flexible math	-System links can be hard to follow -Data links can be difficult to change -Programming is less intuitive than others (more like a language)	$13,532
EXTENDSIM		Off-the-shelf software for which CDM Smith has develop customized modules	-More modular than others: allows rapid replication of similar facilities/elements -Easy to create tiered submodels	-Some of the modular functionality is proprietary to CDM Smith	$2,500

MICROSOFT EXCEL WITH PREMIUM SOLVER AND VISUAL BASIC (VBA)		Spreadsheet-based platform for explicit mathematical optimization (SOLVER) and dynamic/statistical programming (VBA)	-Completely customizable -Can do simulation and explicit optimization -Algorithms can be easily added with Visual Basic	-Changes are difficult with VBA and SOLVER -Programming can be lengthy -No functional system graphics -Limited planning insight with optimization	$2,000

6.0 MODEL INPUTS

Aside from a database of hydrologic data, economic information, demand projections, and other data sets that will be embedded within the model as needed, the user (CDM Smith and JEA) will enter key inputs to define scenarios. The inputs will be very similar for the PLANNING MODE and the OPERATIONS MODE. Table 4 lists the key inputs required for model scenarios:

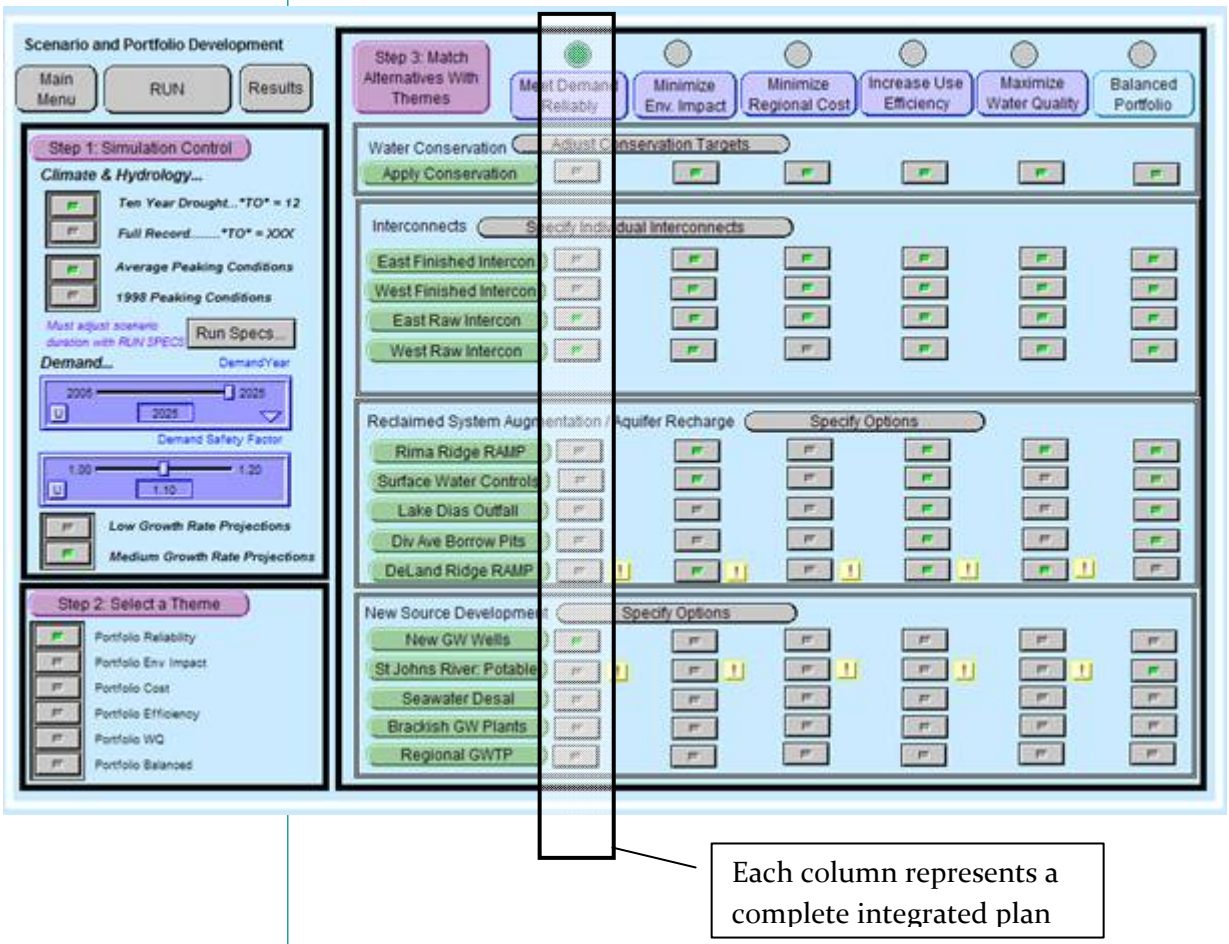
Table 4: Key Model Inputs

Input	Planning Mode	Operations Mode
Future options from Table 2 for supply, reuse, and demand management (ON/OFF and amounts available)	●	
Options from table 2 implemented and available at the time of model use		●
25-year demand projections for water and reuse (high/medium/low)	●	
1 or 3 year demand projection		●
Hydrologic conditions (dry, normal, wet)	●	●
Long-term energy price assumptions	●	

Input	Planning Mode	Operations Mode
Current energy prices		●
Operating Cost Assumptions / Energy Needs	●	●
Regulatory constraints for 25-year planning period (CUPs, MFLs)	●	
Current regulatory constraints (CUPs, MFLs)		●

Figure 1 illustrates an example input screen for a similar Integrated Water Resource Model using STELLA software. The user identifies key scenario parameters (hydrologic conditions, demand, etc.) and then selects from available supply and management options to formulate a comprehensive plan. Alternative plans can then be tested against each other and refined.

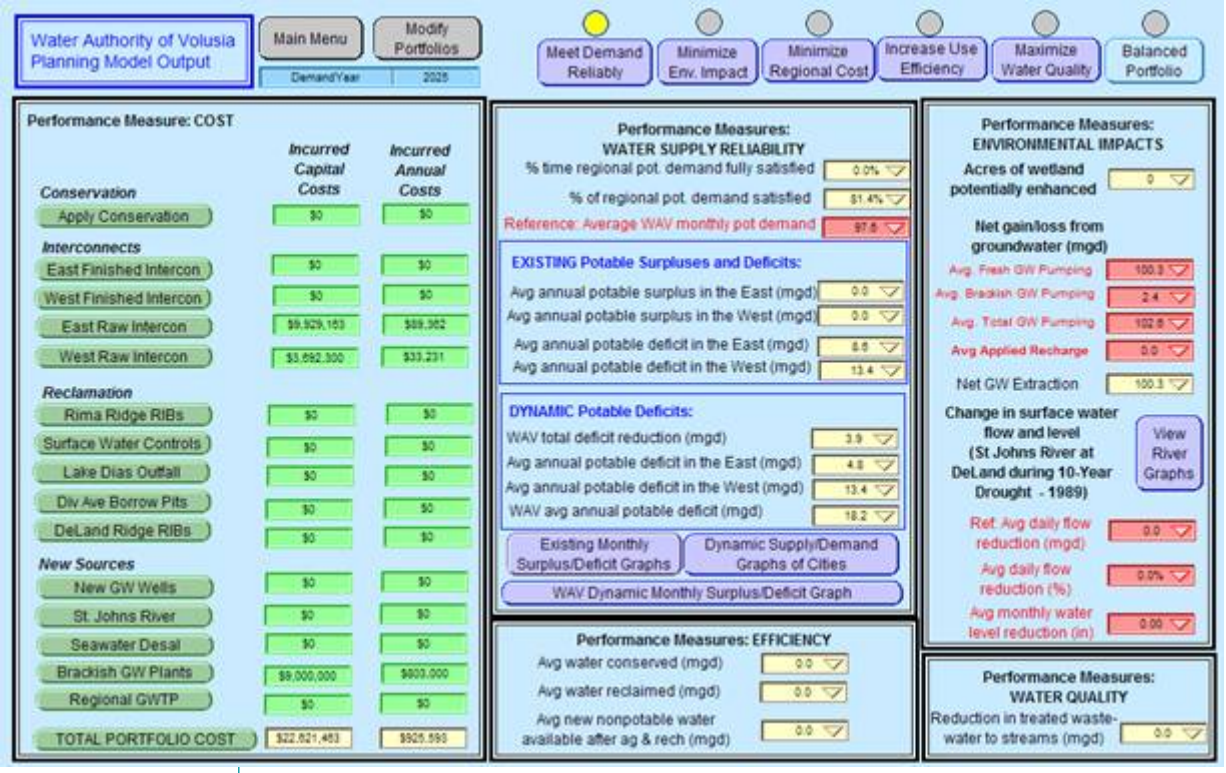
Figure 1: Example Input Screen for STELLA Model*



7.0 MODEL OUTPUTS

The outputs will be based around the performance measures outlined in Table 1, and will naturally evolve during the course of collaborative development with JEA. An example output screen in STELLA from another Integrated Water Resources Plan is included as **Figure 2.**

Figure 2: Example Output Screen in STELLA*



**Used for the Water Authority of Volusia Integrated Facilities Plan. Numbers are examples only, and do not reflect any actual decisions, costs, relationships, or specific scenarios.*

The example above is useful for defining specific performance measures in simple, numeric formats. Other key outputs, such as timeseries plots, will be presented in graphs, tables, and/or summary statistics to meet the needs of JEA.

8.0 MODELING WORK PLAN

The following task outline will be followed for the development of the model:

1. Develop Economic Modeling Plan: Define techniques and assumptions for cost calculations, energy price estimates, present

worth basis (inflation and discount rates, planning horizon, etc.), cost levelization.

2. Draw schematic diagram of model network and conceptual relationships

3. Develop simplified relationships based on previous modeling:

    a. Groundwater withdrawals vs. levels
    b. Groundwater withdrawals vs. salinity
    c. Energy needs and affiliated cost
    d. Conservation effectiveness
    e. Availability from other sources
    f. Etc.

4. Program model network with existing water, wastewater, and reclaimed facilities and infrastructure (represented either explicitly or conceptually, as needed), as well as future options identified for modeling in **Table 2.**

5. Develop input and output interface screens for selecting and grouping alternatives, specifying demand levels, viewing results, etc.

6. Test model against recent withdrawal, treatment, and distribution patterns to verify costs, supply usage, well response, etc.

7. Memorandum on model development and testing. At this point, the model will be ready for use in formulating and comparing alternatives for JEA's IWRP.

Appendix C

Economic Modeling Approach

ECONOMIC MODELING APPROACH

To help evaluate projects and alternatives for JEA's IWRP project, an economic modeling approach (EMA) is required. This EMA will be programmed into JEA's STELLA system model in order to track all costs and present information in standard economic terms. The EMA can be applied for comparing individual projects or combinations of projects (e.g., alternatives).

The EMA will incorporate and address the following:

- ***All projects will have similar cost contingencies (planning, engineering, construction) that are typical for high-level planning estimates.***
- ***Although JEA might use different levels of cash vs. debt to fund capital projects during actual project implementation, the EMA assumes all project capital costs will be 50 percent financed.***
- ***The EMA will assume the same escalation factor for both capital and annual O&M costs to account for escalation.***
- ***The EMA will produce standard economic metrics, such as:***
  - ***Total lifecycle present value cost (sum of nominal annual costs discounted by a discount rate for life of project/alternative)***
  - ***Simple average unit cost (sum of total nominal annual costs divided by sum of total water supply capacity for life of project/alternative)***
  - ***Levelized unit cost (present value cost divided by present value of beneficial water supply produced for life of project/alternative)***

1.0 PROJECT COST ESTIMATION

JEA has conducted many planning studies during the past several years, and included in these studies are cost estimates for many of the projects that will be explored in the IWRP project. CDM Smith Inc. (CDM Smith) will first bring all prior cost estimates to current year (2012) dollars using the appropriate ENR index. For those projects without cost estimates, CDM Smith will utilize unit cost estimates for similar project from other studies conducted throughout the United States in order to develop high-level planning cost estimates. All cost estimates will include similar (comparable) contingencies for planning, permitting, engineering and construction.

2.0 ECONOMIC FACTORS AND ASSUMPTIONS

The following economic factors or terms will be used as default values for the IWRP project, based on the last 10 years of historical trends. However, these values can be changed or varied as inputs to the STELLA model in order to test the sensitivity they may have on decisions.

Economic Factor	Value
Escalation Rate	3%
Finance (Borrowing) Rate	5%
Life of project for pipelines, pump stations, stormwater BMPs	20 years
Life of project for treatment plants, wells, storage, conveyance	30 years
Discount Rate	5%

Assumptions were made to determine a baseline cost for running the current JEA system.

- Based on the 2011 data from the annual report, it was determined that assets were split evenly with about 50% for water and 50% for sewer. Thus, similarly it was assumed that 50% of the current debt financing could be attributed to the water system. Taking the average of annual debt service for 2010 and 2011 this was $62,000,000 per year.
- It is assumed that 50% of JEA's reported operating costs are spent on water withdrawal, treatment and distribution. Based on an average of 2010 and 2011 data this equates to $124,000,000 in O&M per year. Within the model $1.50 per 1000 gallons (or $1500 per million gallons) is assumed to be variable O&M based on the total water produced. This leaves $58,000,000 per year as a fixed O&M cost.
- The cost of moving water from the north to south grid through the interconnect is handled separately in the model. Based on JEA provided data, the costs used are $132 per million gallons for average annual transfers less than or equal to 15 mgd and $148 per million gallons for average annual transfers above 15 mgd.

3.0 ECONOMIC COMPARISONS

Comparing projects and alternatives (combinations of projects) from an economic standpoint can be challenging for several reasons. First, not all projects have the same economic life. Second, because JEA's current groundwater source is the cheapest water supply (up to JEA's CUP), any project that displaces this lowest cost water is not providing an economic benefit. And third, because new water supply projects come in all sizes of capacity, it is important to present economic terms in unit cost (dollars per volume of water produced).

Standard economic theory states that the best cost comparisons take into account the time value of money, meaning that a dollar today is worth more than a dollar 10 years from now. This is because a dollar today can be invested. To account for the time value of money, all future year costs are brought back to present value terms using the following formula:

$$PVc = \frac{CF_t}{(1+r)^t}$$

Where:

PVc = present value cost
CF = future cash flows in *t* years from now
t = number of years
r = discount rate

Project/alternative comparisons using a present value approach are only valid if the supply produced is the same for all projects/alternatives. If projects or alternatives produce different quantities of water, then a unit cost comparison is needed. For example, if Project A cost $100 and produces 20 units and Project B cost $10 and produces 1 unit, which is more cost effective? Without converting to unit cost, Project A is the most expensive. But when comparing unit cost, Project B is the most expensive ($10/unit for Project B vs. $5/unit for Project A). This is important because projects can be scalable, meaning many smaller projects can be done in order to equal the supply yield of one big project.

However, the method commonly used to develop average unit cost (sometimes called a simple unit cost), does not take into account the time value of money and the beneficial water supply. Beneficial water supply is defined as the amount of water that is needed (as opposed to the capacity of supply that can be produced). To account for both of these issues, levelized cost is used. Levelized cost for a particular project is defined as that value of a unit cost constant over time that, if charged for the annual volume of water supplied, would yield the present value of the cost of the project. The formula for levelized cost is:

$$LC = \frac{PVc}{PVw}$$

Where:

LC = Levelized cost
PVc = present value cost
PVw = present value of water that is beneficially needed (as opposed to supply capacity)

The use of levelized costs is also helpful in identifying options/alternatives that return the lowest user costs. To illustrate this, **Table 1** compares two projects against a projected need for water. The need for water represents the difference between projected water demands and existing water supplies. Project A has an annual supply capacity of 5,475 million gallons (15 mgd), a capital cost of $3.1 million and O&M cost of $0.25 million, with a life cycle of 20 years, and comes online in 2013. Project B has an annual supply capacity of 1,000 million gallons (2.7 mgd), a capital cost of $0.5 million and O&M cost of $0.05 million, with a life cycle of 15 years, and comes online in 2015.

Assuming capital costs are completely financed at 5 percent and O&M costs are escalated at 3 percent per year, the total lifecycle costs in nominal dollars over the life of both projects (no discounting) is $12 million for Project A and $1.8 million for Project B. Dividing both of these lifecycle costs by capacity of water that can be produced by the two projects yields a simple average unit cost of $110/million

gallons for Project A vs. $120/million gallons for Project B—indicating that Project A is more cost-effective. But because the full supply capacity of Project A is not needed until 2025, the full capacity should not be counted when calculating a true levelized cost. Only the portion of supply yield that is equal or less than the total water need should be counted. Because Project B's supply capacity is always less than the total water need, all of its supply is beneficial. When this factor is taken into account, plus discounting both cost and water, then Project B becomes more cost-effective with a levelized cost of $119/million gallons vs. $146/million gallons for Project A. It should be noted that in this example, both projects cannot be phased. This method would allow phasing of projects to be tested from an economic perspective.

4.0 ECONOMIC MODELING PROTOCOL

To calculate both simple and levelized unit cost, capital costs estimated in 2012 dollars will be escalated at 3 percent to the start year of water production, and then 50% financed using an interest rate of 5 percent. O&M costs estimated in 2012 dollars will be escalated by 3 percent per year. For levelized cost, all future costs will be discounted at 5 percent in order to develop a present value cost. Future values of beneficial water supply (equal to or less then water need) will be discounted at 5 percent in order to develop a present value of water. Levelized cost will be calculated as PV cost divided by PV water. This economic modeling protocol will be incorporated into the STELLA model for evaluation of projects and alternatives.

Table 1. Economic Comparison Example

Escalation (inflation) Rate	3%
Financing Rate	5%
Discount Rate	5%

	Value	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Need for New Water (mil gal)		1,362	1,575	1,788	2,634	2,937	3,248	3,558	3,867	4,185	4,462	4,788	5,112	5,437	5,760	6,034	6,266	6,498	6,730	6,960	7,107	7,827	8,546	9,265	9,957
Project A																									
Annual Supply Capacity (mil gal)			5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475			
Beneficial Supply (mil gal)[1]			1,575	1,788	2,634	2,937	3,248	3,558	3,867	4,185	4,462	4,788	5,112	5,437	5,475	5,475	5,475	5,475	5,475	5,475	5,475	5,475			
Project Life (years)	20																								
Total Capital Cost ($M)	$3.10																								
Annualized Capital + Debt ($M)			$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26	$0.26			
Annual O&M Cost ($M)	$0.25		$0.26	$0.27	$0.27	$0.28	$0.29	$0.30	$0.31	$0.32	$0.33	$0.34	$0.35	$0.36	$0.37	$0.38	$0.39	$0.40	$0.41	$0.43	$0.44	$0.45			
Total Annualized Cost ($M)			$0.51	$0.52	$0.53	$0.54	$0.55	$0.55	$0.56	$0.57	$0.58	$0.59	$0.60	$0.61	$0.62	$0.63	$0.65	$0.66	$0.67	$0.68	$0.69	$0.71			
Simple Unit Cost ($/mil gal)[2]	$110																								
Levelized Unit Cost ($/mil gal)[3]	$146																								
Project B																									
Annual Supply Capacity (mil gal)					1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000						
Beneficial Supply (mil gal)[1]					1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000						
Project Life (years)	15																								
Total Capital Cost ($M)	$0.50																								
Annualized Capital + Debt ($M)					$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05	$0.05						
Annual O&M Cost ($M)	$0.05				$0.05	$0.06	$0.06	$0.06	$0.06	$0.06	$0.07	$0.07	$0.07	$0.07	$0.07	$0.08	$0.08	$0.08	$0.08						
Total Annualized Cost ($M)					$0.11	$0.11	$0.11	$0.11	$0.11	$0.12	$0.12	$0.12	$0.12	$0.12	$0.13	$0.13	$0.13	$0.13	$0.14						
Simple Unit Cost ($/mil gal)[2]	$120																								
Levelized Unit Cost ($/mil gal)[3]	$119																								

[1] Represents that water supply that offsets the need for new water, but nothing more since JEA's current groundwater source is already the cheapest water

[2] Represents the sum of total annualized cost divided by the sum of the annual supply capacity.

[3] Represents the present value of total annualized cost divided by the present value of beneficial supply.

Appendix D

Option Factsheets

JEA IWRP Option Factsheets

Model Set-Up

- Seasonal Peaking Factors
- CUP Allocations
- Reclaimed Water Capacity and Demand
- Generic Additional Supplies

Water Supply Options

- Desalination
- Intermediate Aquifer Wells
- Non-Floridan Private Irrigation
- Regional Surface Water Reservoirs

Reuse Water Options

- Indirect Potable Reuse
- Keystone Lake Region Reuse
- Regional Reuse
- Targeted Reuse

Demand Management

- Conservation
- Reduce Unaccounted for Water

Seasonal Peaking Factors

Category: Model Set-Up

Brief Description:

This factsheet describes how seasonal peaking factors were incorporated into the model

Water Demand:

The annual water demand values within the model are those described within the Task 1 Water Demand and Gap Analysis technical memo. To these annual demands, a monthly peaking factor is used to determine the demand for a given month. The seasonal peaking factors were developed based on JEA's historical sales data from 2004-2011. For each year, the ratio of the monthly sales to the yearly average was calculated providing a seasonal pattern for that year. All eight historical years were then averaged together to determine the overall peaking factor for the model. The developed pattern compared to the historical data can be seen in **Figure 1.**

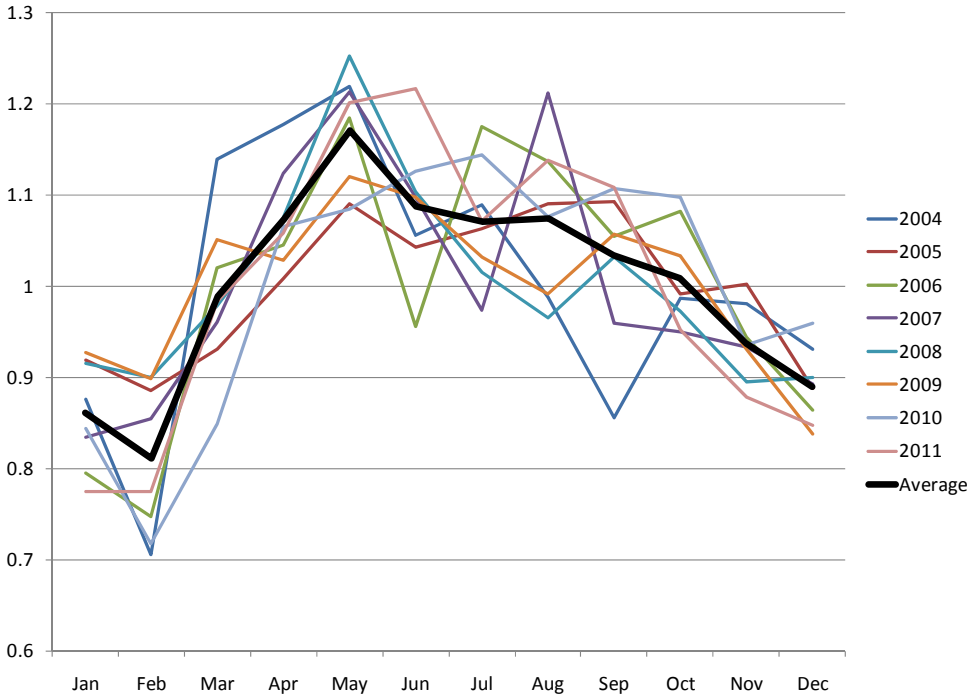


Figure 1: Seasonal Water Demand Pattern

Reclaimed Water Demand:

The same method was used to develop the reclaimed water demand pattern except only the years 2008-2011 were utilized. This was because earlier years showed different patterns as reclaimed water usage in the area was still being developed. The most recent years are assumed to be the most representative of the current usage patterns. **Figure 2** shows the historical data and the average seasonal pattern used within the model.

Seasonal Peaking Factors

Category: Model Set-Up

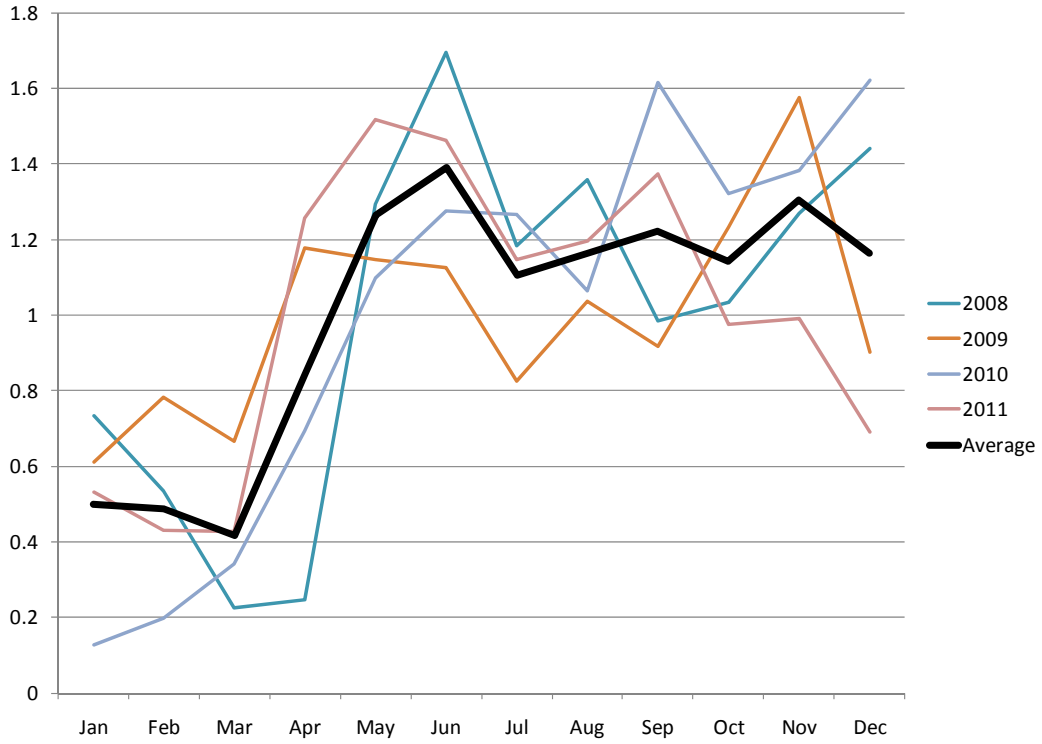


Figure 2: Seasonal Reclaimed Water Demand Pattern

Wastewater Demand:

The same method was used to develop the wastewater demand pattern which was based on the total wastewater treated for 2010 and 2011. The wastewater data seems to be strongly influenced by large storms which cause a large peak in wastewater flow. The years 2010 and 2011 were chosen since there appeared to be minimal influence from these storms. **Figure 3** shows the historical data and the developed seasonal pattern.

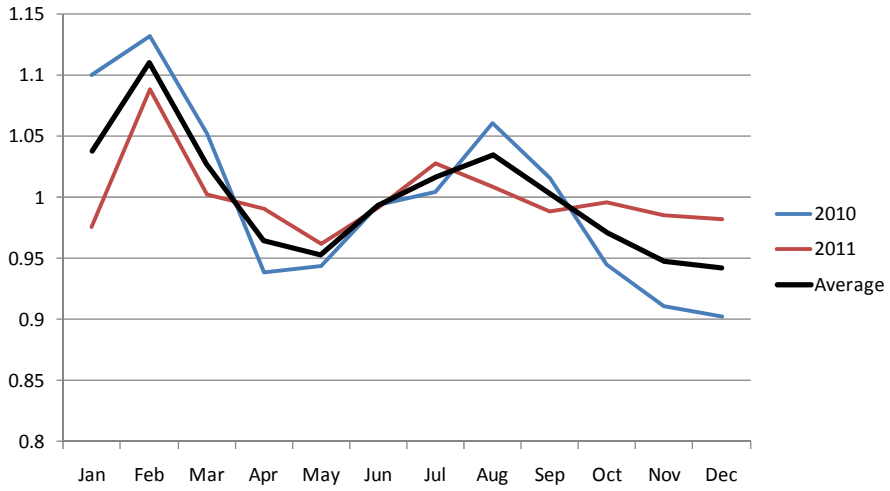


Figure 3: Seasonal Wastewater Peaking Factors

Seasonal Peaking Factors

Category: Model Set-Up

Citations:

CDM Smith (2012) “Water Demand Forecast & Gap Analysis” Task 1 of the JEA Integrated Water Resource Planning Project.

JEA (2012) “Sales Data.xlsx” Spreadsheet of historical sales data provided to CDM Smith on June 22, 2012.

JEA (2012) “Metrics.xlsm” Spreadsheet provided to CDM Smith on June 22, 2012

CUP Allocations

Category: Model Set-Up

Brief Description:

This factsheet describes how the main wellfields and CUP allocations are set-up within the Stella model.

Grid Set-Up:

Each individual wellfield is not modeled, but instead wellfields are combined based on grids. Six grids have been included within the model: the North Grid, South Grid, Ponte Vedra Grid, Ponce De Leon Grid, Lofton Oaks/Nassau Grid, and Mayport Grid.

Capacity Constraints:

The available flow to be supplied within each grid from the Floridan aquifer CUP allocations is limited by capacity constraints at either the wells or the water treatment plants. The limiting capacity for each grid came from JEA's 2012 Annual Water Resource Master Plan as listed in **Table 1.** The increases between current conditions and 2020 are based upon the planned improvements listed within the plan.

Table 1: Max Capacity per Grid

Grid	Limiting Capacity 2012 (MGD)	Limiting Capacity 2020 (MGD)
North	143.5	155.5
South	158.3	175.6
Mayport	0.19	0.19
Lofton Oaks	5.33	9.09
Ponce De Leon	1.29	1.29
Ponte Vedra	3.0	3.0

CUP Constraints:

JEA's consumptive use permit (CUP) outlines the total volume which can be withdrawn from the Floridan aquifer each year. However, within the permit are a series of conditions affecting the allocation. Figures 1a and 1b within the CUP provide the total volume allowable per year per wellfield. The values provided for 2011 through 2021 are used as the baseline allocation for each grid. After 2021 the allocation is held constant pursuant to condition 12 of the permit which does not allow for an increase in the allocation unless additional requirements are met. One of these requirements is the amount of reclaimed water provided for reuse. **Figure 1** shows the allocations for the North and South Grids. The allocation in the South Grid has a decreasing pattern to help combat salinity intrusion and there is thus not the opportunity for increased allocation. **Figure 2** shows the allocations for the smaller grids assuming an increase in allocation is available.

Another condition of the permit allows for individual wellfields to surpass their allocation by 20% as long as the total system allocation is not exceeded. Within the model, there is an option to allow this internal system trading between the North and South Grids or between the North and Lofton Oaks Grids between specified years to help meet grid specific deficits.

CUP Allocations

Category: Model Set-Up

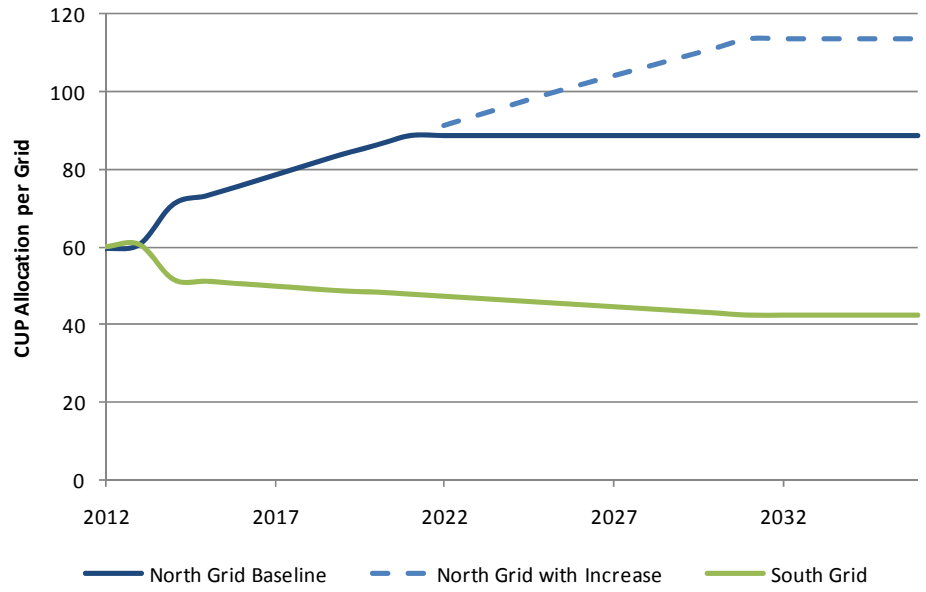


Figure 1: CUP Allocation per Grid for North and South Grids (mgd)

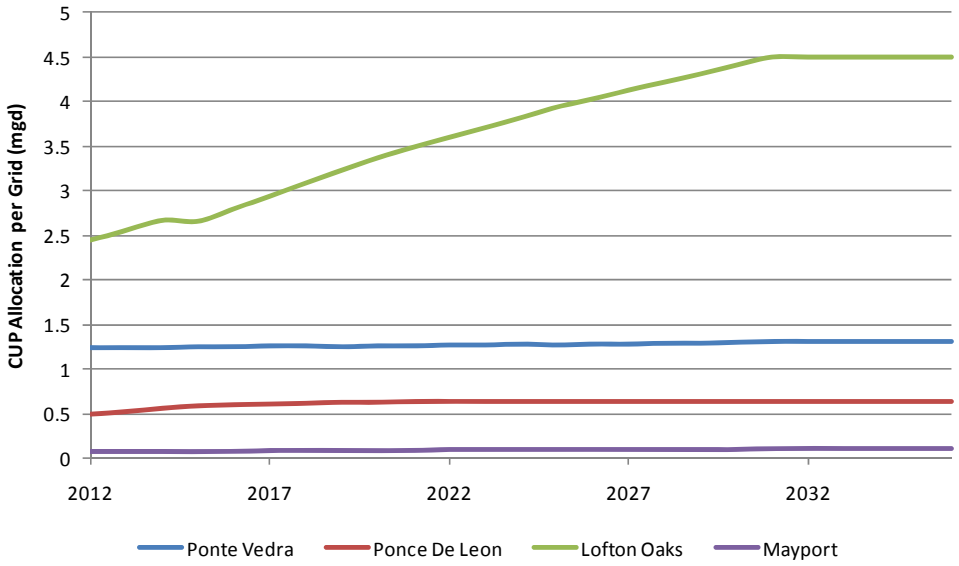


Figure 2: CUP Allocation per Grid for the Small Grids (mgd)

CUP Allocations

Category: Model Set-Up

Reclaimed Water and the CUP Allocations:

The targeted reclaimed water values required to increase the CUP allocation are provided in **Table 2**.

Table 2: Reclaimed Water Requirements for Increased CUP Allocation

Year	Required Reuse (mgd)
2020	31.55
2025	37.36
2030	43.76

An exemption to meeting these reclaimed water targets is provided in condition 38: "except to the extent the permittee demonstrates that some portion of the amount of reuse required below is not economically, environmentally, or technologically feasible". The model has a series of choices for how the CUP allocations are handled:

- **No increased allocation**: This option can be selected to maintain the allocation at the baseline conditions.
- **Guarantee additional allocation:** This option automatically provides the increase in allocation independent of reclaimed water availability and usage.
- **Additional allocation depends on reuse:** Within this option the amount of reclaimed water made available by JEA is compared to the targets and the CUP allocation is not increased until the targets are met.

Citations:

JEA (2011) "Consumptive Use Technical Staff Report; Application #: 2-031-88271-11" April 15, 2011

Reclaimed Water Capacity and Demand

Category: Model Set-Up

Brief Description:

This factsheet describes how the reclaimed water capacity and general demand was set-up within the model.

Reclaimed Capacity:

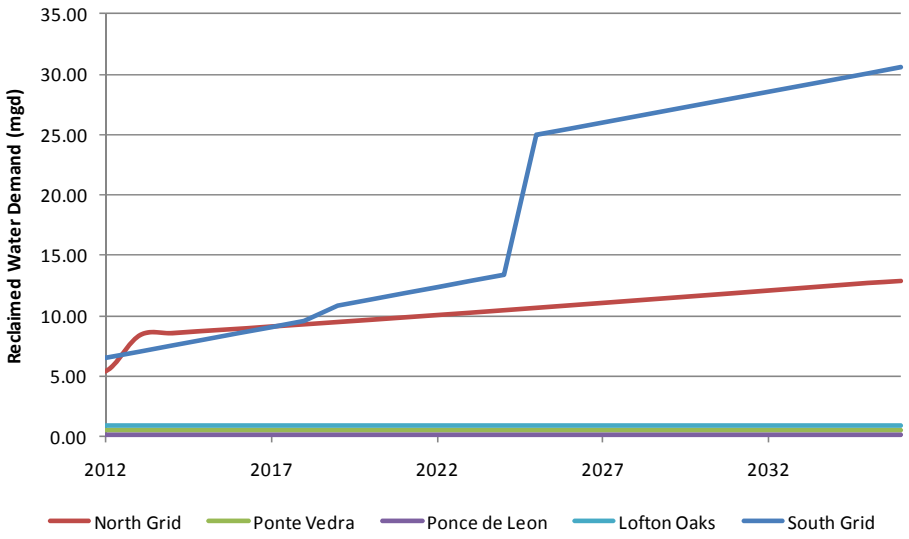
Initial capacities for the each of the reclaimed facilities were taken from the table on page 225 of the 2012 Annual Water Resource Master Plan and then confirmed and updated by JEA staff. Capacities of the plants are increased in future years as laid out in the Master Plan. **Table 1** provides the initial capacity and eventual planned capacity of each plant without any other options considered.

Table 1: Reclaimed Water Facilities Capacity

Facility	Grid	Initial Capacity 2012 (MGD)	Eventual Capacity (MGD)
Buckman	North	7.7	7.7
District II/Cedar Bay	North	5.0	9.0
Dinsmore	North	0	0
Southwest	North	0.8	0.8
Arlington East	South	6.0	18.0
Blacks Ford	South	3.0	6.0
Mandarin	South	5.7	5.7
GEC	South	0	9.0
Ponte Vedra	Ponte Vedra	0.8	0.8
Ponce de Leon	Ponce de Leon	0.24	0.24
Nassau	Lofton Oaks	1.55	1.55
Total		**30.8**	**58.8**

Reclaimed Demand:

The reclaimed water demand per grid also comes from the 2012 Water, Wastewater, and Reclaimed Water Forecast with refinements by JEA staff. The shape of these demand curves is shown in **Figure 1.** Any additional demand from the selected options is added to this baseline demand.



Citations:

JEA (2011) "2012 Annual Water Resource Master Plan: Water – Wastewater – Reclaimed" Corporate Planning Department, Water/Sewer System Planning. September 2011.

JEA (2011) "JEA 2012: Water, Wastewater, Reclaimed Water Forecast" Prepared by M. Dvoroznak and B. Russell, JEA Water/Sewer Systems Planning. December 2011.

Generic Additional Supplies

Category: Model Set-Up

Brief Description:

As a way to capture future supply alternatives, generic additional supplies were added into the model. All grids have a generic additional supply available with basic elements pre-programmed as described below.

Set-Up:

The generic supplies are treated as simple supply options. The standard option variables have been set-up within the model and interface. The user can adjust the variables of yield, capital cost, fixed O&M cost, variable O&M cost, start year, project life, and finance life similarly to any other option.

The generic supply options however stand alone and do not interact with other model features other than helping to meet the overall demand for the grid and influencing cost. For example, the supply will not be checked against reclaimed capacity nor will the supply go toward meeting the reclaimed requirements to increase the CUP allocation.

Desalination

Category: Water Supply Option

Brief Description:

This option consists of desalination to produce a new source of potable supply. Four different desalination options are considered: (1) extraction of brackish groundwater from the Lower Floridan aquifer, (2) withdrawing brackish river water from the upper St. Johns River, (3) withdrawing seawater-quality influent from the lower St. Johns River, or (4) withdrawing seawater from the ocean.

Facilities Required:

A desalination plant would be required for all options as well as connection to the distribution system and concentrate disposal. For brackish groundwater extraction, a well field would be needed, and for the surface water options an intake structure would be required.

Key Assumptions:

For brackish groundwater, a total dissolved solids (TDS) concentration of 1500 mg/l was assumed, this increased to 5000 mg/l for the brackish St. Johns River water, and 35,000 mg/l for ocean water.

Flexibility:

This option will add a previously unused source water to the JEA supply. It also makes use of either a source with an unlimited supply in the case of ocean water or a source with limited potential for other use in the case of the brackish supplies.

Environmental Impacts (Promote Environmental Sustainability):

For all options, concentrate disposal will be an environmental issue. Potentially more so for the sources with higher TDS values. For groundwater withdrawal there could be possible drawdown effects. For the river withdrawals there would be a decrease in river flows.

Ease of Implementation:

Concentrate disposal options will need more study and could complicate implementation. Within the qualitative scoring, desalination was given a score of 2 for reliance on proven technology signifying that there is a precedent for use in the Southeaster US but known challenges. Desalination was given a 1 for the ability to permit, signifying JEA has no precedent and it is assumed to be difficult to permit. A score of 5 was given to public acceptance signifying that no new public acceptance is needed.

Water Quality:

The required desalination and treatment facilities would produce water of potable quality. In is unknown how this new supply source would blend with current supplies. Within the qualitative scoring, the brackish desalination sources were given a score of 2 for water quality signifying that the blending is unknown or difficult. The lower St. Johns River and ocean desalination option were given a score of 1 since the more difficultly with blending over to the brackish sources is assumed for these locations.

Yield:

All options could be sized to accommodate various treatment capacities. Options of 5, 15, 30 and 50 mgd had costing provided and these four potential yields can be selected within the model set-up. Flow from all the desalination options is assumed to go towards meeting demand in the south grid.

Desalination

Category: Water Supply Option

Cost:

Table 1 provides estimated capital and O&M costs of each alternative for a range of treatment capacities. Capital costs include the treatment facilities, intake, link to the distribution system, and line for concentrate disposal.

Table 1: Desalination Option Costs

	Treatment Capacity (mgd)			
	5	15	30	50
Brackish Groundwater				
Capital	$43,100,000	$88,800,000	$136,000,000	$207,000,000
O&M Fixed Costs per Year	$520,000	$1,160,000	$1,940,000	$2,840,000
O&M Variable Costs per MG	$1139.73	$847.49	$708.68	$622.47
Brackish St. Johns River Water				
Capital	$85,500,000	$160,000,000	$238,000,000	$335,000,000
O&M Fixed Costs per Year	$640,000	$1,540,000	$2,700,000	$4,060,000
O&M Variable Costs per MG	$1402.74	$1125.11	$986.30	$889.86
Seawater Quality Water from St. Johns River				
Capital	$173,000,000	$352,000,000	$562,000,000	$795,000,000
O&M Fixed Costs per Year	$1,120,000	$2,800,000	$5,320,000	$8,680,000
O&M Variable Costs per MG	$2454.79	$2045.66	$1943.38	$1902.47
Ocean Water				
Capital	$185,000,000	$376,000,000	$590,000,000	$825,000,000
O&M Fixed Costs per Year	$1,120,000	$2,800,000	$5,320,000	$8,680,000
O&M Variable Costs per MG	$2454.79	$2045.66	$1943.38	$1902.47

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

CH2MHill (2008) "JEA Total Water Management Plan". September 2008.

WTP Intermediate Aquifer Wells

Category: Water Supply Option

Brief Description:

This option consists of construction of wells or a wellfield targeting the intermediate aquifer as the source of supply for potable or irrigation use.

Facilities Required:

New wells targeting the intermediate aquifer would be required. These could hopefully be co-located at existing wellfields to diminish additional piping needs.

Key Assumptions:

The middle of the South Grid area was determined to be the best target for exploration.

Flexibility:

This option will improve flexibility through the introduction of groundwater from a different aquifer system.

Environmental Impacts (Promote Environmental Sustainability):

The connectivity between aquifers is not well understood so withdrawing from the intermediate aquifer could have effects on the surficial aquifer above it or the Floridan aquifer below.

Ease of Implementation:

With many unknowns, developing this resource would be a long-term project. Additional test holes will be needed and aquifer testing required to determine the capacity of each well and potential impacts to surrounding users and environmental resources. Permitting will require this test data and new groundwater flow models will need to be developed that accurately include the intermediate aquifer. Within the qualitative scoring, intermediate aquifer wells was given a score of 3 for reliance on proven technology signifying that there is the precedent for use in Florida but the source is new to JEA and there are unknown hurdles. A score of 3 was given for the ability to permit signifying that it may be challenging but precedents do exist. A score of 3 was given to public acceptance signifying that it may be difficult to convince the public to participate or accept the water source.

Water Quality:

The water within the intermediate aquifer is generally of high-quality. Blending with water from the Floridan aquifer should be easier than with other surface water sources. Within the qualitative scoring, intermediate aquifer wells was given a score of 5 for water quality signifying that there should be no blending issues.

Yield:

Based on other regions currently utilizing the intermediate aquifer, it is reasonable to expect a yield of approximated 0.5 mgd per well. Dispersal of about 10 wells in strategic locations may be able to produce up to 5 mgd total yield for the South Grid. It is assumed that these wells will come on line in phases throughout the planning period. An initial phased approach is provided in **Figure 1** but can be updated within the model.

WTP Intermediate Aquifer Wells

Category: Water Supply Option

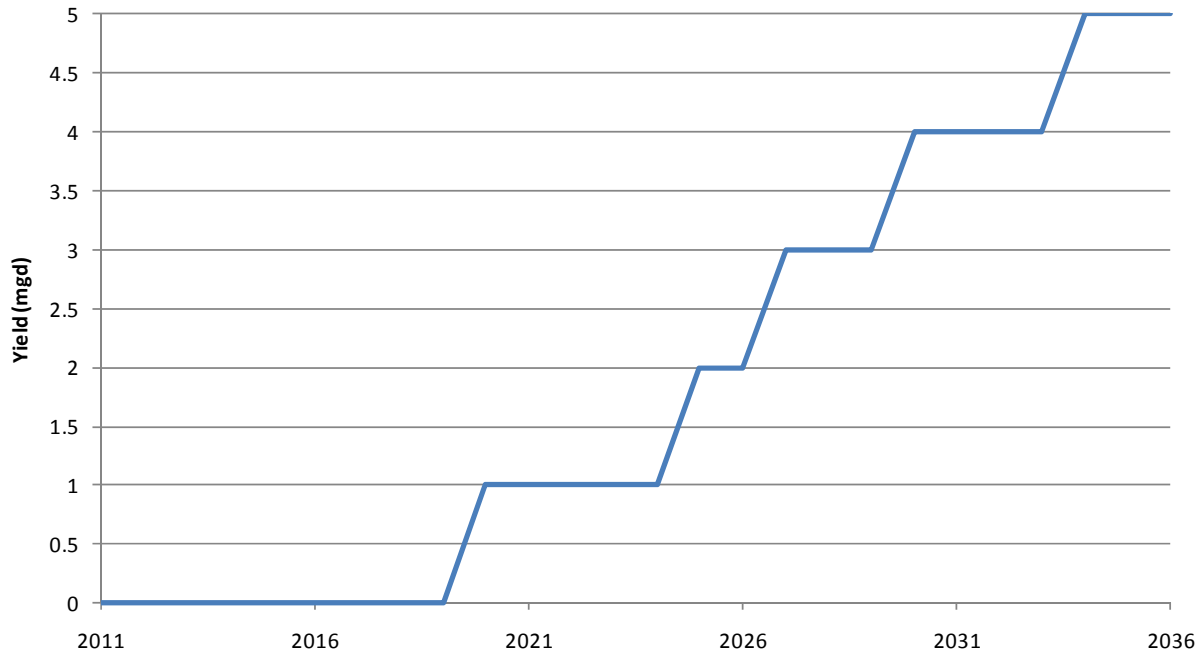


Figure 1: Phasing of the available yield provided by the intermediate aquifer to the South Grid

Cost:

Because the intermediate aquifer is shallower, the installation of new wells should be less expensive than those reaching the Floridan aquifer. Based on the JEA project definition for the intermediate aquifer pilot study/implementation, development of the new wells and integration into the wellfield would be approximately $1,950,000. O&M fixed costs were estimated as $28,000 per year while variable O&M was estimated as $61.37 per million gallons of water.

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

JEA Water Sewer Systems Planning (2012) "Intermediate Aquifer Pilot Study/Implementation – Project Definition". Prepared for JEA Capital Budget Planning. February 2012.

SDII Global Corporation (2010) "Preliminary Feasibility Investigation: Viability of the Intermediate Aquifer as a Water Source". Prepared for JEA. November 2010.

Non-Floridan Private Irrigation

Category: Water Supply Option

Brief Description:

This option involves construction of groundwater wells either in the surficial aquifer or the intermediate aquifer in order to supply irrigation water to private residences. This use would replace the Upper Floridan aquifer (UFA) supply currently being used to meet those demands. Two options are proposed: (1) converting those already on self-supply from the UFA to a different aquifer, and (2) wider scale adoption by moving current JEA customers to private irrigation wells.

Facilities Required:

The only facilities required will be the private wells.

Key Assumptions:

In determining the potential yield, 50% of residential demand was attributed to landscape irrigation for the customers currently on self-supply. For wider adoption, an estimate of 12,500 gallons/month/household was used.

Flexibility:

This option will improve the operational flexibility of JEA as the demand needs on the Floridan aquifer will be reduced, freeing the allocation to be used in other areas.

Environmental Impacts (Promote Environmental Sustainability):

The connectivity between aquifers is not well understood so withdrawing from the surficial aquifer could still have effects on the Floridan aquifer. Additionally, environmental impacts to wetlands in the vicinity of new surficial aquifer wells are possible.

Ease of Implementation:

There is minimal technical difficulty with this option; however, gaining participation from the public could be a challenge. Permitting could also potentially be a concern near wetlands or other wellfields.

Water Quality:

The water quality of the surficial aquifer should be adequate for irrigation needs. Testing will be recommended at individual well locations.

Yield:

Self Supply

Currently there are 665 domestic supply wells in Duval County with an estimated withdrawal of 3.3 mgd. By 2030 it is estimated that there will be an increase of 755 additional private domestic supply wells bringing the total withdrawal to 8.9 mgd. It is assumed that through incentives up to half of these private owners would switch to a non-Floridan supply. This switch is assumed to happen slowly over time as estimated in **Figure 1**. As currently modeled, the self-supply customers are assumed to be split with 50% in the North Grid and 50% in the South Grid.

Wider Adoption

For wider adoption of this supply, households not currently using a self-supply for irrigation needs would need to switch to self-supply from the surficial aquifer. It is estimated that up to 37,000 households could be converted accounting for 15 mgd of supply. This adoption was spread linearly over the 25-year period as shown in **Figure 1**. As currently modeled, the yield from wider adoption is assumed to be split with 50% in the North Grid and 50% in the South Grid.

Non-Floridan Private Irrigation

Category: Water Supply Option

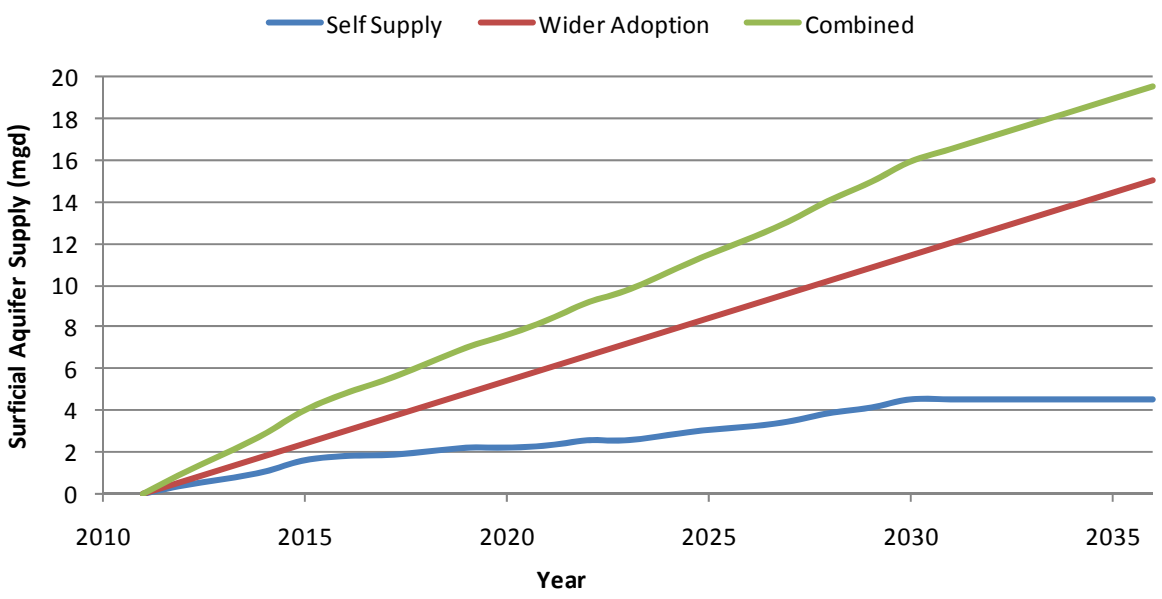


Figure 1: Projected yield per year

Cost:

Self Supply

Irrigation well replacement is estimated as $1,500 - $4,500 per well which includes the well, pump and electrical service. Assuming $3000 per well fully subsidized by JEA and 710 wells replaced (half of the total), capital costs would be $2.13 million. There would be no O&M costs as this would fall to the private homeowners.

Wider Adoption

For wider adoption the full cost of the wells would not need to be subsidized as the homeowners will have an additional financial incentive due to decreased water bills after switching to a self-supply. A subsidy of $500 would be provided. For 37,000 households this equates to a capital cost of $18.5 million. There would be no O&M costs as this would fall to the private homeowners.

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

JEA "Reclaimed Water Feasibility Study: Retrofit of Multiple High Water Use Neighborhoods along Existing Reclaimed Water Lines" Powerpoint Presentation.

Regional Surface Water Reservoir for Potable

Category: Water Supply Option

Brief Description:

This option consists of construction of an off-line storage reservoir on a tributary to the St. Johns River to store wet weather flow to be treated and used as potable supply. Three locations have been carried forward for consideration: Ortega River, Big Davis Creek, and Durbin Creek.

Facilities Required:

Facilities required include a river diversion, dam, reservoir, treatment plant, and connection to the distribution system.

Key Assumptions:

In determining the estimated reliable yield the maximum diversion rate was assumed to be 25% of the mean daily flow and a ratio of 1.5 was used from the diversion rate to the reliable yield.

Flexibility:

This option will add surface water as a previously unused source into the system.

Environmental Impacts (Promote Environmental Sustainability):

This option will remove water from the tributaries. There is no affect assumed on the aquifers.

Ease of Implementation:

It is unknown if contiguous parcels of adequate size are available near the withdrawal points to site the dams and reservoirs. Ortega would need approximately 20 acres of land, Big Davis would need 7 acres, and Durbin Creek would need 13 acres. Additionally, there could be push back from neighbors not wanting a reservoir near them or because the project would affect tributaries in their areas. Permitting of dams and reservoirs will likely be more difficult then permitting of other options.

Within the qualitative scoring, the surface water reservoirs were given a score of 4 for reliance on proven technology signifying that further investigation is needed to implement. A score of 3 was given for the ability to permit, signifying that it may be challenging to permit but precedents exist. A score of 3 was given to public acceptance signifying that it may be difficult to convince the public to accept the new water source

Water Quality:

All locations in the lower St. Johns River basin are listed as impaired water according to the 2008 LSJRB SWIM study. Thus there will be a definite need for treatment before use. Blending issues with the groundwater sources are unknown and pilot studies would need to be conducted. Customers receiving the surface water or blended water could notice a change in taste and perceived quality. Within the qualitative scoring, the surface water reservoirs were given a score of 4 for water quality signifying minimal blending issues.

Regional Surface Water Reservoir for Potable

Category: Water Supply Option

Yield:

The yield was estimated as a maximum reliable yield. Potentially more flow could be available during wet years but the maximum reliable yield is assumed as a constant in the model. The estimations were made based on USGS gages stations. The yield from each reservoir is assumed to come online in the specific start year all at once without any phasing. **Table 1** shows the yield from each reservoir as well as the grid to which it is assumed to contribute flow.

Table 1: Regional Reservoir Yields

Tributary	Max Reliable Yield (mgd)	Grid
Ortega River	6.7	North
Big Davis Creek	1.3	South
Durbin Creek	3.4	South

Cost:

Table 2 provides the estimated capital and O&M costs for each tributary as well as a separate cost for the land. Land costs were estimated at $320,000 per acre plus an additional 18% for land acquisition. The cost of land was added to the capital costs for input into the model.

Table 2: Estimate Costs in 2012 Dollars

Tributary	Capital Costs	Land	O&M Fixed Costs per Year	O&M Variable Costs per MG
Ortega River	$48,500,000	$7,500,000	$2,100,000	$572.48
Big Davis Creek	$20,400,000	$2,600,000	$660,000	$927.29
Durbin Creek	$33,800,000	$4,900,000	$1,260,000	$676.87

Citations:

CH2MHILL (2010) "2010 Alternative Water Supply Study" JEA. July 2010.

Indirect Potable Reuse

Category: Reuse Water Option

Brief Description:

This option consists of treating wastewater effluent from one or more of JEA's large wastewater treatment facilities to meet the requirements for indirect potable reuse or groundwater recharge. The reclaimed water produced from this type of facility would be used to directly recharge the drinking water source of the Floridan aquifer.

Facilities Required:

Direct injection wells for the reclaimed water would be required as would process upgrades to the wastewater treatment plants.

Key Assumptions:

A one-to-one ratio of injection to allowable withdrawal is assumed but can be changed in the model.

Flexibility:

This option provides more flexibility in the amount of water to be withdrawn from the Floridan aquifer.

Environmental Impacts (Promote Environmental Sustainability):

This option has the potential to improve aquifer sustainability. River quality may also be improved as less wastewater effluent will reach the river.

Ease of Implementation:

Public acceptance could be an issue for injecting reclaimed wastewater into a potable water source. Permitting a one-to-one offset may also be difficult. Within the qualitative scoring, indirect potable reuse was given a score of 2 for reliance on proven technology signifying that there is a precedent for use in the Southeaster US but known challenges. A score of 1 was given for the ability to permit, signifying JEA has no precedent and it is assumed to be difficult to permit. A score of 1 was given to public acceptance signifying that public acceptance is unlikely.

Water Quality:

Upgraded treatment at the WWTP will be needed to bring wastewater to indirect potable reuse standards. Within the qualitative scoring, indirect potable reuse was given a score of 3 for water quality signifying that some blending issues are to be expected.

Yield:

Various treatment capacities can be implemented within both the north and south grids ranging between 5 and 50 mgd. The amount of potential yield JEA can then utilize would be dependent on the permitted injection to withdrawal ratio which can be changed within the model.

Indirect Potable Reuse

Category: Reuse Water Option

Cost:

Table 1 provides estimated capital and O&M costs for a range of treatment capacities within both the north and south grids

Table 1: Indirect Potable Reuse Option Costs

	Treatment Capacity (mgd)			
	5	15	30	50
North Grid				
Capital	$98,000,000	$175,700,000	$295,800,000	$587,800,000
O&M Fixed Costs per Year	$1,280,000	$3,080,000	$5,400,000	$8,120,000
O&M Variable Costs per MG	$1052.05	$843.84	$739.73	$667.4
South Grid				
Capital	$101,600,000	$182,700,000	$309,800,000	$498,300,000
O&M Fixed Costs per Year	$1,280,000	$3,080,000	$5,400,000	$8,120,000
O&M Variable Costs per MG	$1052.05	$843.84	$739.73	$667.4

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

CH2MHill (2008) "JEA Total Water Management Plan". September 2008.

Keystone Lake Region Reuse

Category: Reuse Water Option

Brief Description:

This option consists of using reclaimed water from the Southwest WWTP to directly recharge the Floridan aquifer through direct injection. It is likely that there may not be sufficient reclaimed water available for recharge exclusively from the Southwest WWTP since average wastewater flows at this facility (as of December 2010) were approximately 8.8 mgd. Therefore, it may be possible to augment the reclaimed water supply with surface water from the Ortega River, which is located in close proximity to this facility.

Facilities Required:

Either rapid infiltration basins or direct injection wells will be required along with process upgrades to the Southwest WWTP as well as treatment of the surface water at Ortega. New pipelines will also be required to distribute the flow between the injection wells.

Key Assumptions:

A one-to-one injection to withdrawal ratio is assumed but can be changed in the model.

Flexibility:

This option provides more flexibility in the amount of water to be withdrawn from the Floridan aquifer.

Environmental Impacts (Promote Environmental Sustainability):

This option has the potential to improve aquifer sustainability. There will be impacts to the Ortega River if used to augment the wastewater effluent.

Ease of Implementation:

Public acceptance is a likely issue for injecting reclaimed wastewater into a potable water source. Additionally, there will be similar public issues as for the regional surface water reservoirs with use of the Ortega River. Permitting a one-to-one offset may also be difficult. Within the qualitative scoring, Keystone Lake regional reuse was given a score of 2 for reliance on proven technology signifying that there is a precedent for use in the Southeaster US but known challenges. A score of 1 was given for the ability to permit, signifying JEA has no precedent and it is assumed to be difficult to permit. A score of 1 was given to public acceptance signifying that public acceptance is unlikely.

Water Quality:

Upgraded treatment at the WWTP will be needed to bring wastewater to indirect potable reuse standards. The effects of blending reclaimed water, surface water, and groundwater sources together is unknown. Within the qualitative scoring, Keystone Lake regional reuse was given a score of 4 for water quality signifying minimal blending issues expected.

Yield:

A total yield of 15 mgd can be achieved if 8.8 mgd from the Southwest WWTP is utilized along with 6.7 mgd from the Ortega River. This option is thus not able to be combined with a regional surface water reservoir on the Ortega River since that would double count use of the Ortega River water.

Keystone Lake Region Reuse

Category: Reuse Water Option

Cost:

Capital costs for this option were estimated at $177,500,000 along with fixed O&M costs of $2,000,000 per year and variable O&M costs of $365.3 per million gallons of water.

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

Regional Reuse

Category: Reuse Water Option

Brief Description:

This option increases the supply of available reclaimed water throughout the whole St. Johns River Water Management District. Three different scales of options were considered: (1) increasing reclaimed water availability with a max capital expenditure of $300 million; (2) achieving 60 percent reuse from wastewater effluent; and (3) achieving 75 percent reuse from wastewater effluent. A fourth scenario of 100 percent reuse was also considered in the base report, but this has not been included in the model since the yields as described were not available based on the most recent wastewater projections.

Facilities Required:

Treatment plant expansions would be required to bring the wastewater effluent to reclaimed quality. Additionally pump stations, pipeline, storage facilities, and rapid infiltration basins would be required to make use of the new resources feasible.

Key Assumptions:

The yields and costs for this option are set up based on the 2008 "Lower St. Johns River Reuse and Treatment Project" report. The exact percentage targets of 60 and 75 may no longer be accurate percentages based on the latest wastewater projections but the terminology has been maintained.

Flexibility:

Increased availability of reclaimed water will allow JEA to meet the reuse requirements for increases in the CUP allocations.

Environmental Impacts (Promote Environmental Sustainability):

There would be a beneficial impact to the quality of the St. Johns River with less wastewater effluent disposal. The estimated percentage reduction in total nitrogen to the river from the different scenarios is 24%, 43%, and 68% respectively.

Ease of Implementation:

Projects of this size and requiring coordination with both Clay County Utility Authority (CCUA) and the St. Johns County Utility District (SJCUD) will make implementation more difficult.

Water Quality:

Upgraded treatment at the WWTP will be needed to bring wastewater to indirect potable reuse standards.

Yield:

Within the Lower St. Johns River Reuse and Treatment Project, a series of scenarios were studied based on the percentage of wastewater effluent moved to reclaimed quality. **Table 1** provides the increased reclaimed water flows available under the four scenarios for the north and south grids. As well as the potable offset calculated for each scenario. In is assumed that this potable offset is for the whole region including the CCUA and SJCUD service areas. Within the model the percentage of the total offset available to JEA is set at 50% but can be adjusted. The percentage split of JEA's portion of the offset is split between the North and South Grids based on the ratio of increased reclaimed water availability per grid for the given scenario.

Regional Reuse

Category: Reuse Water Option

Table 1: Reclaimed Water Increased Availability (mgd)

Scenario	North Grid	South Grid	Total Potable Offset for Region (MGD)
$300 Million Max	19	4	42
60% Reuse	27	14	61
75% Reuse	43	13	64

Cost:

Within the Lower St. Johns River Reuse and Treatment final report, costs for each scenario were provided for treatment facilities, pipeline, pump stations, storage reservoirs, and rapid infiltration basins. Within **Table 2** the estimated total costs of each scenario is provided along with JEA's estimated portion. Assumptions used in determining JEA's portion include the following:

- Costs of treatment facilities upgrades were broken down by facilities and those facilities within JEA's service area were included as part of the costs. Facilities within SJCUD or CCUA were not included.
- Only a total cost for pipeline improvements was provided. However, a listing of the linear-feet of pipe within each service area was given. The percentage of the pipeline cost attributed to JEA was proportional to the percentage of the linear-feet of new pipe within its service area.
- New storage reservoirs were listed based on the service area within which they were planned for construction. Only costs for the reservoirs within the JEA service area were included.
- The cost of the rapid infiltration basins was provided as a single cost with the facilities to be utilized by all three utilities. JEA's percentage of the costs was based on the percentage of the total projected wastewater flow for the region in 2030. JEA is projected to produce 75% of the flow so 75% of the cost for the infiltration basins was assigned to them. CCUA is projected to produce 18% and SJCUD 7% of the flow.

Table 2: Scenario Costs

	Capital	O&M Fixed per Year	O&M per MG	O&M Total
$300 Million Total Expenditure				
Total for Region	**$304,000,000**			**$8,000,000**
JEA Total	**$157,400,000**	**$2,200,000**	**$262.06**	**$4,400,000**
60% Reuse Target				
Total for Region	**$515,000,000**			**$14,000,000**
JEA Total	**$302,200,000**	**$3,700,000**	**$247.24**	**$7,400,000**
75% Reuse Target				
Total for Region	**$780,000,000**			**$18,000,000**
JEA Total	**$479,000,000**	**$4,950,000**	**$242.17**	**$9,900,000**

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

CH2MHill (2008) "Lower St. Johns River Reuse and Treatment Project; Phase II: Combined East and West River Reuse Initiative Solutions". Prepared for St. Johns River Water Management District, JEA, St. Johns County Utility Department, and Clay County Utility Authority. September 2008.

Targeted Reuse

Category: Reuse Water Option

Brief Description:

This option consists of using available reclaimed water for the specific targeted uses of: (1) replacing the Stone Container Corporation's use of potable water with reclaimed water in their commercial processes; (2) use of reclaimed water from the Arlington East facility for groundwater salinity management; (3) providing reclaimed water to 'water hogs' (large residential users) in the south grid.

Facilities Required:

New reclaimed water lines would be required as well as injection wells for the salinity management option.

Key Assumptions:

The cost of increased treatment capacity to produce the reclaimed water is not included under this option. The sub-options are instead potential methods to use reclaimed water already available.

Flexibility:

Use of reclaimed water allows for a potable water offset and will potentially trigger increases in the CUP allocations if total reclaimed water use targets are achieved.

Environmental Impacts (Promote Environmental Sustainability):

This option will improve river quality through increasing the use of wastewater effluent. Aquifer sustainability will also be positively affected due to less reliance on groundwater.

Ease of Implementation:

Public acceptance could be an issue for injecting reclaimed wastewater into a potable water source. Also there is no guarantee that residential clients will use the reclaimed water once it is made available.

Water Quality:

There are no blending issues within the distribution system since the reclaimed water will be kept separate from potable sources under all options.

Yield:

The yields for the various sub-options are described below.

1. The Stone Container Corporation currently uses 8.8 mgd from the local aquifer. The nearest reclaimed water line is served from the Cedar Bay facility. Currently this facility produces 5 mgd of flow; however, accounting for other users only 3.3 mgd would currently be available for use by the Stone Container Corporation. This could be increased if other options are enacted increasing the available reclaimed supply.
2. The salinity barrier option was planned to provide 5 mgd of potable offset. A conservative injection to withdrawal ratio of 1.5 was used, meaning 7.5 mgd of treated and injected water would be required.
3. As part of a Reclaimed Water Feasibility Study, bringing reclaimed water to the four high use areas of Queen's Harbor, Deerwood, Hidden Hills, and Glen Kernan was studied. Based on the population of each community, the percentage of customers currently with irrigation meters and the average water use per irrigation meter a total value of 1.05 mgd was calculated for potential reclaimed use.

Targeted Reuse

Category: Reuse Water Option

Cost:

The costs assumptions for each option are described below and capital and O&M costs summarized in **Table 1**.

1. The costs for source replacement at the Stone Container Corporation includes filters and high level UV disinfection for the 3.3 mgd of flow as well as additional pumping and piping to transport the water.
2. The costs for the salinity barrier included low pressure RO, high level UV disinfection, pumping, piping, and 18 injection wells.
3. An estimate of $20 million is currently being used as the capital cost to expand the reuse system into high use residential areas. This is loosely based on the piping costs developed for the salinity barrier option and was verified by the Reclaimed Water Feasibility presentation.

Table 2: Estimate Costs in 2012 Dollars

Sub-Option	Capital Costs	O&M Fixed Costs per Year	O&M Variable Costs per MG
Stone Container Corp	$27,600,000	$250,000	$232.46
Salinity Barrier	$94,000,000	$276,000	$226.85
Water Hogs	$20,000,000	$300,000	$78.28

Citations:

CDM (2011) "2011 Alternative Water Supply Evaluation and Implementation Plan" JEA. August 2011.

CH2MHill (2008) "JEA Total Water Management Plan". September 2008.

JEA "Reclaimed Water Feasibility Study: Retrofit of Multiple High Water Use Neighborhoods along Existing Reclaimed Water Lines" Powerpoint Presentation.

Conservation

Category: Demand Management

Brief Description:

This option involves reducing demand through conservation efforts.

Facilities Required:

No significant new facilities would be required.

Key Assumptions:

It is assumed that conservation will follow the same seasonal pattern as demand with more potential for conservation in the summer than the winter months.

Flexibility:

Operational flexibility can be improved if conservation can reduce peak demand needs as well as delay the need for additional sources.

Environmental Impacts (Promote Environmental Sustainability):

This option will improve the efficiency of water use within the JEA system. There are no assumed impacts on the river and positive benefits to the aquifer through reducing demand.

Ease of Implementation:

This option depends on public participation.

Water Quality:

There are no water quality considerations.

Yield:

The proposed conservation targets in the CUP were taken as the medium conservation scenario. The pattern proposed included a sharp increase in conservation between 2012 and 2016 followed by a milder rate of increase in the following years. This same pattern was adjusted to form the low and high conservation scenarios. For the low conservation scenario, the original sharper increase was kept to half the original value followed by the same milder rate of increase as the medium scenario. For the high conservation scenario, the same initial jump in conservation as the medium scenario was used followed by a rate of conservation double that of the medium scenario in the following years. All these patterns can be seen in **Figure 1** and are able to be adjusted within the model. There is also the option for no conservation programs to be implemented.

The total conservation targets are split between grids proportionately based on the 2036 demand. The default percentage of the total conservation assigned to each grid is provided in **Table 1.** This can be adjusted within the model interface.

Table 1: Percentage of Conservation per Grid

Grid	Percentage
North	39%
South	57%
Ponte Vedra	1%
Ponce de Leon	0.3%
Lofton Oaks	3%
Mayport	0.1%

Conservation

Category: Demand Management

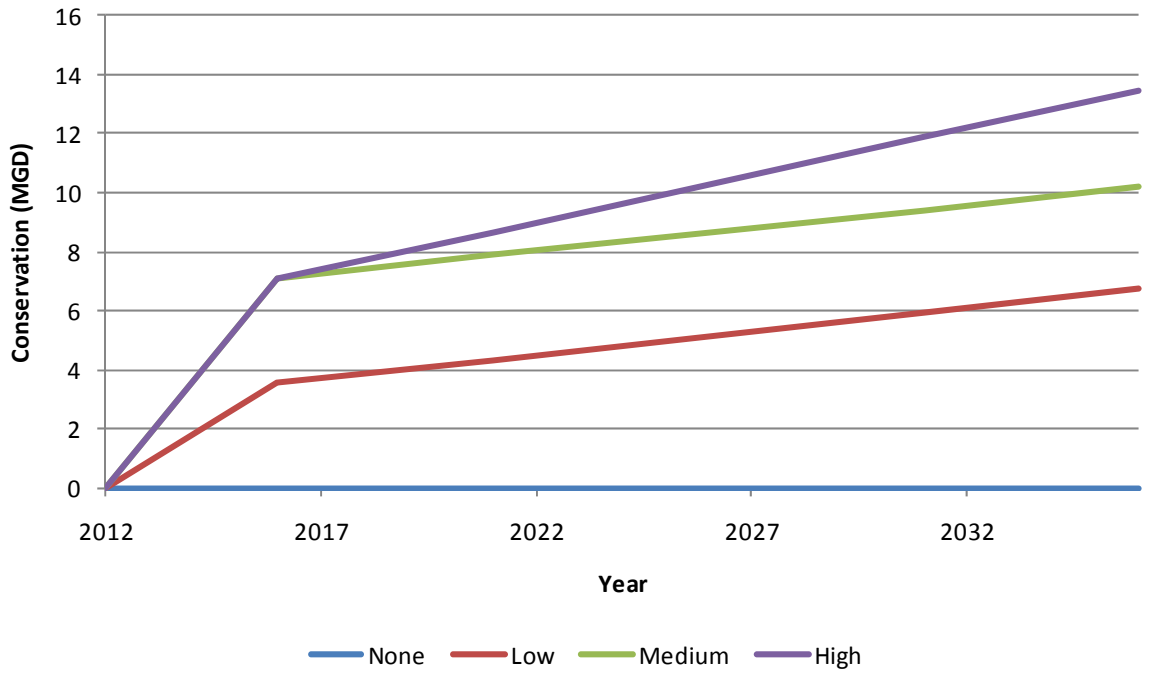


Figure 1: Levels of Conservation

Cost:

Since no infrastructure is required, the cost of the program is through education and outreach on the importance of conservation and methods to reduce water use within the home. For the low level, costs are assumed to be $500,000 a year, for the medium level $750,000, and for the high level $1,000,000 per year.

Citations:

CDM (2012) "Water Demand Forecast & Gap Analysis for the JEA Integrated Water Resource Planning Project" Prepared for JEA. April 2012.

Reduce Non-Revenue for Water

Category: Demand Management

Brief Description:

This option reduces non-revenue for water within the current system through leak reduction and other measures.

Facilities Required:

No significant new facilities would be required.

Key Assumptions:

JEA has an Infrastructure Leakage Index of 4.1 which puts it in the category which should evaluate the costs of water resources relative to the cost of a loss control program. However, the South and Ponce De Leon Grids have higher rates of unaccounted for water and a leak detection program is a requirement of the CUP allocation.

Flexibility:

This option will improve operational flexibility through reduction of wasted water.

Environmental Impacts (Promote Environmental Sustainability):

This option will improve the efficiency of water use within the JEA system. There are no assumed river or aquifer impacts.

Ease of Implementation:

A leak detection program should be easy to implement.

Water Quality:

There are no water quality concerns.

Yield:

Data from 2011 shows 17.89 mgd of non-revenue water. Assuming that at the maximum 50% of the losses can be addressed through leak reduction programs, there would be 8.9 mgd in water savings. However, 5 mgd was considered a more reasonable goal and is the initial default value within the model. Currently this value is split with 80% of the savings in the North Grid and 20% of the savings in the South Grid.

Reduce Non-Revenue for Water

Category: Demand Management

Cost:

Placeholder values of $5 million in initial capital costs and $1 million in fixed yearly O&M are included in the model for reducing non-revenue water. There is assumed to be no variable O&M. These values should be refined as more information becomes available.

Citations:

CDM (2012) "Water Demand Forecast & Gap Analysis for the JEA Integrated Water Resource Planning Project" Prepared for JEA. April 2012.

CDM Smith

cdmsmith.com

EXHIBIT _____
JEA RFP NO. 156-18 CONTRACT
ENGINEERING SERVICES
FOR
Integrated Water Resource Plan (IWRP)

This Exhibit, when executed, shall be incorporated in and become part of the CONTRACT (RFP NO. 156-18) between JEA (OWNER), and CDM Smith Inc. (CONSULTANT), dated _____, 2019 for Integrated Water Resource Planning.

PROJECT BACKGROUND

The intent of the OWNER is to develop a holistic, comprehensive, integrated and sustainable plan and schedule for managing the supply, production, treatment, transmission, and delivery of OWNER's water supply for the next 50 years (to Year 2070).

OWNER is seeking options for the next beneficial incremental water supply and to increase the system flexibility and resiliency. The CONSULTANT will develop an Integrated Water Resource Plan (IWRP) and a Demand Side Management (DSM) study ("Project") which will consider in detail the alternatives for OWNER's future water supply and conservation program. It is essential that the IWRP and DSM Plan be sustainable, cost-effective, permittable, defensible and protect the local water resources.

As part of this Project the OWNER desires the CONSULTANT to develop recommendations, strategic goals, and include near-term & long-term actions to develop, manage and sustain OWNER's water resources.

The development of the scope of work of this CONTRACT is based on the introductory meeting held between OWNER management and staff, and CONSULTANT. At this introductory meeting, overall project goals for the JEA Integrated Water Resources Plan (IWRP) were established, as well as critical success factors.

The JEA IWRP project goals are as follows:

- Provide surety/certainty for OWNER's long-term water supply needs over the next 50-years
- Maximize the use of reclaimed water and minimize wastewater discharges to the river
- Demonstrate that IWRP recommendations are aligned with OWNER's four corporate measures: Financial, Environmental, Customer, and Community Impact; and will provide for continued supply reliability for next 50 years
- Develop a targeted and cost-effective Demand-Side Management (DSM) strategy, which includes specific recommendations for program implementation including required administration and management
- Develop specific recommendations for water supply projects, with implementation schedules for the next 5, 10, and 20 years

SCOPE OF WORK

Task 1 – Develop IWRP Evaluation Framework and Objectives

To help ensure that the IWRP and its recommendations are defensible and well-supported, it is important to develop an Evaluation Framework at the onset of the project that is mutually agreed to by OWNER and CONSULTANT. The Evaluation Framework will provide: (1) the overall methodology on how alternatives will be analyzed, compared and ranked; (2) details key planning assumptions regarding hydrologic period of record, financial parameters, range of population projections, and future climate scenarios; and (3) definition of IWRP objectives and performance measures used for evaluating alternatives. The Evaluation Framework will be used to support Tasks 8, 9 and 10 of this scope of work.

Objectives and performance measures are defined as:

- Objectives: Represent the major goals for the IWRP in broad, understandable and distinctive terms. Objectives will be defined to easily communicate the goals of the IWRP to all internal/external stakeholders. Examples of objectives might include ensure supply and system reliability, achieve cost-effective solutions, reduce risk and uncertainty, improve water quality, and protect environment. ONWER and CONSULANT to work together to develop approximately 6–10 objectives and weigh them in terms of relative importance.

- Performance Measures: For each objective, one or several performance measures will be established, with the goal of establishing as many quantitative measures as feasibly possible. Where quantitative measures cannot be established, qualitative measures using best engineering judgment will be supplemented. Examples of performance measures might include life-cycle cost, probability of water shortages, likelihood of permitting hurdles, or environmental impacts.

CONSULTANT will participate in the following meetings with the OWNER to develop the IWRP Evaluation Framework and finalize the objectives and performance measures:

Meetings:

- One project kick-off meeting with OWNER members and key consultant staff to develop evaluation framework and draft objectives.

- One follow-up conference call with OWNER to review final draft recommendations for objectives and evaluation framework

- One conference call with OWNER to finalize objectives and evaluation framework

Deliverables:

- Technical memorandum (TM) on IWRP evaluation framework and objectives

Task 2 – Review OWNER Reports and Collect Data

CONSULTANT will review relevant past studies, reports and plans prepared for OWNER. Consultant will request specific data, models and information from OWNER, and will collect other supporting data required for the IWRP.

Meetings:

- One conference call with OWNER to go over requested data from OWNER

Deliverables:

- Data log sheet

Task 3 – Conceptualize Supply Options

CONSULTANT will fully leverage OWNER past studies, reports and plans to develop a preliminary list of feasible water supply options. CONSULTANT will augment any information gaps or identify up to two other supply options that were not previously evaluated by OWNER. At the outset of this task a complete list of potential water supply options will be reviewed with the OWNER for consideration and selection for evaluation. Upon the conclusion of this review, the list of potential water supply options will be finalized by the OWNER and used as the basis for consultant conceptualization. For scoping purposes, a total of eleven (11) supply options will be conceptualized from existing OWNER reports and studies and two (2) other supply options that were not previously evaluated by the OWNER will be developed by the CONSULTANT, with guidance given by the OWNER. The likely eleven (11) supply options preliminarily selected for conceptualization are listed below:

Preliminary Screening of 2019 JEA IWRP Supply Options for Evaluation
Additional Traditional Floridan Groundwater (Assumes CUP SCs Are Met)
Indirect Potable Reuse via Groundwater Recharge
Desalination: Brackish Groundwater
Desalination: Lower St. Johns River near NSGS (seawater quality)
Desalination: Upper St. Johns River (brackish quality)
Regional Surface Water Reservoir for Potable Water Supply
Regional Surface Water Reservoir for Irrigation Water Supply
Non-Floridan Source Private Irrigation
Direct Potable Reuse (Targeted Large Industrial Users for Potable Offset)
Distributed Stormwater Collection for Supplemental Reclaimed or Direct Irrigation
Distributed Stormwater Collection for Potable Use

Each supply option for consideration in the IWRP will be conceptualized in terms of:

1) Project description, potential siting/locations within OWNER service area, and identification of key facility components (e.g., treatment, distribution, pump stations, storage)

2) Project yield and potential hydrologic variation in yield

3) Project capital cost estimate

4) Project O&M cost estimate

5) Water quality attributes, permitting/regulatory ease, customer acceptance, distribution system integration challenges, and other attributes (e.g., environmental benefits, social benefits, etc.)

Meetings:

- One conference call with OWNER to go over preliminary list of supply options
- One conference call with OWNER to finalize list of supply options

Deliverables:

- Preliminary list of supply options
- TM that summarizes conceptualized options, with key attributes

Task 4 – Spatial Forecast of Water Demand

CONSULTANT will utilize OWNER's existing water demand forecast and population projections for its service area as the basis for spatially disaggregation into specific planning neighborhoods, which will be required for hydraulic analysis of water supply options (Task 5) and evaluation of DSM measures (Task 7). The disaggregated demand forecast will be calibrated to water production and customer sales (billing) data by the grid networks. Population projections will be used to project water demand by sector and neighborhood to the year 2070. This task includes close coordination and iterative collaboration between the OWNER and the CONSULTANT's Demographer sub-consultant, CONSULTANT's DSM Expert and Hydraulic Engineer, as outlined below:

1) The DSM Expert, Demographer and OWNER will work together to define neighborhood boundaries and evaluate them based upon property appraiser data, census data and geocoded customer billing data. Neighborhood averages of characteristics such as percent residential/commercial/industrial, development density/ lot size, age of housing and development, values of land and buildings, unit occupancy, persons per household, household income, planned development/redevelopment and water use by customer type will be used to delineate neighborhoods into relatively homogenous groupings. Neighborhood delineations will be reviewed with OWNER staff. If possible, neighborhoods may be classified into a limited number of higher-level classifications for DSM planning, such as "large lot, affluent residential", "older, high density residential", "light commercial", etc. The definition of the higher-level classifications will likely evolve from analysis of the data and be defined in collaboration with OWNER staff.

2) The Demographer will use available geocoded customer data to develop representative water use factors by sector per neighborhood. Sectors may include residential, commercial and industrial users or may be further defined as single-family, multifamily, commercial, industrial, recreation, and irrigation water use depending upon the clarity of customer data. The DSM Expert will review the water use factors for anomalies and a reasonable range of factors, including recommendations for updating and refining, as needed. Final definition of sectors will be developed in collaboration with OWNER staff. A water use factor per unit will be estimated for each sector for each neighborhood. The 'units' may be population, acreage or square footage depending upon the sector definition. It is noted that not all OWNER water

customer accounts have been geocoded and therefore it will be necessary for the CONSULTANT to approximate a geocode for those accounts that are not currently geocoded.

3) The DSM Expert will use the sector water use factors and current population, acreage or square footage by neighborhood to estimate current water use by sector by neighborhood. The estimated current water use by neighborhood will be compared with current consumption (sales) data and the existing demand forecast at either the neighborhood or grid level for calibration of the water use model. The current water use by sector and neighborhood will be formatted by the DSM Expert as an input for the Task 6 analysis of current water use by sector and neighborhood by end use. Differences in current water use across neighborhoods within the same customer sector will provide the basis for developing DSM targets by sector and neighborhood. The high-level classification information by neighborhood will be used by the DSM Expert to develop DSM target characteristics.

4) Current (January 2018) population projections for the OWNER service area from 2020 to 2045 will be expanded to 2070 and updated with the latest county population forecasts from BEBR by the Demographer. This includes developing forecasts of both population and non-residential development for Duval, St. Johns, Nassau and Clay Counties using its GIS-based, parcel-level models. Because population models were developed for OWNER as recently as 2017, some elements of those models will be leveraged for efficiency. Updated property appraiser and planned development data will be used to capture new development, and the models will be extended in five-year increments to 2070. The population forecasts will be controlled to the county-level forecasts from the Bureau of Economic and Business Research (BEBR), which are the official state numbers. Those county-level forecasts will also be extended from 2045 to 2070 in consultation with BEBR's lead demographer. Non-residential development will be forecasted for the first time, and it will be done based on a combination of historical trends and future land use data. This forecast will also be extended to 2070 in five-year increments. Recent trends in nonresidential development by neighborhood will be used to extrapolate from the current nonresidential development to a forecast of 2070 development using Future Land Use data. Thus, a projected set of sector units will be developed for each neighborhood to 2070 in five-year increments.

5) The DSM Expert will input the sector water use factors and projected sector units into a Microsoft Excel spreadsheet model to estimate the future water consumption by sector for each neighborhood from 2020 to 2070. Estimates of system losses (i.e., non-revenue water or unaccounted-for water) by grid network will be determined and system loss will be added to the water demand of each neighborhood. Summaries and averages by customer grouping will also be developed to help guide DSM planning.

6) The Hydraulic Engineer will review the spatial characteristics of the water demand forecast as it pertains to high-level hydraulic modeling of supply options in Task 5.

Meetings:

- One conference call with OWNER to discuss key assumptions for water demand forecast
- One meeting with OWNER to present water demand forecast

Deliverables:

- TM that summarizes water demand forecast
- Spreadsheet/database with detailed, spatially allocated forecast of water demands

Task 5 – High-Level Hydraulic Analysis of JEA Water/Reclaimed Water Distribution System

Using OWNER's existing hydraulic models, CONSULTANT will analyze current groundwater and recycled water sources under several scenarios of future peak water demands (based on 5, 10 and 20-year forecasts) to determine major system deficiencies and/or constraints in delivery of water to customers. Specifically, this analysis will include simulations of the existing systems with superimposed future demands to determine the extent of areas in each system where the desired customer level-of-service (e.g. supply volume, system pressures) cannot be met.

The analysis of OWNER's water and recycled water distribution system will be used to refine the supply options conceptualized in Task 3, by correlating potential supply points to areas of need. The hydraulic analysis will then be used to screen supply alternatives by determining what storage and transmission facilities (approximate length and size of pipelines, need for pump stations, and diurnal storage for the supply options) will be needed based on defining the needs by either mid-term needs (10-years or less) or long-term needs (greater than 10-years out). These screening analyses will consider both delivery and the net supply throughput by considering impacts on other supplies (e.g., does a new supply cause other existing supplies to deliver less flow due to changes in system hydraulics). Additionally, the results of this task are used by the CONSULTANT in support of developing future conceptual capital and O&M costs related to supply options and developing the portfolio of alternatives that will be evaluated in subsequent tasks.

It should be noted this task represents a high-level hydraulic analysis for refined conceptualization of water supply alternatives and not intended for detailed distribution system analysis that is typically used for master planning.

Meetings:

- One conference call with OWNER to discuss OWNER hydraulic models and system assumptions
- One conference call with OWNER to present findings from hydraulic analysis

Deliverables:

- TM that summarizes hydraulic analysis

Tasks 6 – Assessment of Current Water Use Efficiency, Future Passive Conservation and End Use Model of Water Demand

Using a combination of OWNER billing data by sector (e.g., single-family, commercial, industrial, etc.), parcel level data that was used in Task 4, census data, and literature and research studies on end uses of water, consultant will breakdown OWNER's sector water use data into major end uses

such as toilet flushing, clothes washing, landscape irrigation, food processing, industrial processing, and others. This information will also be used to estimate the current levels of water use efficiency.

This task includes the CONSULTANT providing support to the OWNER who will conduct a customer survey to obtain information on water use practices and attitudes towards water conservation. This survey will help improve the assessment of current levels of water use efficiency and willingness to participate in future OWNER DSM programs that may be recommended as part of this project. The survey and analysis of survey results will need to be completed before this task begins. The cost proposal outlined in the budget section below includes support from the CONSULTANT to develop the survey, working with OWNER, and with OWNER administering the online survey. The target survey objective is to survey up to 1,500 JEA Customers. The survey task includes the CONSULTANT drafting the survey, reviewing the draft survey with the OWNER, and the CONSULTANT finalizing the survey questions and summarizing and reviewing the results of the survey with OWNER. OWNER would be responsible for administering the survey and providing the survey results to the CONSULTANT, so the CONSULTANT can summarize the results.

CONSULTANT will estimate future passive water conservation for OWNER's service area. Passive conservation is defined as that which is expected to occur from adherence to federal and state plumbing codes. As new development occurs, it is expected that per home/per business water use will be lower than existing development due to toilets, showerheads and urinals being more water efficient per plumbing codes. It is important to reflect future passive conservation in the demand forecast because it will provide a better indication of where targeted DSM measures should be implemented.

A spreadsheet DSM model of end uses will be developed in this task. The DSM model will be used to determine the remaining potential for DSM measures, spatially within OWNER's service area. This will help ensure that the overall DSM Program is targeted to where the biggest potential conservation savings are for areas that also have water supply (including reclaimed supply) constraints.

Meetings:

- One conference call with OWNER to discuss assumptions for the DSM model
- One meeting with OWNER to present DSM model and passive conservation savings estimate
- Two meetings to review the draft online survey and review the results of the survey

Deliverables:

- Spreadsheet DSM model
- Draft write-up of the OWNER customer survey, execute an online OWNER customer survey and summarize the results and present results to OWNER

Task 7 – Evaluation of Future DSM Measures and Development of DSM Strategy

The DSM model of end uses developed in Task 6 will be used to evaluate the water conservation savings, cost-effectiveness and benefits to OWNER of future DSM measures. To this end,

CONSULTANT will utilize its past experience in evaluating DSM measures, with focus on those measures that are technologically superior and proven to work (e.g., smart irrigation systems tied to weather stations). This experience will be augmented by literature of emerging trends and OWNER-specific information on customers. CONSULTANT will also estimate the economic benefit of implementing future DSM measures to OWNER in terms of reduced water treatment and delivery costs, deferment of large capital infrastructure, and potential rate impacts to customers (if any). Several metrics will be used for cost-effectives such as net present value, levelized unit cost, and internal rate of return.

To estimate "representative" administrative/implementation costs for OWNER's DSM Program, consultant will conduct an informal survey of water conservation managers around the country. Further, consultant will assess likely implementation challenges and/or customer acceptance issues regarding future DSM measures. Each future DSM measure will be ranked in terms of overall cost-effectiveness, economic benefit to OWNER, and implementation challenges.

CONSULTANT will deliver to OWNER a DSM Strategy Report that has the following components:

1. Recommended list of DSM measures with targeted location and timing for implementation, anticipated water savings, recommended inventive levels, and overall cost-effectiveness ranking.

2. Representative administrative cost and required management for overall DSM program, including different options for turn-key vendors to administer the program.

Meetings:

- One conference call with OWNER to discuss potential DSM measures
- One conference call with OWNER to present draft findings of ranking DSM measures
- One meeting with OWNER to present final ranking of DSM measures and summarize recommendation for overall DSM Strategy

Deliverables:

- TM that summarizes the evaluation of DSM measures and provides recommendations for overall DSM strategy

Task 8 – Update OWNER's IWRP Model

CONSULTANT will update OWNER's IWRP model, developed using the STELLA systems software in 2012, using the information from previous tasks of this project. The IWRP model represents OWNER's water, wastewater and recycled water by service zone. The model runs quickly and allows for alternatives to be evaluated in a more holistic, interconnected manner.

Alternatives, representing combinations of supply and demand-side management options, can be developed on the fly with the IWRP model and tested under different planning scenarios of demand growth, climate and other factors.

The IWRP model presents the following output:

- Reliability of water and recycled water system in meeting future water demands
- Identification of major conveyance and treatment capacity needs in the future
- Levelized unit costs

Meetings:

- One conference call with OWNER to discuss potential gaps in need using the IWRP model without new investments

Deliverables:

- Updated IWRP model with a Technical Memorandum that summarizes the updates that were made to the existing model.

Task 9 – Develop and Analyze Alternatives

CONSULTANT will work closely with OWNER to identify up to five initial integrated alternatives, representing combinations of various supply and demand-side management options. These integrated alternatives will be developed around themes, such as: high resiliency, lower-cost, higher adaptability, higher sustainability, etc.

CONSULTANT will use the IWRP model to analyze the performance of the initial integrated alternatives and then use a multi-criteria decision software called Criterium Decision Plus, to rank the alternatives by the objectives developed in Task 1.

Based on the results of evaluating the initial integrated alternatives, consultant will work with OWNER to develop up to three (3) hybrid alternatives that take the best elements from the initial alternatives. The intent is to create super performing alternatives that can be tested. The IWRP model and use of the decision software will be used to rank the hybrid alternatives.

Meetings:

- One conference call with OWNER to develop the initial integrated alternatives
- One conference call with OWNER to present results of evaluation the initial alternatives
- One conference call with OWNER to develop hybrid alternatives
- One meeting with OWNER to present results of ranking hybrid alternatives

Deliverables:

- TM summarizing the ranking of alternatives

Task 10 – Test Alternatives Under Uncertainty and Develop Recommendations

The top two performing alternatives from Task 9 will be tested under a range of uncertainty using scenario planning. Anticipated scenarios might include: (1) baseline growth with historical climate; (2) higher growth with historical climate; and (3) higher growth with warmer/drier future climate.

CONSULTANT will analyze the results and develop draft recommendations for implementation of specific water supply projects and DSM programs for short-term, mid-term, and long-term planning horizons. For the short-term horizon, CONSULTANT will recommend timing and location of specific water supply projects and DSM programs for 5, 10, and 15 years. This will also include "conceptualized" construction cost estimates. Because the future becomes more difficult to anticipate after 15 years, CONSULTANT will identify triggers for OWNER to monitor for longer-term implementation of projects and programs. Triggers might include: (1) levels of population growth; (2) performance of OWNER under existing CUP; (3) potential changes to the CUP; and (4) changes in long-term climate. These triggers can be used by OWNER for adaptive management and implementation of projects and programs for the long-term planning horizon after 15 years.

Meetings:

- One conference call with OWNER to develop planning scenarios and assumptions
- One conference call with OWNER to present draft recommendations for 5, 10, and 15-year implementation of projects and programs
- One meeting with OWNER to present final recommendations with adaptive management

Deliverables:

- TM summarizing the IWRP recommendations

Task 11 – Prepare IWRP and DSM Reports

CONSULTANT will prepare the IWRP and DSM reports, using the TMs and other information from the previous tasks. CONSULTANT will work with OWNER to determine the format of these reports.

A first draft of the IWRP and DSM reports, representing and 80% completion, will be delivered to the OWNER for review. CONSULTANT will incorporate comments from the OWNER and prepare a final draft of the IWRP and DSM reports for OWNER review. CONSULTANT will incorporate comments from the OWNER and prepare the final reports.

Meetings:

- One conference call with OWNER to review comments on first draft reports of IWRP and DSM
- One conference call with OWNER to review comments on final draft reports of IWRP and DSM

Deliverables:

- First draft reports for IWRP and DSM
- Final draft reports for IWRP and DSM
- Final reports for IWRP and DSM

Task 12 – Project and Quality Management

Activities performed under this task consist of those general functions required to maintain the project on schedule, within budget, and that the quality of the work products defined within this CONTRACT is consistent with CONSULTANT's standards and OWNER's requirements. This includes following the issuance of the Notice to Proceed (NTP) from OWNER, CONSULTANT will perform an internal project quality management meeting and a project planning and scope review meeting. Additionally, CONSULTANT maintains a Quality Management System (QMS) on all projects. CONSULTANT will hold Technical Review meetings, in accordance with QMS, prior to transmitting documents to OWNER. Technical Review comments will be addressed prior to moving forward with finalizing deliverables for the OWNER's review. CONSULTANT will maintain and submit to OWNER on a periodic basis a Comment and Response Spreadsheet that will track OWNER comments and CONSULTANT's response and intended actions to address the comments.

OWNER's RESPONSIBILITY

OWNER will be responsible for the following listed items and other items as specifically included in this CONTRACT:

- Provide Notice to Proceed.
- Provide the available and requested data, reports and references to CONSULTANT.
- Provide existing OWNER IWRP model from the 2012 IWRP project (programmed in STELLA).
- Provide review of CONSULTANT submittals of documents and return comments to CONSULTANT within 15 business days.

ASSUMPTIOMS

The following assumptions have been prepared in support of the CONSULTANT's basis of estimate:

- The basis for developing most of the conceptualized supply options as part of Task 3 will come from existing work products and OWNER will provide the necessary existing references and previous reports/studies including Alternative Water Supply Studies, Total Water Management Plan and Updates, Consumptive Use Permit (CUP 88271-16), Alternative Water Supply Facilities Master Plan (2015), Wellfield Water Quality Management Plan (CUP condition 49), Integrated Water Supply Testing, Evaluation, and Rehabilitation (iWater) and OWNER's 2018 Annual Water Resource Master Plan.
- The existing OWNER IWRP model from the 2012 IWRP project (programmed in STELLA) will be used for the base systems model development in Task 8.
- The existing hydraulic models used in support of Task 5 will not require model calibration.

PROJECT SCHEDULE

It is anticipated that the Project will take 18 months to complete, starting within two weeks of receipt of a formal notice to proceed (NTP). The estimated schedule by task is shown in Figure 1. CONSULTANT will prepare an updated detailed schedule within the first thirty (30) calendar days after Notice to Proceed.

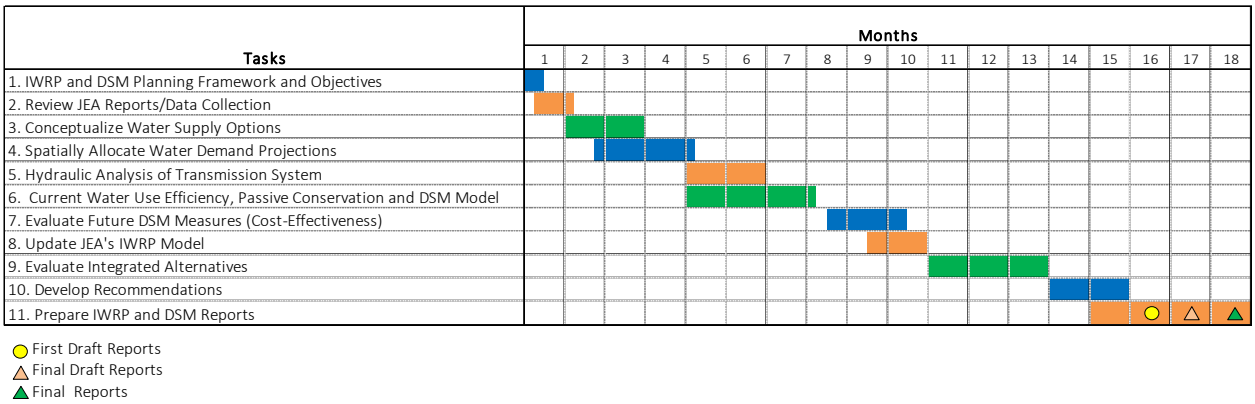


Figure 1. Project Schedule based on NTP

COMPENSATION AND PAYMENT

For performing the services in Task 1 to 12 of this Contract (Exhibit _____), OWNER agrees to pay CONSULTANT a lump sum amount of $1,095,792 for its labor, subconsultants, and direct costs. For invoice purposes only, the value breakdown is shown in **Table 1** below. The CONSULTANT will submit monthly invoices based on the percentage of the work completed by task during the period of the invoice.

Table 1
JEA 2019 Integrated Water Resource Plan and Demand Side Management Plan
Budget Estimate
Wednesday, January 29, 2019
CDM Smith

Task Description	Total Dollars By Task
Task 1 – Develop IWRP Evaluation Framework and Objectives	$30,772
Task 2 – Review OWNER Reports and Collect Data	$54,375
Task 3 – Conceptualize Supply Options	$60,021
Task 4 – Spatial Forecast of Water Demand	$107,730
Task 5 – Hydraulic Analysis of OWNER Water/Recycled Water Distribution System	$84,161
Task 6 – Assess Water Use Efficiency, Passive Conservation, End Use Model Water Demand	$151,340
Task 7 – Evaluation of Future DSM Measures and Development of DSM Program	$56,550
Task 8 – Update OWNER's IWRP Model	$68,450
Task 9 – Develop and Analyze Alternatives	$123,050
Task 10 – Test Alternatives Under Uncertainty and Develop Recommendations	$148,985
Task 11 – Prepare IWRP and DSM Reports	$140,627
Task 12 – Project and Quality Management	$69,731
Total Lump Sum Budget	**$1,095,792**

PRELIMINARY OFFICIAL STATEMENT DATED SEPTEMBER 11, 2019

NEW ISSUE – FULL BOOK ENTRY

In the opinion of Orrick, Herrington & Sutcliffe LLP, Bond Counsel to MEAG Power, based upon an analysis of existing laws, regulations, rulings and court decisions, and assuming, among other matters, the accuracy of certain representations and compliance with certain covenants, interest on the Series 2019A Bonds (as defined below) is excluded from gross income for federal income tax purposes under Section 103 of the Internal Revenue Code of 1986, as amended (the "Code"). In the further opinion of Bond Counsel, interest on the Series 2019A Bonds is not a specific preference item for purposes of the federal alternative minimum tax. Bond Counsel is also of the opinion that, by virtue of the Act (as defined herein), the Series 2019A Bonds, the transfer thereof and the interest thereon are exempt from taxation by the State of Georgia and any of its political subdivisions. Bond Counsel expresses no opinion regarding any other tax consequences related to the ownership or disposition of, or the amount, accrual or receipt of interest on, the Series 2019A Bonds. See, however, "TAX MATTERS" herein.

$475,000,000*
Municipal Electric Authority of Georgia
Plant Vogtle Units 3&4 Project M Bonds, Series 2019A

Dated: Date of Delivery **Due: January 1, as shown on the inside cover page**

The Plant Vogtle Units 3&4 Project M Bonds, Series 2019A (the "Series 2019A Bonds") are to be issued to finance a portion of MEAG Power's costs associated with Project M (as described below). The Series 2019A Bonds will be payable from and secured by a pledge of the revenues of MEAG Power derived from Project M and other moneys and securities pledged under the Project M Bond Resolution (as defined herein). Such revenues include, generally, payments received by MEAG Power from the sale of output and services of Project M to 29 municipalities located in the State of Georgia (the "Project M Participants") pursuant to take-or-pay power sales contracts, as described more particularly herein. See "SUMMARY OF VOGTLE UNITS 3&4 POWER SALES CONTRACTS – Vogtle Units 3&4 Participants' Obligations to Pay" in Appendix K to the Annual Information Statement referred to herein.

Vogtle Units 3&4 are two 1,102 megawatt ("MW") nominally rated nuclear generating units currently under construction at Generation Station Vogtle in Burke County, Georgia. As more particularly described herein, MEAG Power's interest in Vogtle Units 3&4 (which is held by three wholly-owned special purpose companies formed by MEAG Power for such purpose) is 22.7 percent, representing approximately 500.308 MW of nominally rated generating capacity. MEAG Power has structured its interest in Vogtle Units 3&4 as three separate projects, as more particularly described herein. Project M comprises approximately 33.871 percent of MEAG Power's interest in Vogtle Units 3&4, representing approximately 169.458 MW of capacity.

None of the Series 2019A Bonds will be an obligation of the State of Georgia, and the State of Georgia will not be obligated to make any payments, levy any taxes or impose any charges in connection with MEAG Power or the Series 2019A Bonds. However, the payment obligations of each Project M Participant under its Project M Power Sales Contract (as defined herein) are general obligations to the payment of which its full faith and credit are pledged.

The Series 2019A Bonds will be subject to redemption prior to maturity, as described herein.

The Series 2019A Bonds are issuable as fully registered bonds and when initially issued will be registered in the name of Cede & Co., as nominee of The Depository Trust Company, New York, New York ("DTC"), which initially will act as securities depository as described herein. Purchases of Series 2019A Bonds will be made in book-entry form only, in the principal amount of $5,000 or any integral multiple thereof, both through brokers or dealers who are, or who act through, DTC participants. Beneficial owners of the Series 2019A Bonds will not be entitled to receive physical delivery of bond certificates so long as DTC or a successor securities depository acts as the securities depository with respect to the Series 2019A Bonds. Semiannual interest on the Series 2019A Bonds is payable each January 1 and July 1, commencing January 1, 2020, as more fully described herein. So long as DTC or its nominee is the registered owner of the Series 2019A Bonds, payments of the principal of and interest on such bonds will be made directly to DTC. Disbursement of such payments to DTC participants is the responsibility of DTC and disbursement of such payments to the beneficial owners is the responsibility of DTC participants. See "BOOK-ENTRY ONLY SYSTEM" in APPENDIX A hereto.

MATURITY SCHEDULE – See Inside Cover Page

The Series 2019A Bonds are offered when, as and if issued and accepted by the Underwriters, subject to the approval of legality by Orrick, Herrington & Sutcliffe LLP, New York, New York, Bond Counsel to MEAG Power. Certain legal matters will be passed upon for MEAG Power by Peter M. Degnan, Esq., Senior Vice President, General Counsel of MEAG Power. Certain legal matters will be passed upon for the Underwriters by their counsel, King & Spalding LLP. It is expected that the Series 2019A Bonds will be available for delivery in book-entry form only through the facilities of DTC in New York, New York on or about September __, 2019.

Goldman Sachs & Co. LLC **Wells Fargo Securities**
Barclays **BofA Merrill Lynch**
PNC Capital Markets LLC **TD Securities**

The date of this Official Statement is September __, 2019.

* Preliminary, subject to change.

- it transferred approximately 33.871 percent of its ownership interest, representing 169.458 MW of nominally rated generating capacity (which is the portion of its ownership interest attributable to Project M (hereinafter defined)), to MEAG Power SPVM, LLC, a limited liability company organized and existing under the laws of the State of Georgia (the "Project M Entity"), of which MEAG Power is the sole member;

- it transferred approximately 41.175 percent of its ownership interest, representing 206.000 MW of nominally rated generating capacity (which is the portion of its ownership interest attributable to Project J (hereinafter defined)), to MEAG Power SPVJ, LLC, a limited liability company organized and existing under the laws of the State of Georgia (the "Project J Entity"), of which MEAG Power is the sole member; and

- it transferred approximately 24.955 percent of its ownership interest, representing 124.850 MW of nominally rated generating capacity (which is the portion of its ownership interest attributable to Project P (hereinafter defined)), to MEAG Power SPVP, LLC, a limited liability company organized and existing under the laws of the State of Georgia (the "Project P Entity" and, together with the Project M Entity and the Project J Entity, the "Vogtle Units 3&4 Project Entities"), of which MEAG Power is the sole member.

In contemplation of the transfers described above, MEAG Power and each Vogtle Units 3&4 Project Entity entered into a take-or-pay, "hell or high water" Wholesale Power Sales Agreement, dated as of December 31, 2014 (respectively, the "Project M Power Purchase Agreement," the "Project J Power Purchase Agreement" and the "Project P Power Purchase Agreement" and, collectively, the "Vogtle Units 3&4 Power Purchase Agreements"), pursuant to which (a) MEAG Power is entitled to all of the capacity and output of the respective Vogtle Units 3&4 Project Entity's Ownership Interest in Vogtle Units 3&4 and (b) MEAG Power is obligated to pay to such Vogtle Units 3&4 Project Entity all of its costs and expenses (including, without limitation, debt service on such Vogtle Units 3&4 Project Entity's DOE Guaranteed Loan (hereinafter defined), except as otherwise provided in connection with the occurrence and continuance of a Standstill Period (as hereinafter defined) under the Project J or Project P, as applicable, DOE Loan Guarantee Agreement (as hereinafter defined)) in connection with the ownership and operation of such Vogtle Units 3&4 Project Entity's Ownership Interest in Vogtle Units 3&4. See "SUMMARY OF VOGTLE UNITS 3&4 POWER PURCHASE AGREEMENTS" in Appendix N to the Annual Information Statement for a summary of certain provisions of the Vogtle Units 3&4 Power Purchase Agreements. As a result, each of the Vogtle Units 3&4 Projects now includes all of MEAG Power's right, title and interest in and to the capacity and output of the related Vogtle Units 3&4 Project Entity's Ownership Interest in Vogtle Units 3&4, but does not include such Ownership Interest.

Key Recent Developments with Respect to Vogtle Units 3&4

Key recent developments pertaining to Vogtle Units 3&4 are outlined below. For additional information and definitions of certain terms, see "VOGTLE UNITS 3&4 – Status of Vogtle Units 3&4" herein. See, also, "RISK FACTORS" herein.

- The U.S. Internal Revenue Service allocated production tax credits ("PTCs") to each of Vogtle Units 3&4, which originally required the applicable unit to be placed in service before 2021. The Bipartisan Budget Act of 2018, signed into law on February 9, 2018, removed the deadline for these PTCs by allowing for new nuclear reactors placed in service after December 31, 2020 to qualify for the nuclear PTCs. It also provided a modification to prior law to allow public power utilities, such as MEAG Power, to utilize the credits. The passage of this bill allows MEAG Power to monetize the hundreds of millions of dollars of tax credits to reduce the cost of the output of the Vogtle Units 3&4 Project Entities' ownership shares of the project.

Calculation of Value to the City of Jacksonville

In Response to Question 22

- Based on the Process Goals outlined on slide 19 of the ITN, JEA's financial minimum requirement outlines >$3 billion of value to the City of Jacksonville
- In the event that ITN process results in a sale of any asset including but not limited to an acquisition of the integrated utility, the purchase price shall be on a debt free cash free basis and will be subject to a standard target net working capital calculation and adjustment mechanism which shall be determined at the appropriate time during the negotiation phase of the process

Calculation of Value to the City of Jacksonville	$MM	Responsible Party: JEA [1]	Responsible Party: Respondents
Gross Proceeds			✓
Less: Defeasance cost, other liabilities not assignable and transaction costs	$3,500 - $4,000	✓	
Less: Employee retention payments	$165	✓	
Less: Employee pension protection	$132	✓	
Net Proceeds	**Value to City of Jacksonville**	**Greater than $3 billion**	

While Respondents must indicate clearly and specifically how their Reply would allow JEA to achieve its goals, given the information provided in the ITN and otherwise available publicly, such Replies may be more qualitative in nature until additional non-public information is provided to Respondents in the Negotiation Phase

Note:
1. JEA to pay for these costs from gross proceeds