

Onslow Water & Sewer Authority
Board of Directors' Special Meeting Jacksonville City Hall
Thursday, November 19, 2020
APPROVED MINUTES

CALL TO ORDER: Having a quorum, Chairman Jerry Bittner called the meeting to order at 6:00pm. Board members present included Chairman Jerry Bittner, Secretary/Treasurer Paul Conner and Directors Timothy Foster, Gregory Hines, and Michael Lazzara. Absent was Vice Chairman Royce Bennett, Directors Joann McDermon and Pat Turner.

INVOCATION: Chairman Jerry Bittner requested that Jeff Hudson, CEO, provide the invocation. Mr. Hudson led the Board and audience in prayer.

PLEDGE OF ALLEGIANCE: Director Michael Lazzara led the Board and audience in the Pledge of Allegiance.

CHAIRMAN'S REMARKS – Chairman Bittner provided general guidance to the audience regarding the meeting.

- 1. APPROVAL OF AGENDA** – Chairman Jerry Bittner read the proposed agenda addition Item G Approval of Easement for Bojangles and asked if there was a motion to approve the agenda with the addition. Secretary Paul Conner made a motion to approve the agenda with the amendment adding Item G Approval of Easement for Bojangles. Director Timothy Foster seconded the motion. All were in favor. The agenda was approved with unanimous consent.

- 2. APPROVAL OF ITEMS ON CONSENT AGENDA** – A motion was made by Director Timothy Foster to approve the consent agenda. A second was made by Secretary/Treasurer Paul Conner. The motion passed unanimously. Therefore, the September 2020 and October 2020 Financial Reports, August 2020 and September 2020 OPS Reports were accepted, the July 30, 2020 Special Meeting Minutes, 2021 Proposed Schedule of Board of Directors Meetings, Farm Lease Agreement with Double R Farm Service, LLC for the amount of \$103.00 per acre to farm the Northwest Regional Water Reclamation Facility for a period of three years and authorize the CEO to execute the agreement plus other documents as may be required in connection with the lease, Proposed easement to the Town of Swansboro for the Charleston Park property and authorize the Chief Executive Officer to execute this document and any additional documents as required in connection with this action were approved.

- 3. SPECIAL PRESENTATION TO DIRECTOR MICHAEL LAZZARA**
Chairman Jerry Bittner presented outgoing Director Michael Lazzara with a clock in appreciation of his over thirteen years of service with the ONWSA Board of Directors.

4. BUSINESS

A. Ordinance Amending Utility Ordinance

Chairman Jerry Bittner called on Authority Attorney, Chuck Kitchen, to present the item. Mr. Kitchen stated that the North Carolina General Assembly adopted Session Law 2020-61 which changes the date when System Development Fees are due effective January 1, 2021. He added this new law requires that all System Development Fees be paid prior to the issuance of a building permit and prevents the use of a deferred payment agreement as the Authority has used. Mr. Kitchen stated he discussed the new law with a representative of the UNC School of Government who monitored the passage of the bill. He also said as a result, the Authority's ability to enter into deferred payment agreements will end on January 1, 2021 and the Utility Ordinance needs to be amended to follow this new law. Mr. Kitchen stated the Board adopted the Declaration of Intent to Amend the Utility Ordinance on September 17, 2020 and the required notices and time for review have been given and the item is now available for Board action.

Director Gregory Hines asked Mr. Kitchen if we had any idea why the legislature decided to do this. Mr. Kitchen replied that his understanding was that several different groups wanted changes in the System Development Fees and they all wanted something different and this is what was decided on. Mr. Kitchen went on to say there were other systems that had payment plans like ours (ONWASA's) and asked for an exception to be able to continue and that did not make it in the legislation. [A copy of the Ordinance Amending the Utility Ordinance may be found at Exhibit A and are fully incorporated herein by reference.]

Action: A motion was made by Director Michael Lazzara to approve the Ordinance Amending the Utility Ordinance which would require the payment of system development fees prior to the issuance of a building permit and would not provide payment plans for the payment of the System Development fee. A second was made by Secretary/Treasurer Paul Conner. The motion passed unanimously.

B. Dixon Water Treatment Plant Filter Tank Rehabilitation

Chairman Jerry Bittner called on Ms. Tiffany Riggs, CFO, to present the item. Ms. Riggs began by stating two filter tanks and one softener tank need old media removed to allow for visual inspection of each tank so any necessary repairs can be made. She added the tanks will be painted prior to new media installation and the water treatment staff recommended the project be awarded with the media supplied by the vendor. Mrs. Riggs informed the Board four companies submitted bids and three of those had complete bid packages with the lowest bid made by Utilitech Inc. in the amount of \$155,500.

Action: Director Timothy Foster made a motion to proceed with a contract with Utilitech Inc. in the amount of \$155,500.00 for the Dixon Water Treatment Plant Filter Tank Rehabilitation Project and authorize the Chief Executive Officer to execute this contract plus other documents as may be required in connection with this action. Director Michael Lazzara made a second. The motion passed unanimously.

C. Northwest UV & Filter Building Modifications Project Final Change Order

Chairman Bittner called on Mr. David Mohr, COO, to present the item. Mr. Mohr stated the Change Order request is for construction that is nearing completion on the Northwest Regional Water Reclamation Facility, UV and Filter Building Modifications Project. He added the project consists of repairs and modifications to ultraviolet disinfection, filtration and electrical distribution/controls equipment damaged by flooding during Hurricane Florence. The contractor is Enviro-Tech Unlimited Construction Services, LLC of Harbinger, NC. Mr. Mohr shared the contractor is currently addressing the remaining items of work and construction is now considered substantially complete but has experienced ongoing delays in delivery of key equipment and the scheduling/completion of work by sub-contractors due to the impacts of the current pandemic. He added the Change Order requested would add 79 calendar days to the contract at no additional cost to ONWASA. Mr. Mohr explained the total contract amount would be increased with the Change Order by \$1,658.10 to address the installation of an additional door hardware that are required by building code. Mr. Mohr explained the requirement of the additional hardware came from a final inspection. Mr. Mohr stated the design engineer on the project (W.K. Dickson and Company, Inc.) has reviewed and agreed with the proposed contract revisions, and staff recommends the approval of the Change Order.

Action: Secretary/Treasurer Paul Conner made a motion to proceed with execution of Change Order #6 with Enviro-Tech Unlimited Construction Services, LLC, and to authorize the Chief Executive Officer to execute this Change Order and any additional documents as required in connection with this action. Director Michael Lazzara made a second. The motion passed unanimously.

D. Dixon Water Treatment Plant Wells D10 and D11 Project Final Change Order

Mr. David Mohr, COO, presented the item. Mr. Mohr stated the Change Order was for the second of two construction projects nearing completion and like the first had experienced delay due to the current pandemic. He added the contract amount of this project would be decreased by \$35,412.92 with the approval of the Change Order. He explained the decrease was due to work being completed with part quantities less than were included in the bid.

Mr. Mohr said the design engineer on the project (Groundwater Management Associates) has reviewed and agreed with the proposed contract revisions, and staff does recommend approval of this Change Order.

Chairman Bittner asked with the addition of the two wells how much is being added to the production capabilities. Mr. Mohr replied one well is rated at 1200 gallons a minute and the other at 1400 gallons per minute.

Action: Director Timothy Foster made a motion to proceed with execution of Change Order #8 with A.C. Schultes of Carolina, Inc. and to authorize the Chief Executive Officer to execute this Change Order and any additional documents as required in connection with this action. Secretary/Treasurer Paul Conner made a second. The motion passed unanimously

E. Main Office Roof Replacement (CIP-001) Construction Contract

Mr. David Mohr, COO, presented the item. Mr. Mohr stated the request was for approval of a construction contract to replace the entire built-up roof on the Administration Building at 228 Georgetown Road. He explained the existing roof leaks frequently during prolonged rain events and initial condition assessments have determined multiple areas where the existing roof insulation is retaining water. Mr. Mohr added the proposed replacement was a fully adhered thermoplastic membrane material with sloped insulation to allow for draining and included would be replacement soffit/fascia system. He added the project was advertised for formal bid beginning September 28, 2020 and a total of six (6) bids were received by the November 5, 2020 due date. The apparent low bidder for the contract was Rescue Construction Solutions of Raleigh. Mr. Mohr stated the design architects for the project have reviewed the bids submitted and recommended both acceptance of the low bid and execution of a construction contract with this firm.

Director Michael Lazzara asked for the square footage of the roof. Mr. Mohr did not have the exact number available for reference but stated over 40,000 square feet. Chairman Jerry Bittner asked if there was a guarantee on the proposed new roof. Mr. Mohr replied that there would be a guarantee. He further added that all ONWASA construction projects have a mandatory one-year warranty from the contractor.

Action: Director Michael Lazzara made a motion to proceed with a construction contract with Rescue Construction Solutions in the amount of \$338,020 for the ONWASA Roof Alteration Project, and to authorize the Chief Executive Officer to execute this contract and any additional documents as required in connection with this action. Secretary/Treasurer Paul Conner made a second. The motion passed unanimously.

F. Southeast Wastewater Capacity Solution Update

Mr. David Mohr, COO, presented the item along with Ms. Elaine Conti, Vice President, with Raftelis. Mr. Carl Scharfe with The Wooten Company was available in the audience for questions. [A copy of the presentation may be found at Exhibit B and are fully incorporated herein by reference.]

Mr. Mohr began by providing background information on the Southeast Wastewater Capacity Solution. He stated on July 30, 2020 the ONWASA Board of Directors met in a special meeting to consider future wastewater capacity solutions for both the Swansboro and Southeast service areas of the Authority and at that meeting, the Board approved a plan to send all wastewater from the Swansboro system to the French Creek Wastewater Treatment Facility aboard Marine Corps Base Camp Lejeune (MCBCL) for treatment, and preliminary design work for the infrastructure necessary to do so is now underway. He added for the Southeast service area, direction was given to conduct further investigations into a similar approach that would route wastewater now treated at both the Summerhouse and Holly Ridge Wastewater Treatment Facilities to MCBCL for treatment. Mr. Mohr stated after reviewing additional technical information supplied by MCBCL, further investigation of probable force main and pump station locations and considering peak flows and projected future growth in the area the engineer (Wooten Company) has completed a technical memorandum that summarizes the infrastructure improvements necessary to make the connection with the MCBCL. He added that the estimated cost data has also been analyzed by Raftelis, who has performed a rate analysis to determine the impact of this project in light of the current CIP and Swansboro wastewater project. Mr. Mohr introduced Ms. Elaine Conti with Raftelis and asked Ms. Conti to discuss the rate model impacts for Southeast Alternative 4. [A copy of the presentation is included in Exhibit B and are fully incorporated herein by reference.]

Chairman Jerry Bittner asked if the bottom line was this alternative is a savings over conventional construction of new plants. Ms. Conti replied yes out of the alternatives Southeast Alternative 4 is the most feasible of the considered options.

Secretary/Treasurer Paul Conner asked what the assumed twelve million equates to in percentage points as it relates to the thirty three and a half percentage increase through fiscal year 2026. Ms. Conti replied it would be one or two percentage points.

Director Michael Lazzara asked Mr. Hudson if there was an issue with allocation. Mr. Hudson replied there is not an issue in the amount of wastewater capacity the base would allocate to ONWASA. He went on to explain the current agreement with the Base provides five million gallons and of that one million is given to the City of Jacksonville leaving four million for ONWASA.

Chairman Bittner asked how much the flow would be to the Base including this solution. Mr. Mohr answered with assumed growth and expansion the estimate is at 3 million gallons a day in twenty years which would leave another million a day under the existing agreement.

Mr. Hudson stated that the Board did previously take a vote to move forward with Southeast Alternative 4 and at that time the discussion was to let us (staff) bring back information to the Board. Mr. Hudson further stated we have now given you a complete picture based on everything we know both from an engineering and rate analysis standpoint so if the Board has seen anything in the items presented that would make you change direction this would be the time to let Staff know and provide us further direction and If the Board did not see anything that made you want to change direction then our next step would be to go full force into design.

Action: There were no directors who expressed a desire to change direction with previous action therefore no action requested.

G. Approval of Easement for Bojangles

Chairman Jerry Bittner asked Mr. Chuck Kitchen, Authority Attorney, to present the item. Mr. Kitchen explained Bojangles is in the process of building a new restaurant which requires sewer lines to run across the Swansboro Library property. He further explained Onslow County approved a temporary construction easement for the project and has requested ONWASA join in approving the temporary construction easement as the owner of the permanent easement.

Action: Secretary/Treasurer Paul Conner made a motion to accept the permanent easement from Onslow County and approve the execution of the temporary construction easement. A second was made by Director Michael Lazzara. The motion passed unanimously.

5. CHIEF EXECUTIVE OFFICER'S COMMENTS – Chairman Jerry Bittner called upon Mr. Hudson to provide any comments. Mr. Hudson expressed his appreciation on behalf of ONWASA Staff to Director Michael Lazzara for his over 13 years of service as a director. He also said as we approach the holiday season he would like to wish all customers and members of the Board a Happy Thanksgiving, Merry Christmas, and a Happy New Year.

6. BOARD OF DIRECTOR'S COMMENTS

Director Timothy Foster congratulated Director Lazzara on his recent election win. He stated he has enjoyed working with him (Director Lazzara) over the past two years and appreciates his service to ONWASA and the community over the years. He also wished everyone a Happy Thanksgiving, Merry Christmas, and hopefully a great start to 2021.

Director Gregory Hines stated it has been a pleasure to work along with Director Lazzara over the years. He also thanked everyone who was at home watching the meeting and

wished everyone a Happy Thanksgiving.

Secretary/Treasurer Paul Conner said Director Lazzara was one of the first people to welcome him on the ONWASA Board and it has been great working along side him over the years.

Director Michael Lazzara wished everyone a Happy Thanksgiving and Merry Christmas and stated it has been a pleasure to work alongside everyone.

Chairman Jerry Bittner said Happy Thanksgiving and Merry Christmas to customers, staff, and fellow directors.

7. **ADJOURNMENT:** A motion was made by Director Gregory Hines to adjourn at 6:49 PM. Director Michael Lazzara seconded the motion. All in favor, the motion passed

The minutes were approved on January 21, 2021.

Onslow Water & Sewer Authority Board of Directors



Jerry Bittner, Chairman



ATTEST:



Heather Norris, Clerk

ORDINANCE AMENDING UTILITY ORDINANCE

WHEREAS, the ONWASA Board of Directors had created a program to help elderly persons pay system development fees; and

WHEREAS, due to the passage of Session Law 2020-61, the program no longer complies with State statute; and

WHEREAS, the Board of Directors desires to bring the Utility Ordinance into compliance with the amended statute.

NOW, THEREFORE, the Board of Directors of the Onslow Water and Sewer Authority doth ordain:

1. Section 1.7 of the Utility Ordinance is amended to read as follows:

Section 1.7 - Initial Fees

The application shall include identification number and state of the applicant's government-issued photo identification. The Authority may require a copy of the government-issued photo identification. The application shall also include the Security Deposit, System Development Fee, Inspection Fee and other required fees and charges, as applicable. Failure to make any payment or payments under any prior payment agreement for any reason, including death of the applicant, shall result in suspension of the utility service, and Section 10.6 herein shall apply.

2. Section 4.1 of the Utility Ordinance is amended to read as follows:

Section 4.1 - General

Charges Related to New Utility Service

a) System Development Fee – a charge or assessment for service imposed with respect to new development to fund costs of capital improvements necessitated by and attributable to such new development, to recoup costs of existing facilities which serve such new development, or a combination of those costs, the amount of which shall be based on meter size. System Development Fees shall be paid at the time of application for new utility service. Any Person undertaking any “development” (defined below) to be connected to the Authority Utility Facilities shall pay the System Development Fee. If a meter size on which the fee is based is not described in the Rate and Fee Schedule or if there is no meter, and for all collection of liquid condensate from residential heating and cooling systems, the amount of the System Development Fee shall be determined by the Executive Director based upon the anticipated water use and sewage generation rates for sizes in question.

(b) Application Fee – a fee due when a Person applies for new and existing utility service.

(c) Inspection Fee – a fee to cover the cost to the Authority of witnessing, inspecting and approving the work of a contractor engaged by an applicant to connect the applicant’s Owner Service Facilities to Authority Utility Facilities.

(d) Meter Fee – a charge to cover the cost of the water meter when the tap is being made by a licensed contractor and not the Authority, and/or replacement cost of damaged meter, yoke, angle stop, and appurtenances.

(e) Tap Fee – a one-time charge to cover the cost to the Authority of installing services of Authority Utility Facilities which benefit only the consumer being served. Tap Fees shall be paid at the time of application for new utility service.

(f) Initial Connect Fee – a one-time administrative fee due when new service is connected to Authority’s Utility Facilities, or existing account is transferred from one customer to another.

3. This amendment shall be effective on and after January 1, 2021.

This the 19th day of November 2020.

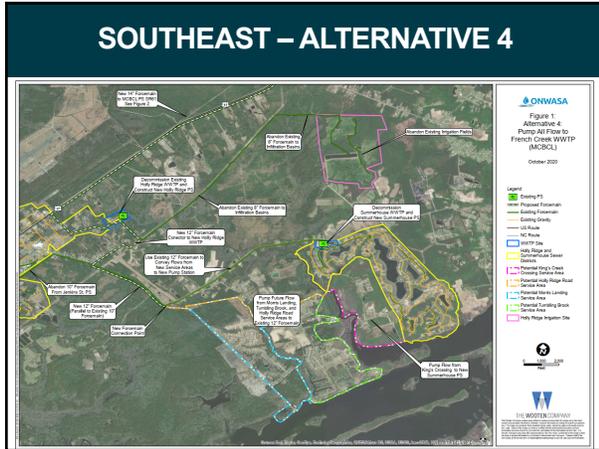


Jerry A. Bittner

Jerry A. Bittner, Chairman

Attest:

Katherine W. Norrie
Clerk



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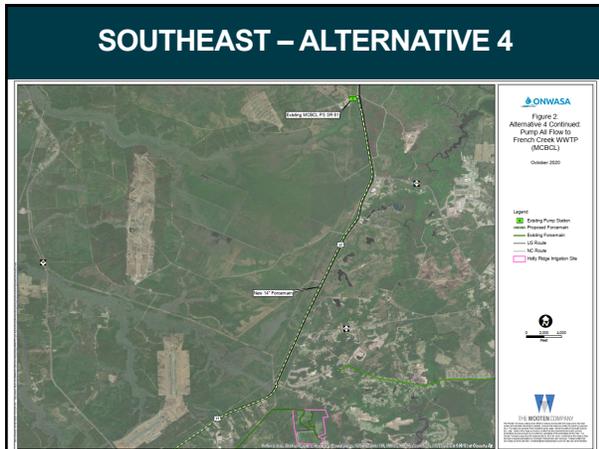
SOUTHEAST – ALTERNATIVE 4

Estimated Capital Costs
ONWASA Wastewater Pumping System Improvements

Item	Estimated Cost
Summerhouse Pump Station	\$ 620,000
Transmission Main from Summerhouse PS to Holly Ridge PS	\$ 1,300,000
Holly Ridge Pump Station	\$ 2,040,000
Force Main to SR61 Pump Station	\$ 10,400,000
Decommission Holly Ridge WWTP	\$ 80,000
Decommission Summerhouse WWTP	\$ 500,000
Construction Subtotal	\$ 14,940,000
Capital Contingencies (20%)	\$ 3,060,000
Project Administration (design, permitting, CA/CO)	\$ 1,800,000
Total Estimated Capital Cost (2021 dollars)	\$ 19,800,000

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SOUTHEAST – ALTERNATIVE 4

Estimated Capital Costs
MCBCL Wastewater Pumping System Improvements

Item	Estimated Cost
SR61 Pump Station Upgrade	\$ 1,815,000
VL342 Pump Station Upgrade	\$ 1,675,000
Transmission Main from SR61 to VL342	\$ 5,490,000
Construction Subtotal	\$ 8,980,000
Capital Contingencies (20%)	\$ 1,820,000
Project Administration (design, permitting, CA/CO)	\$ 1,200,000
Total Estimated Capital Cost (2021 dollars)	\$ 12,000,000

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EXHIBIT B CONTINUED

SOUTHEAST

	Capital Cost
Wastewater Options in the Southeast	
SE #1: Existing Summerhouse WWTP, New Holly Ridge WWTP	\$ 28,100,000
SE #2: New WWTP to replace both existing plants	\$ 31,600,000
SE #3: Send all to Pluris (PS and Pluris capital) *	\$ 18,450,000
SE #4: Send all to Base	\$ 31,800,000

*SE#3 includes \$13.05 million in capital costs for Pluris and \$5.4 million in capital costs for ONWASA.

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ESTIMATED AVERAGE BILLS PER YEAR

Average Water Bill

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Foundational CIP	\$ 29.77	\$ 29.77	\$ 31.41	\$ 33.14	\$ 34.96	\$ 34.96
SE #1	\$ 29.77	\$ 29.77	\$ 31.41	\$ 33.14	\$ 35.66	\$ 38.51
SE #2	\$ 29.77	\$ 30.37	\$ 32.68	\$ 35.16	\$ 38.10	\$ 39.24
SE #3	\$ 29.77	\$ 30.67	\$ 33.32	\$ 36.21	\$ 39.55	\$ 39.55
SE #4	\$ 29.77	\$ 30.37	\$ 32.68	\$ 35.16	\$ 37.73	\$ 38.48

Average Combined Water & Wastewater Bill

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Foundational CIP	\$ 83.68	\$ 88.28	\$ 93.13	\$ 98.25	\$ 98.25	\$ 98.25
SE #1 Total	\$ 83.68	\$ 88.28	\$ 93.13	\$ 98.25	\$ 100.22	\$ 108.24
SE #2 Total	\$ 83.68	\$ 89.95	\$ 96.70	\$ 103.95	\$ 107.07	\$ 110.28
SE #3 Total	\$ 83.68	\$ 90.79	\$ 98.50	\$ 106.88	\$ 111.15	\$ 111.15
SE #4 Total	\$ 83.68	\$ 89.95	\$ 96.70	\$ 103.95	\$ 106.03	\$ 108.15

The current median water and sewer bill for the state of NC is \$35.95 and \$44.20, respectively or \$80.15 combined. (Source: UNC Environmental Finance Center 2020 NC Dashboard)

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ESTIMATED OVERALL RATE INCREASES

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Combined Avg Increase
Foundational CIP Baseline Rate Increases	0.0%	5.5%	5.5%	5.5%	0.0%	0.0%	16.5%
<i>PLUS incremental rate increases from alternatives:</i>							
Wastewater Options in the Southeast							
SE #1: Existing Summerhouse WWTP, New Holly Ridge WWTP	0.0%	0.0%	0.0%	0.0%	2.0%	8.0%	10.0%
SE #2: New WWTP to replace both existing plants	0.0%	2.0%	2.0%	2.0%	3.0%	3.0%	12.0%
SE #3: Send all to Pluris (PS and Pluris capital) *	0.0%	3.0%	3.0%	3.0%	4.0%	0.0%	13.0%
SE #4: Send all to Base	0.0%	2.0%	2.0%	2.0%	2.0%	2.0%	10.0%
Total Estimated Rate Increase for Foundational and Southeast Alternatives							
SE #1: Existing Summerhouse WWTP, New Holly Ridge WWTP	0.0%	5.5%	5.5%	5.5%	2.0%	8.0%	26.5%
SE #2: New WWTP to replace both existing plants	0.0%	7.5%	7.5%	7.5%	3.0%	3.0%	28.5%
SE #3: Send all to Pluris (PS and Pluris capital)	0.0%	8.5%	8.5%	8.5%	4.0%	0.0%	29.5%
SE #4: Send all to Base	0.0%	7.5%	7.5%	7.5%	2.0%	2.0%	26.5%

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ESTIMATED BILLS FOR CHOSEN OPTIONS

Resulting Average Bill for Options SW 1 and SE 4:

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
WATER						
Existing Bill	\$ 29.77	\$ 29.77	\$ 32.15	\$ 34.72	\$ 37.49	\$ 40.35
Plus General CIP	\$ -	\$ 1.64	\$ 1.73	\$ 1.82	\$ -	\$ -
Plus SW #1	\$ -	\$ 0.15	\$ 0.17	\$ 0.18	\$ 2.13	\$ -
Plus SE #4	\$ -	\$ 0.60	\$ 0.67	\$ 0.76	\$ 0.74	\$ 0.75
Total Bill	\$ 29.77	\$ 32.15	\$ 34.72	\$ 37.49	\$ 40.35	\$ 41.11
% Change in Water Bill		8.0%	8.0%	8.0%	7.6%	1.9%

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
Combined Bill						
Existing Bill	\$ 83.68	\$ 83.68	\$ 90.37	\$ 97.58	\$ 105.35	\$ 113.41
Plus General CIP	\$ -	\$ 4.60	\$ 4.86	\$ 5.12	\$ -	\$ -
Plus SW #1	\$ -	\$ 0.42	\$ 0.47	\$ 0.52	\$ 5.98	\$ -
Plus SE #4	\$ -	\$ 1.67	\$ 1.89	\$ 2.13	\$ 2.08	\$ 2.12
Combined Bill	\$ 83.68	\$ 90.37	\$ 97.58	\$ 105.35	\$ 113.41	\$ 115.53
% Change in Combined Bill		8.0%	8.0%	8.0%	7.6%	1.9%

The current median water and sewer bill for the state of NC is \$35.95 and \$44.20, respectively or \$80.15 combined. (Source: UNC Environmental Finance Center 2020 NC Dashboard)

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TECHNICAL MEMORANDUM

ATTN: David M Mohr, PE
Chief Operations Officer
ONWASA
P: (910) 937-7550
E: dmohr@onwasa.com

DATE: November 5, 2020

RE: Holly Ridge/Summerhouse WWTP Capacity Study
Follow-Up and Refinements – Alternative 4 (SE-4)
TWC No. 2896 AK

This technical memo presents the results of engineering work conducted to further evaluate Southeast Alternative 4 (SE-4) for pumping wastewater to Marine Corp Base Camp Lejeune (MCBCL). This work included meeting with MCBCL representatives and determining the ability of their wastewater pumping system capacity to accept ONWASA's wastewater from the Holly Ridge/Summerhouse service area.

1.0 BACKGROUND

As authorized under previous Task Orders No. 6 and 12, the Wooten Company has completed a wastewater capacity study and follow-up Technical Memo update study for ONWASA's Holly Ridge/Summerhouse sewer service area (Task Orders 6 and 12). These studies provided descriptions, costs, and non-cost item comparison for alternatives to meet future wastewater needs in this service area. ONWASA then performed user rate impact analysis of three potential alternatives in a separate financial evaluation.

In the same time period, ONWASA also inquired with the Marine Corp Base at Camp Lejeune (MCBCL) concerning a potential fourth alternative of pumping all raw wastewater flow from the Holly Ridge/Summerhouse sewer service areas (referred to as Southeast Service Area) to MCBCL for treatment. On July 10, 2020, ONWASA staff requested that Wooten evaluate and provide engineering feasibility for this new alternative (Southeast Alternative 4). A preliminary evaluation and cost estimate were developed and presented at the July 30, 2020 ONWASA Board of Directors Meeting. This alternative is described below:

Alternative 4: Pump all Holly Ridge and Summerhouse service area flows to Marine Corps Base Camp Lejeune (MCBCL)

This alternative includes re-routing all existing and future Summerhouse and Holly Ridge service flows to a new raw wastewater pump station located at the Holly Ridge WWTP site. Wastewater will be pumped from this site to MCBCL's existing SR61 Pump Station at the intersection of State Highway 17 and CC Road.

EXHIBIT B CONTINUED

Preliminary work cited above evaluated potential routes and estimated costs to pump ONWASA wastewater to the MCBCL SR61 Pump Station. However, the ability of the Base system to pump this flow to their treatment facility was not initially evaluated. This memo includes recommendations on infrastructure needed to pump wastewater to the MCBCL SR61 Pump Station, as well as a preliminary evaluation of the MCBCL wastewater pumping system to accommodate ONWASA's flows.

2.0 FLOW CAPACITY SUMMARY

The current wastewater flows generated by the Holly Ridge/Summerhouse service area are approximately 0.28 million gallons per day (MGD) with a current combined WWTF capacity of 0.32 MGD. Projected future average daily flows (ADF), as determined in the original Holly Ridge/Summerhouse Capacity Study (Wooten February 2020), are shown on **Exhibit 1**. For pump station and forcemain design the ADF flows must be peaked to provide sufficient design capacity. According to the NCDEQ Minimum Design Criteria for the Permitting of Pump Stations and Force Mains, the minimum peak flow to average daily flow ratio to be used is 2.5 (PF/ADF). Thus, the ADF must be multiplied by 2.5 to obtain design capacities for new ONWASA pump station and forcemains in this alternative. The design flow information for each service area and the combined service area are listed below:

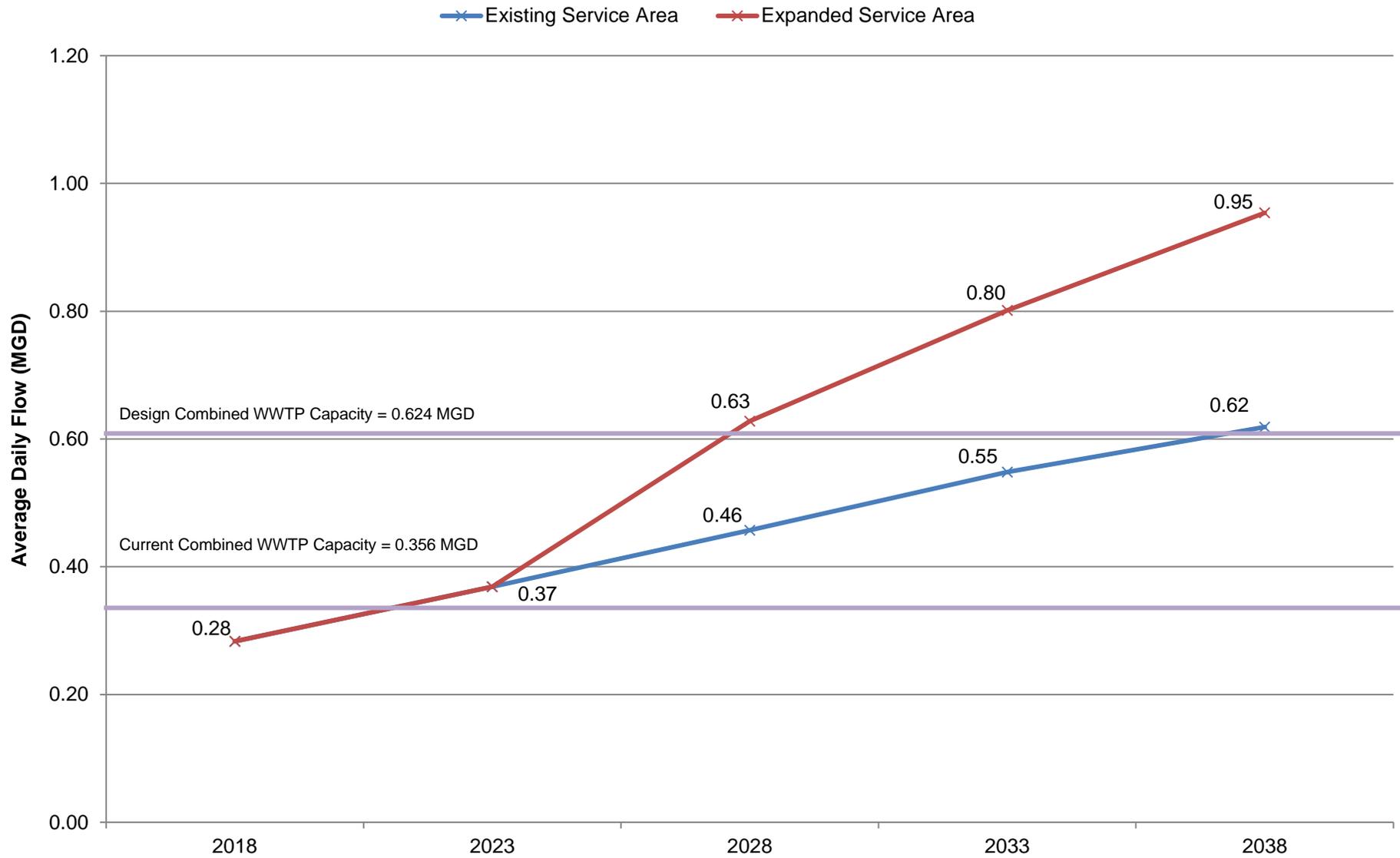
- **Holly Ridge Service Area:**
 - The service area includes the currently serviced Holly Ridge town limits and ETJ, and the proposed future service areas at the Preserve at Morris Landing, Tumbling Brook area, and the Holly Ridge Road future service areas.
 - 2040 Design Average daily flow of 0.58 MGD (575,000 gpd) and peak of 1.5 MGD (1,050 gpm).

- **Summerhouse Service Area: Average daily flow of 379,000 gpd**
 - The service area includes the currently serviced Summerhouse subdivision, and the future service area to the west which is named Kings Creek Crossing.
 - 2040 Design Average daily flow of 0.38 MGD (380,000 gpd) and peak of 1 MGD (700 gpm)

- **Combined Service Area Design Flow:**
 - 2030 ADF of ~ 0.7 MGD and peak flow of 1.75 MGD (1,200 gpm).
 - **2040 ADF of 1.0 MGD and peak flow of 2.5 MGD (1,800 gpm)**

EXHIBIT B CONTINUED

EXHIBIT 1 – AVERAGE DAILY FLOW PROJECTIONS



3.0 ALTERNATIVE 4 (SE-4) EVALUATION

The primary tasks in the scope of work for the Alternative 4 were to develop the routing from the ONWASA Holly Ridge and Summerhouse service area to the MCBCL system, and then evaluate the ability of the MCBCL system to accommodate the ONWASA flow. The two subsections below provide an engineering evaluation of both aspects of Alternative 4.

3.1 ONWASA WASTEWATER PUMPING SYSTEM EVALUATION

Alternative 4 includes two new pump stations – Summerhouse Pump Station and Holly Ridge Pump Station – and two forcemain alignments in order to transfer flow from the Holly Ridge and Summerhouse service areas to the MCBCL service area. After this overview, the primary components and preliminary design criteria for Alternative 4 are presented in Section 4. Detailed information on the service areas, the new pump station locations and forcemain alignment for the ONWASA portion of Alternative 4 is provided in **Attachment 1** of this memo.

- **Summerhouse and Holly Ridge Pump Stations.** The locations of the new Summerhouse and Holly Ridge Pump Stations were evaluated in context of the potential service area growth for station. The Summerhouse PS will be located at the Summerhouse WWTP and serve the Summerhouse Subdivision and the adjacent Kings Crossing area. The Holly Ridge PS will be located at the Holly Ridge WWTP and receive flow from the Summerhouse PS and the remainder of the existing and future service area.
- **Summerhouse PS-To-Holly Ridge PS Forcemain Route Evaluation.** Currently, flow from the Holly Ridge service area that is in excess of the capacity of the Holly Ridge WWTP is diverted to the Summerhouse WWTP via an existing 10-inch forcemain along Smith Street and Morris Landing Road, and a 12-inch forcemain along Holly Ridge Road. Evaluations were conducted on these existing forcemains to determine if they have the capacity for the projected flow. Based on these evaluations, the 12-inch forcemain along Holly Ridge Road will remain undisturbed but the 10-inch forcemain along Morris Landing Road must be upsized to 12 inches in order to not exceed the maximum forcemain velocity requirements. A new 12-inch forcemain extension would be installed along Morris Landing Road, Stump Sound Church Road and Homestead Lane in order to connect to the Holly Ridge PS. See **Attachment 1, Figure 1** for the route.
- **Forcemain from Holly Ridge PS To MCBCL SR61 PS.** The original forcemain alignment and cost estimate for the July 30, 2020 ONWASA Board of Directors Meeting was based on installing a portion of the forcemain inside a Duke Energy electrical easement and placing the forcemain adjacent to a MCBCL Base service road on the north and west side of Hwy. 17 (and generally outside the Hwy. 17 right of way). When contacted about this approach, Duke Energy stated that they are no longer allowing the construction of new utility lines within their utility easement. Based on discussion with ONWASA staff, the preferred alternative route to using the electrical easement is to route the new forcemain from the Holly Ridge PS west and north to Hwy. 17 and then along the southeastern Right-of-Way (ROW) line in order to serve existing lots along the south side of Hwy. 17. This is the case up to the point where the Duke Energy power line crosses Hwy. 17 (see **Figure 1** in **Attachment 1**). From this point, the forcemain will be aligned along the north and west side of Hwy. 17 all the way to the SR61 PS.

EXHIBIT B CONTINUED

ONWASA, MCBCL, and Wooten representatives met on August 20, 2020 to tour SR61 PS and the Base service road paralleling Hwy. 17. MCBCL personnel were asked if the Base would allow installation of the ONWASA forcemain adjacent and parallel to the Base service road. MCBCL personnel stated that such an installation may be possible, however, it would likely require the performance of an unexploded ordinance review along the proposed pipe route. If so, this could add a year or more to the schedule. To date, MCBCL personnel have not confirmed if the unexploded ordinance review will or will not be required. According to Base personnel, placing the new forcemain on Base property will also require a NEPA environmental process be conducted (as it is on federal property). MCBCL was also asked if the new forcemain could be placed approximately 2 to 3 feet from the service road edge and no answer has been received. Given this information and the fact that ONWASA will require regular access to Base property in order to service and maintain the forcemain, locating the ONWASA forcemain adjacent to the Base service road was eliminated from consideration.

As part of this study effort, a desktop evaluation of utilities in the Hwy. 17 ROW was conducted using available drawing information along with some field visits on either side of the highway during the August 20, 2020 site visit. A summary of preliminary utility information in table format for both sides of Hwy. 17 is presented in **Attachment 1**. Wetlands are present on both sides of the Highway with the Base side apparently having more wetlands. In general, the ROW available on the north and west side of Hwy. 17 is 25 feet to 30 feet where on the south and east side the available ROW varies from 29 to 102 feet. However, there are more utilities on the south and east side of Hwy. 17 including telephone poles, fiberoptics, two ONWASA water supply wells, raw and finished water lines.

Given all these factors, placing the new 14-inch forcemain on the north/west side ROW of Hwy. 17 was chosen as the forcemain route alignment for the purposes of this memo. The length and cost to place the new forcemain in the east and south side would be comparable. At the design stage, the final alignment would be determined.

3.2 MCBCL WASTEWATER PUMPING SYSTEM EVALUATION

As indicated previously, a meeting was held at SR61 PS with representatives of the MCBCL, ONWASA and Wooten in attendance. **Attachment 2** contains the following information provided by MCBCL personnel: 1) a general map of the Base pump station/forcemain network, 2) forcemain maps and a MCBCL pump station capacity table, 3) historical pump station capacity and drawdown information, 4) SR61 and VL342 PS plan drawings, and 5) SR61 existing pump curves. Profile information on the Base forcemains is not available, so a preliminary profile based on website information was used for evaluation purposes (see **Attachment 2**).

The MCBCL pump stations and forcemains must be designed to handle the peak wastewater flow from ONWASA plus the peak capacity of the pumps at the existing MCBCL pump stations. **Therefore, the MCBCL pump stations and forcemains must be designed to pump the existing Base peak flows plus 2.5 MGD (1,800 gpm) from ONWASA.**

ONWASA flows would be transmitted in the following order:

- ONWASA Holly Ridge PS to SR61 PS – New ONWASA forcemains.

EXHIBIT B CONTINUED

- SR61 PS to VL 342 PS – Existing Base forcemains (10”, 12”).
- VL 342 PS to 24-inch gravity sewer line - Existing Base forcemain (16”).
- 24-inch gravity sewer line to PS 590
- PS 590 to French Creek WWTP – Existing Base forcemain (24”)

Table 1 shows the required MCBCL pump station capacities and forcemain capacities for accepting ONWASA flows. To evaluate potential phasing, the table shows capacity needs for ONWASA existing, 2030, and 2040 flows. It is important to note that the pump stations and forcemains must be sized for **peak flows** and not average flows.

- **SR61 Pump Station.** Currently, this station receives flow from MCBCL Pump Station RR470 (serving MARSOC) and pumps through 10-inch and 12-inch diameter forcemains to VL342 PS.
 1. Adding ONWASA flows exceeds the SR61 pump capacities and requires replacement of the pumps.
 2. Adding ONWASA flows exceeds the existing force main capacities and requires replacement of both forcemains.
 3. Replacement of the existing pumps and forcemains are needed immediately due to the ONWASA flows. The new pump horsepower sizes are considerably larger (125 HP vs 30 HP) than the existing pumps and would require significant electrical component changes. One phasing possibility is to delay purchase of one pump until needed, however, this may not be considered a large enough savings to justify a second future project with the Base.
- **VL342 Pump Station.** According to Base information, this station currently only receives flow from SR61 and then pumps through a 16-inch forcemain to a 24-inch diameter gravity sewer.
 1. Adding ONWASA flows exceeds the stated pump capacity and requires replacement of all the pumps. However, Base information also indicates a pumping rate of 2,100 gpm Based on drawdown testing. If this testing can be confirmed, it may be possible to delay replacement of these pumps for some interim period.
 2. As for the SR61 PS, the existing pumps need to be replaced immediately (at the stated capacity of 1,153 gpm) and the flow conditions are not conducive to a phased approach. Significant electrical changes would be required at this station due to the larger pump horsepower (increase from 40 to 150 HP).
 3. The existing 16-inch discharge forcemain has sufficient capacity.
- **24-inch Gravity Sewer Line.** MCBCL personnel were not able to provide a capacity for this sewer. However, it was assumed this gravity line has a capacity at least as much as the downstream Pump Station 590 and thus changes are not required.
- **590 Pump Station.** Currently this pump station receives flow from VL342 and other parts of the collection system and pumps to the French Creek WWTF. The 590 PS has a peak capacity of 10,300 gpm and should have ample capacity for ONWASA flows.

EXHIBIT B CONTINUED

**Table 1: Preliminary Capacity Table
MCBCL Wastewater System**

Year	Holly Ridge/Summerhouse Flows		MCBCL Pump Station/Forcemain					
	Average Daily Flow (ADF)	Required Pumping Capacity (ONWASA Flows) ¹	Pumping Capacity of RR 470 ²	Minimum Required Capacity for SR 61	10"/12" FM Capacity Exceeded?	Required Capacity for VL 342 ³	16" FM Capacity Exceeded?	Gravity Sewer to PS 590 Capacity
2020	0.32 MGD (228 gpm)	~ 550 gpm	800 gpm	1,350 gpm	Yes/No	1,750 gpm	No	Unknown
2030	0.7 MGD (486 gpm)	~ 1,250 gpm	800 gpm	2,050 gpm	Yes/Yes	2,500 gpm	No	Unknown
2040	1.0 MGD (700 gpm)	~ 1,800 gpm	800 gpm	2,600 gpm	Yes/Yes	3,000 gpm	No	Unknown

¹ Required Pumping Capacity = ADF x 2.5.

² Assumes Base PS 4470 existing pump capacity of 800 gpm is sufficient for the next 20 years.

³ Assumes ~ 400 gpm MCBCL peak demand to this station from the station service area.

4.0 ALTERNATIVE 4 SCOPE OF WORK

The scope, timeline, and cost for Alternative 4 presented below were developed based on the information gathered to date and used in this evaluation. **The information below has not yet been reviewed or accepted by the Base as of the date of this memo.** The Base may have additional information and alternate approaches to be considered in this project.

4.1 ALTERNATIVE 4 DESCRIPTION

As described in Section 1.0, a series of new pump stations and forcemains would transport raw wastewater from the Summerhouse WWTP property to the Holly Ridge WWTP property, and from there to the existing MCBCL SR61 PS which will then pump the flow through the MCBCL wastewater pumping network to the French Creek WWTP. After the completion of this pumping system, the Summerhouse and Holly Ridge WWTPs would be decommissioned. A detailed description of this alternative is provided in **Attachment 1**. A brief narrative on the major components is provided below.

ONWASA Wastewater Pumping System

- **New 700-gpm Summerhouse Pump Station at Summerhouse WWTP**
Flow from the Summerhouse and Kings Creek Crossing service areas will be collected and transferred to this pump station for transmission to the Holly Ridge PS.
- **12-inch Forcemain from Summerhouse PS to Holly Ridge PS**
This forcemain would consist of the existing 12-inch forcemain along Holly Ridge Road and a 12-in. forcemain extension from the existing 12-inch line to the Holly Ridge WWTP site.
- **New 1,800-gpm Holly Ridge Pump Station at Holly Ridge WWTP**
This station will serve the existing Holly Ridge service area, new areas along the 12-inch forcemain, and flows from the new Summerhouse PS. This station would include screening and grit removal units, as well as odor control chemical feed facilities.
- **New 14-inch diameter Forcemain to Base SR61 PS**
Construct a new ~ 10-mile long, 14-inch diameter forcemain from the new Holly Ridge PS to Base SR61 PS within the north/west ROW of Hwy. 17.
- **Decommission Existing Summerhouse and Holly Ridge WWTPs**
Following the construction and startup of the previously listed pump stations and forcemains, the Summerhouse and Holly Ridge WWTPs would be decommissioned.

MCBCL Wastewater Pumping System

- **Upgrades to the MCBCL SR61 PS and Forcemain**
Upgrade the MCBCL SR61 Pump Station to increase peak pump capacity to 2,600 gpm. Replace pumps, piping, hoist crane system, and electrical components. Replace the existing 10-inch and 12-inch forcemain from the MCBCL SR61 Pump Station to the MCBCL VL342 Pump Station with a new 16-inch forcemain.

EXHIBIT B CONTINUED

- **Upgrades to the MCBCL VL342 PS**

Upgrade the MCBCL VL342 Pump Station to increase peak pump capacity to 3,000 gpm. Replace pumps, piping, hoist crane system, and electrical components.

Attachment 1 includes a summary of the design criteria for pump stations and forcemains. A detailed listing of the components associated with this alternative, including updated figures, are also included in **Attachment 1**.

4.2 ALTERNATIVE 4 PROJECT TIMELINE

A preliminary project timeline for Alternative 4 was developed based on a detailed look at the steps necessary to implement the alternative. A capacity step graph and a Gantt type schedule were developed and are provided in **Attachment 1**. These graphs work together to provide a planning project schedule. **The project design start date is assumed to be March 1, 2021.** Coordination with MCBCL will likely result in longer durations for certain steps.

In developing the project timeline, it is assumed design will start in early spring and the ONWASA Engineer would design the entire project. It was also assumed that there would be a two-month period to obtain Base access passes at the start of design and construction, and for Base reviews as the design proceeds. Finally, four months in the schedule was allowed for the Base to gather and provide additional information during the design phase.

The schedule for the ONWASA improvements and the MCBCL improvements are based on preparation of two separate bid document sets. **The following implementation steps and the Gantt schedule (see Attachment 1) assumes that ONWASA will self-fund the project and thus funding agency approval requirements were not considered.**

MCBCL Wastewater Pumping System

1. Design and Regulatory Approval (29 months)

- a. Pump Stations and Forcemains: preparation of design documents, regulatory permit applications and approvals, NEPA approval, MCBCL approvals, encroachment agreement with NCDOT for Hwy. 17, advertising, and bidding the project. **The schedule requires that MCBCL approvals be obtained in 9 months, permit approvals in 4 months, and NEPA approval in 12 months.**

2. Construction and Start-Up (14 months)

- a. Pump Stations and Forcemains: upgrade of the existing MCBCL SR61 PS and VL342 PS and station testing.

ONWASA Wastewater Pumping System Evaluation

1. Design and Regulatory Approval (21 months)

- a. Pump Stations and Forcemains: preparation of design documents, regulatory permit applications and approvals, NEPA approval, acquisition of private and MCBCL approvals, encroachment agreement with NCDOT for Morris Landing Road and Hwy. 17, advertising, and bidding the project. **The schedule requires that MCBCL**

EXHIBIT B CONTINUED

approval and private easements be obtained in 9 months and permit approvals in 4 months.

2. Construction and Start-Up (18 months)

- a. Pump Stations and Forcemains: construction of new pump stations and forcemains (Summerhouse PS and Holly Ridge PS), station testing, start-up, and close out.
- b. Decommission of Summerhouse and Holly Ridge WWTPs.

A time frame associated with these major steps is shown on the Gantt Chart in **Attachment 1**. **Overall, the estimated design and regulatory approval time is 29 months and the estimated construction and start-up time is 18 months.**

Based on the proposed design/construction timeline for this alternative, the pumping system to French Creek WWTP is estimated to be operational in mid-December 2024.

4.3 ALTERNATIVE 4 PROJECT COST

Detailed capital costs and O&M costs for Alternative 4 were developed and can be found in **Attachment 1**. The capital costs for Alternative 4 are as follows:

- **ONWASA Capital Costs:** **\$19,800,000 (2021 dollars)**
- **MCBCL Capital Costs:** **\$12,000,000 (2021 dollars)**
- **Total Capital Cost Estimate:** **\$31,800,000 (2021 dollars)**

The cost increases since the July 30, 2020 ONWASA Board of Directors Meeting are primarily due to: (1) not being able to use the Duke Energy electrical easement for the forcemain route to the SR61 Pump Station, (2) increased directional drilling costs from crossing wetlands, and (3) the inclusion of costs to upgrade the MCBCL Wastewater Pumping System. The MCBCL Wastewater Pumping System improvements add an additional \$12.0 million to the overall capital costs. The improvements to the ONWASA system and the MCBCL system were treated as separate projects in the cost estimate, with distinct soft costs.

The O&M costs for Alternative 4 are as follows:

1. The starting year for the O&M costs is Fiscal Year (FY) 2021/2022. O&M cost associated with the completion and start-up of the series of pump stations and forcemains were revised to match the preliminary schedule and timing presented in the capacity step graphs.
2. The start-up of the series of pump stations and forcemains that will transmit flow from the Holly Ridge and Summerhouse service areas to the French Creek WWTP is projected to be completed by the end of 2024. Therefore, O&M costs associated with this pump stations and forcemains would occur in FY 2024/2025. **It was assumed ONWASA will not directly pay for O&M costs at the MCBCL pump stations and these will be included within the per gallon charge from the Intergovernmental Service Agreement and will be adjusted to account for O&M cost increases in the MCBCL system.**

EXHIBIT B CONTINUED

3. In FY 2024/2025, the new service areas of Kings Creek Crossing, the Preserve at Morris Landing, the Tumbling Brook Area, and the Holly Ridge Road Area will begin producing flow and discharging into the Holly Ridge and Summerhouse service areas.

O&M Cost Estimate:

Start – \$510,000

Year 20 – \$2,241,000

5.0 TECHNICAL MEMO SUMMARY

The purpose of this memo was to further evaluate a new alternative in addition to those presented previously in the Holly Ridge/Summerhouse Capacity Study. As part of this refinement work, the following information was developed:

- Alternative description and figures.
- Project timelines detailing both design and construction phases illustrated via Gantt type schedule. It was assumed that project design would start March 1, 2021.
- Capacity step graphs to demonstrate the construction sequencing as it relates to available capacity and projected future service area flows.
- Construction and operational costs escalated to 2021 dollars to reflect anticipated bidding date (2% annual escalation).

Attachment 3 includes the alternative summary table for Alternatives 1 – 3 evaluated in the previous memo, followed by a summary table for Alternative 4. For more detailed information, please refer to the figures, graphs, charts, and cost information in the attachments.

Sincerely,
THE WOOTEN COMPANY



Carl W. Scharfe, PE
Project Manager/Process Engineer



Genevieve Versteeg, EI
Process Engineer/Project Engineer

Attachment 1:

Alternative 4 Information

- Detailed Description and Design Criteria
- Updated Alternative Figures
- Highway 17 Right-of-Way Information
- New Pump Curves for SR61 and VL342 Pump Stations
- Gantt Schedule
- Capacity Step Graphs
- Detailed Cost Tables

Attachment 2:

MCBCL Wastewater Pumping System Information

- MCBCL Wastewater Pumping System Map
- Forcemain Maps and Pump Station Capacity Table
- SR61 and VL342 Pump Station Historical Information
- SR61 Layout Drawing
- VL342 Layout Drawing
- SR61 Pump Station Pump Curves
- Elevation Profile of the Discharge Forcemains of the SR61 and VL342 Pump Stations

Attachment 3:

Comparison to Previous Alternatives

- Alternatives 1 – 3 Summary Table (March 2020)
- Alternative 4 Summary Table (October 2020)

EXHIBIT B CONTINUED

Technical Memorandum
Holly Ridge/Summerhouse WWTP Capacity Study-Alternatives
November 2, 2020 ONWASA



THE WOOTEN COMPANY

ATTACHMENT 1
ALTERNATIVE 4 INFORMATION

EXHIBIT B CONTINUED

ALTERNATIVE NO. 4 – PUMP ALL HOLLY RIDGE AND SUMMERHOUSE SERVICE AREA FLOWS TO MARINE CORPS BASE CAMP LEJUENE (MCBCL)

In Alternative 4, all of the raw wastewater flow in the Holly Ridge and Summerhouse (Southeast) service areas is pumped to the MCBCL French Creek Wastewater Treatment Plant (WWTP). In order to accomplish this, raw wastewater now sent to the existing plants would be collected and pumped to the existing MCBCL SR61 Pump Station via new pumps and forcemains. The 20-year projected average daily wastewater (ADF) flow from the Southeast service areas is ~1.0 MGD. The peak design flow (PDF) used for pump station and forcemain capacity determinations is ~2.5 MGD. The components of Alternative 4 fall within two wastewater systems: the ONWASA Wastewater Pumping System and the MCBCL Wastewater Pumping System. **Figures 1 and 2** illustrate the Alternative 4 improvements to the ONWASA Wastewater Pumping System. **Figure 1** shows the wastewater infrastructure changes in the vicinity of the Holly Ridge and Summerhouse service areas. **Figure 2** shows a preliminary route for the forcemain to the existing base pump station. The MCBCL Wastewater Pumping System Map included in **Attachment 2** shows the locations of the existing MCBCL pump stations and forcemains.

For the **ONWASA Wastewater Pumping System**, two pump stations will be constructed: one located on the site of the existing Summerhouse WWTP and one on the site of the Holly Ridge WWTP. The new Summerhouse Pump Station (PS) would serve the Summerhouse Subdivision and a new service area called Kings Crossing (see **Figure 1**). The new Holly Ridge Pump Station (PS) will receive flow from the new Summerhouse PS and the rest of the service area including Holly Ridge and its ETJ and the future Holly Ridge Road, Morris Landing and Tumbling Rock service areas (see **Figure 1**). The existing 12-inch diameter forcemain along Holly Ridge Road will be repurposed and a new 12-inch forcemain installed to replace the existing 10-inch forcemain along Morris Landing Road.

The new Holly Ridge PS will be a triplex pump station (to allow for phased growth) and will pump raw wastewater through a new 14-inch diameter forcemain. The length of this forcemain is approximately 53,000 LF and would discharge to the existing Marine Corp Base Camp Lejeune (MCBCL) SR61 Pump Station (PS). As shown in **Figure 2**, the 14-inch forcemain route would traverse first west from the Holly Ridge WWTP and then north to State Highway 17 (Hwy. 17). The forcemain would first be routed along the south side right of way (ROW) of Hwy 17 to pick up additional sewer connections and then cross Hwy 17 and continue on the west and north side ROW of Hwy 17 to MCBCL SR 61 PS.

Initial routing along an existing Duke Energy easement (where an existing ONWASA treated effluent line exists now) was eliminated as Duke Energy will not allow installation of future water and sewer utilities in

EXHIBIT B CONTINUED

their power easements. Installing the forcemain along an existing MCBCL gravel road on base property was also evaluated as this could potentially shorten the route. However, this was eliminated because 1) MCBCL staff indicated an unexploded ordinance study may be needed (typically > 1 year to complete), 2) placing the new forcemain on base property will also require a NEPA environmental process be conducted (as it is on federal property), 3) to avoid wetlands generally requires installing 2 to 3 feet from the service road edge and this may not be possible due to tank traffic on the road, and 4) because ONWASA would need regular access to base property in order to service and maintain the forcemain. Thus, locating the ONWASA forcemain adjacent to the base service road was eliminated.

For the **MCBCL Wastewater Pumping System**, flow will be transmitted from the MCBCL SR61 Pump Station to the VL342 Pump Station, which then discharges into a 24-inch gravity sewer line that feeds into the MCBCL 590 Pump Station. The 590 Pump Station discharges to the French Creek WWTP. Based on an engineering evaluation of the pump station and forcemain capacities it will be necessary to upgrade the the MCBCL SR61 PS capacity and the MCBCL VL342 PS capacity. The forcemains between the two stations must also be replaced with larger forcemains. Based on current available information (see **Attachment 2**), the forcemain and pump station infrastructure downstream of the VL342 PS is of adequate capacity to accommodate the future ONWASA peak flows.

The components of Alternative 4 and their capacities are as follows:

ONWASA Wastewater Pumping System

- **New Summerhouse Pump Station at Summerhouse WWTP:** The combined projected 2040 average daily flow for this pump station is 0.4 MGD with a peak flow of approximately 1.0 MGD (~ 700 gpm). Construct a new duplex pump station with a station rated capacity of 700 gpm. Provide two 700 gpm pumps, 50 HP pumps (one standby and one duty) driven by VFDs. This station capacity is sufficient to maintain a minimum scour velocity (2 ft/sec) in the 12-inch diameter forcemain.
- **Forcemain Summerhouse Pump Station to Holly Ridge Pump Station:** The forcemain would consist of the existing repurposed 12-inch forcemain along Holly Ridge Road and a new 12-inch forcemain from the existing 12-inch line to the Holly Ridge WWTP site. The new 12-inch forcemain will be approximately 1.7 mile long, running parallel and alongside Morris Landing Road from its intersection with Holly Ridge Road to its intersection with Stump Sound Church Road, then running parallel to Stump Sound Church Road to the Holly Ridge WWTP, as shown in **Figure 1**. The existing 10-inch line from the Jenkins St. Pump Station to the intersection of Morris Landing Road and Holly Ridge Road would be abandoned.

EXHIBIT B CONTINUED

- **New Holly Ridge Pump Station at Holly Ridge WWTP:** Construct a new pump station at the Holly Ridge WWTP. This pump station would include below grade screening and grit removal units in order to serve the current gravity flows from the Holly Ridge service areas. The projected 2040 average daily flow for all the service areas is approximately 1.0 MGD with a peak capacity of 2.5 MGD (1,736 gpm). The new Holly Ridge pump station would be a triplex station with a minimum rated capacity 1,800 gpm. Three 900 gpm, 100 HP pumps would be provided. Odor control chemical feed facilities would also be installed at this pump station.
- **New 14-inch diameter Forcemain to MCBCL SR61 Pump Station:** Construct a new approximate 10 mile long, 14-inch diameter forcemain from the new Holly Ridge Pump Station to MCBCL SR61 Pump Station. The proposed forcemain route is shown in **Figure 1**. Preliminary Hwy 17 ROW and utilities information (from NCDOT drawings and site reconnaissance) for each side of the highway are provided in **Attachment 1**. In general, the ROW available on the north and west side of Hwy. 17 is 25 feet to 30 feet where on the south and east side the available ROW varies from 29 to 102 feet. From a ROW perspective this favors the south and east side of the highway. However, the south and east side of Hwy. 17 has more utilities in the ROW including including fiber optic, waterlines, telephone poles, and electric power lines. Construction of the new forcemain on this side of the road is more complicated as there are two ONWASA water supply wells, the ONWASA Dixon Water Treatment Plant, the Dixon High School, and numerous other private properties along the route. On the west and north side of the highway, there is only the base property. ONWASA has an easement agreement with the base if the forcemain route has to deviate off the ROW in some areas. Wetlands are present on both sides of the highway and do not point to a decisive favor to one side of the road or the other. For the purposes of this memo, the base side of the highway was selected for the preliminary route as there are fewer utilities and there should be sufficient room for the new forcemain in the route shown. However, during final design placement of the forcemain on the east and south side is possible if desired.
- **Decommission existing Summerhouse and Holly Ridge WWTPs:** The Summerhouse and Holly Ridge WWTPs would be decommissioned by removing sludge solids, wastewater, and any solid debris and the process units shut down. At the Summerhouse site, the existing structures would be demolished and removed due to the close proximity of Summerhouse residents to the site. At the Holly Ridge WWTP, the existing lagoon would need to go through the lagoon abandonment process similar to ONWASA's Hickory Grove Lagoon.

EXHIBIT B CONTINUED

MCBCL Wastewater Pumping System

Upgrade MCBCL SR61 Pump Station and Forcemain: Upgrade the MCBCL SR61 Pump Station to increase peak pump capacity from existing 800 gpm (1.2 MGD) to a minimum of 2,600 gpm (3.7 MGD). Install a new concrete box on the site to allow connection of the new 14-inch forcemain to to the SR61 PS wetwell. The four pumps in the MCBCL SR61 Pump Station will be replaced with three 1,300-gpm pumps (125-HP) with VFDs and one 800-gpm jockey pump. Replacement of internal piping, valves, and meters at the pump station for all four pumps is also needed as flows will exceed the existing pipe capacity. The existing comminuter in the influent channel must be replaced with a larger unit for the projected flow. The heavier pumps will require the installation of a new 3-ton pump hoist crane and associated metal beams. Major electrical work would be required as part of the upgrade. The existing 10-inch and 12-inch forcemain from the MCBCL SR61 PS to the MCBCL VL342 PS would be replaced with approximately 30,600 LF of new 16-inch forcemain.

- **Upgrade MCBCL VL342 Pump Station:** Upgrade the MCBCL VL342 Pump Station to increase peak pump capacity from existing 1,153 gpm (1.7 MGD) to a minimum of 3,000 gpm (4.2 MGD). The four pumps in the MCBCL SR61 Pump Station will be replaced with three 1,500-gpm pumps (150 HP) with VFDs and one 800-gpm jockey pump. Only one set of existing discharge piping, valves, and meters at the pump station needs to be replaced as the existing pipes are sufficient for two large pumps and the one smaller jockey pump. The grinder in the influent channel would be upsized for the projected flow. The heavier pumps will require the installation of a new 3-ton pump hoist crane and associated beams. Major electrical upgrades are projected for this pump station also.

EXHIBIT B CONTINUED

**Summerhouse/Holly Ridge Alternative 4 Preliminary Design Criteria
All Wastewater Flow to MCBCL**

Design Wastewater Flows to MCBCL	
Design Average Daily Flow (ADF)	~1.0 mgd
Initial ADF (FY 2024/25)	~0.42 mgd
Design Peak Flow Factor	2.5
Design Peak Flow	2.5 mgd
Peak Pumping Rate (minimum)	~1,800 gpm
Summerhouse Raw Wastewater Pump Station	
Station Location	Summerhouse WWTP site
Design ADF	0.40 mgd
Design Peak Hour Flow	0.99 mgd
Design Pumping Rate (minimum)	690 gpm
Pumps	
Pump Type	Submersible
No of Pumps	2
Speed type	Variable
Pump Capacity, each	700 gpm
Total Discharge Head (ft), each	137 feet
Pump Horsepower	50 HP
Electrical supply	480V, 60 Hz, 3 phase
Generator size	60 kW
Discharge Forcemain, size & length	
Reuse Existing Effluent Forcemain	12-in diameter @ 8,875 LF
New Forcemain, size & length	
Replacing Existing 10-in. Forcemain	12-in diameter @ 4,300 LF
Forcemain Extension	12-in diameter @ 4,700 LF
Holly Ridge Raw Wastewater Pump Station	
Station Location	Holly Ridge WWTP site
Design ADF	~1.0 mgd
Design Peak Hour Flow	2.5 mgd
Design Pumping Rate (minimum)	~1,800 gpm
Pumps	
Type	Submersible
No of Pumps	3
Speed type	Variable
Pump Capacity, each	900 gpm
Total Discharge Head (ft), each	241 feet
Pump Horsepower	100 HP
Electrical supply	480V, 60 Hz, 3 phase
Generator size	150 kW
Discharge Forcemain, size & length	
New Forcemain	14-in diameter @ 52,700 LF

EXHIBIT B CONTINUED

MCBCL SR61 Pump Station (upgraded station)	
Station Location	CC Rd. / Hwy. 17 Intersection
Current Pump Station Capacity	
Pump Station ADF	0.46 mgd
Station Peak Hour Capacity	1.15 mgd
Station Peak Pumping Rate ¹	800 gpm
No of Pumps	4 (two small, two large)
Design Capacity, Each Pump	350 gpm (small), 800 gpm (large)
Design Future Capacity	
Holly Ridge PS ADF to SR61 PS	1.00 mgd
Existing Flow to MCBCL Pump Station ADF (minimum)	0.46 mgd
Peak Hour (minimum)	1.46 mgd
Design Pumping Rate (minimum)	3.65 mgd
Design Pumping Rate (minimum)	2,600 gpm
Pumps	
Type	Submersible
No of Pumps	4 (one small, three large)
Speed type	Variable Frequency Drive
Jockey Pump Capacity, each	800 gpm
Large Pump Capacity, each	1,300 gpm (2,600 gpm in total)
Total Discharge Head (ft), each (large pump)	158 feet
Pump Horsepower, each (large pump)	125 hp
Electrical supply (existing)	480V, 60 Hz, 3 phase
Generator size (existing)	400 kW
Diesel Tank (backup)	540 gallons
Discharge Forcemain, size & length	
Replacing Existing 10-in. and 12-in. Forcemain	16-inch @ 30,600 LF
MCBCL VL342 Pump Station (upgraded station)	
Station Location	Verona Loop Rd. / Rhodes Point Rd. Intersection
Current Pump Station Capacity	
Pump Station ADF	0.66 mgd
Station Peak Hour Capacity	1.66 mgd
Station Peak Pumping Rate ²	1,153 gpm
No of Pumps	4 (two small, two large)
Design Capacity, Each Pump ³	900 gpm (small), 1,800 gpm (large)
Design Future Capacity	
SR61 PS ADF to VL342 PS	1.46 mgd
Existing Flow to VL342 PS ADF (minimum)	0.23 mgd
Peak Hour (minimum)	1.69 mgd
Design Pumping Rate (minimum)	4.23 mgd
Design Pumping Rate (minimum)	3,000 gpm

EXHIBIT B CONTINUED

Pumps	
Type	Submersible
No of Pumps	4 (one small, three large)
Speed type	Variable Frequency Drive
Jockey Pump Capacity, each	800 gpm
Large Pump Capacity, each	1,500 gpm (3,000 gpm in total)
Total Discharge Head (ft), each (large pump)	193 feet
Pump Horsepower, each (large pump)	150 hp
Electrical supply (existing)	480V, 60 Hz, 3 phase
Generator size (existing)	400 kW
Diesel Tank (backup)	540 gallons
Discharge Forcemain, size & length	
Use Existing Forcemain	16-inch @ 26,400 LF

¹SR61 Peak Pumping Rate from drawdown test.

²VL342 Peak Pumping Rate from MCBCL capacity table.

³Capacity is based on historical MCBCL information. Historical information indicates capacity from drawdown tests is at ~2,100 gpm.

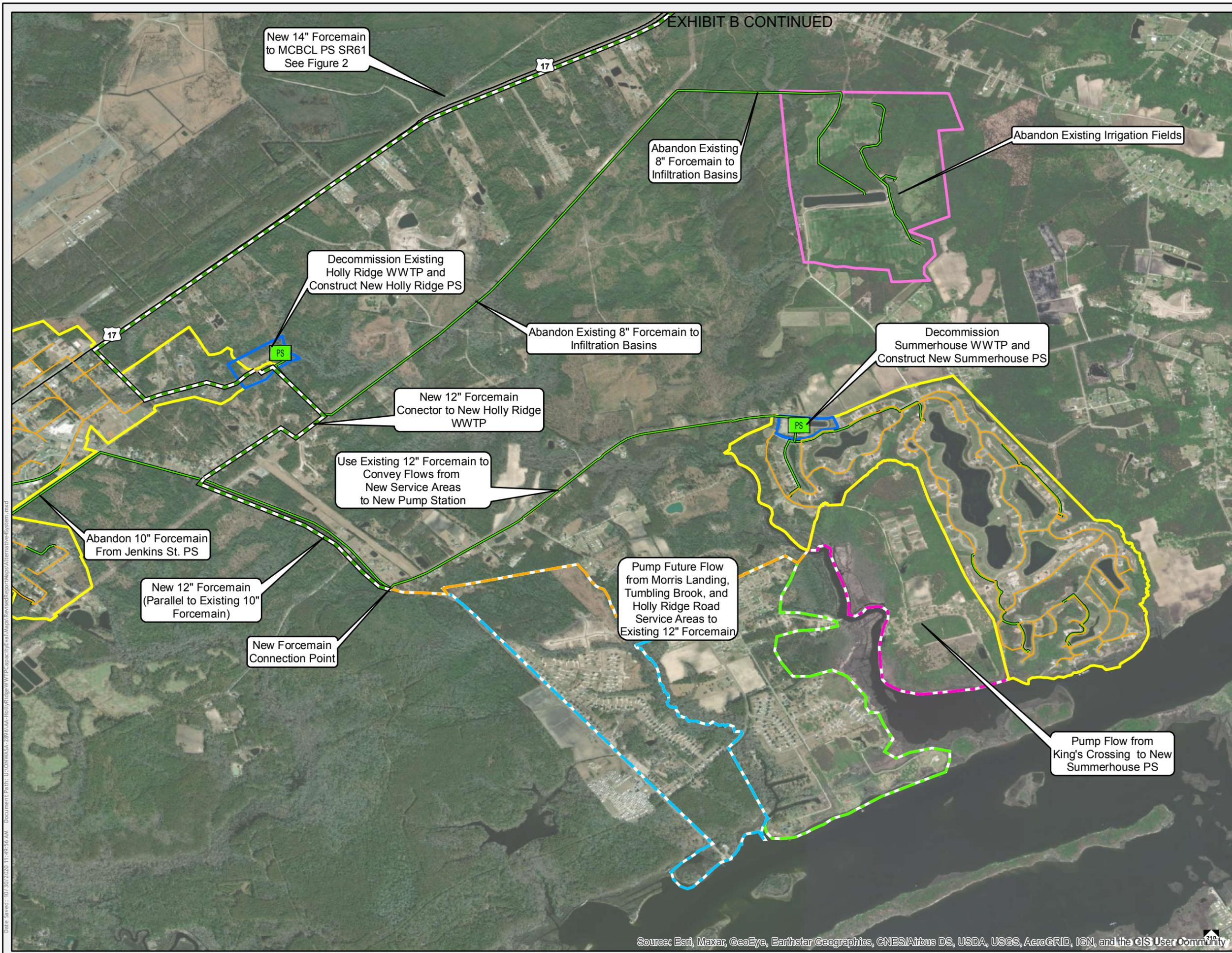


EXHIBIT B CONTINUED



Figure 1:
Alternative 4:
Pump All Flow to
French Creek WWTP
(MCBCL)

October 2020

Legend

- PS Existing PS
- - - Proposed Forcemain
- Existing Forcemain
- Existing Gravity
- US Route
- NC Route
- WWTP Site
- Holly Ridge and Summerhouse Sewer Districts
- Potential King's Creek Crossing Service Area
- Potential Holly Ridge Road Service Area
- Potential Morris Landing Service Area
- Potential Tumbling Brook Service Area
- Holly Ridge Irrigation Site



0 1,000 2,000
Feet



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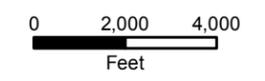


Figure 2:
Alternative 4 Continued:
Pump All Flow to
French Creek WWTP
(MCBCL)

October 2020

Legend

-  Existing Pump Station
-  Proposed Forcemain
-  Existing Forcemain
-  US Route
-  NC Route
-  Holly Ridge Irrigation Site



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Existing MCBCL PS SR 61

New 14" Forcemain

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EXHIBIT B CONTINUED

Highway 17 ROW Information (North/West side)

Station		Distance b/w Stations	Distance from ROW to CL of Hwy. 17	Open Space (ROW to Edge of Hwy. 17)	Obstructions
From	To				
12000	19500	7500	60	26'	Wetlands. 36-inch FO duct + underground Tele + waterline.
20000			60	26'	FO veers down old road (base road). Waterline along Hwy. 17.
20000	26200	6200	60	26'	AT&T 10' easement w/ FO, big ditch. Underground Tele + waterline + electric. Purple markers along Hwy. 17.
26200			60	26'	Tight ROW loaded w/ utilities (Tele + waterline + electric). James-Onslwo Electric (electric lines).
26200	31000	4800	60	26'	Tele close to road (telecom), Two FO lines - 10' easement FO (Old Folkstone Rd.), Wetlands.
31000	44500	13500	60	30'	Tele close to road, 10' easement FO (start at Joes Trail). 36" Outer FO follows base rd. White pole markers.
44500	47300	2800	60	30'	Monster ditch/wetland and 20' swath free of utilites in 1994, 10' easement w/ FO on both sides of base rd. outside ROW (FO is 42.5' from base rd. EOP, ± 50' from Hwy. 17 EOP), Tele in ROW.
47300	50550	3250	85	28'	Tele 6' off pavement, 10' easement off ROW for AT&T FO, base road FO abandoned, FO only on left side of base rd., Tele in ROW.
50550	50900	350	varies 85 to 95	39'	Trees in open swath. Wetlands.
50900	51380	480	95	39'	10' easement off back w/ AT&T FO. Wetlands.
51380	51690	310	varies 95 to 85	39'	10' easement off back w/ AT&T FO. Wetlands.
51690	52100	410	85	28'	10' easement off back w/ AT&T FO. Wetlands.
52100	52500	400	varies	28'	10' easement off back w/ AT&T FO. Wetlands.
52500	54650	2150	varies 105 to 110	28'	10' easement off back w/ AT&T FO. Wetlands.
54650	55050	400	taper back to 85	28'	Wetlands, trees and easements.
55050	60923	5873	tapers to 115'	28'	10' easement off back with AT&T FO, 12" water Line + Tele close to pavement. Tele on right side of base rd., AT&T FO in center of base rd. and right of base rd. Wetlands.

FO - Fiber Optic

Tele - Telephone line

w/ - with

EOP = Edge of Pavement

EXHIBIT B CONTINUED

Highway 17 ROW Information (South/East side)

Station		Distance b/w Stations	Distance from ROW to CL of Hwy. 17	Open Space (ROW to Edge of Hwy. 17)	Obstructions
From	To				
12000	19500	7500	90'	50'	Power lines 42' from Hwy. 17 EOP. Waterlines.
19500	20535	1035	65'	49'	Waterlines + FO + electric.
20535	26100	5565	65'	49'	Water + electric past Folkstone Rd.
28100	30455	2355	160'	102'	Electric + FO before NC 172. Wetlands and woods.
32313	41550	9237	160'	102'	Water-supply Well past Pilchers Rd. Wetlands. Raw water + Electric + FO. Pink flags 5'-8' off Hwy. 17 EOP.
41550	47300	5750	200'	102'	WTP w/ supply well on site. Water + Electric + FO.
47300	49396	2096	165'	116'	Water + Electric + FO. Dixon High school.
49396	51620	2224	varies	Will need to DD	NC 210 interchange. Water + Electric + FO. Wetlands.
52503	52872	369	125'	68'	Water + Electric + FO. Wetlands.
54525	57650	3125	varies	29'	Water + Electric + FO. Wetlands.
57650	59100	1450	80'	29'	Water + Electric + FO. Wetlands.
59100	59800	700	varies	73'	Water + Electric + FO. Wetlands. White caps (OCWD).
59800	61050	1250	130'	73'	Water + Electric + FO. Wetlands. White caps (OCWD).
61050	62000	950	varies 140 to 100	43'(?)	Water + Electric + FO. Wetlands. White caps (OCWD).
62000	62500	500	varies 100 to 110	43'(?)	Water + Electric + FO. Wetlands. White caps (OCWD).
62500	end		100'	43'	Water + Electric + FO. Wetlands. White caps (OCWD).

FO - Fiber Optic

Tele - Telephone line

w/ - with

EOP = Edge of Pavement

1 Pump, Full Speed

Item number	: 001	Size	: 5" 5436MV
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: 5-5436MV-1800-T5D1AS
Quote number	: 386164	Date last saved	: 27 Oct 2020 10:11 AM

Operating Conditions

Flow, rated	: 1,300.0 USgpm
Differential head / pressure, rated (requested)	: 158.0 ft
Differential head / pressure, rated (actual)	: 158.3 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Performance

Speed criteria	: Synchronous
Speed, rated	: 1780 rpm
Impeller diameter, rated	: 13.46 in
Impeller diameter, maximum	: 15.25 in
Impeller diameter, minimum	: 11.50 in
Efficiency	: 66.66 %
NPSH required / margin required	: 20.08 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 30 / 164 Metric units
Minimum Continuous Stable Flow	: 320.0 USgpm
Head, maximum, rated diameter	: 208.2 ft
Head rise to shutoff	: 31.74 %
Flow, best eff. point	: 1,689.1 USgpm
Flow ratio, rated / BEP	: 76.96 %
Diameter ratio (rated / max)	: 88.26 %
Head ratio (rated dia / max dia)	: 71.09 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Material

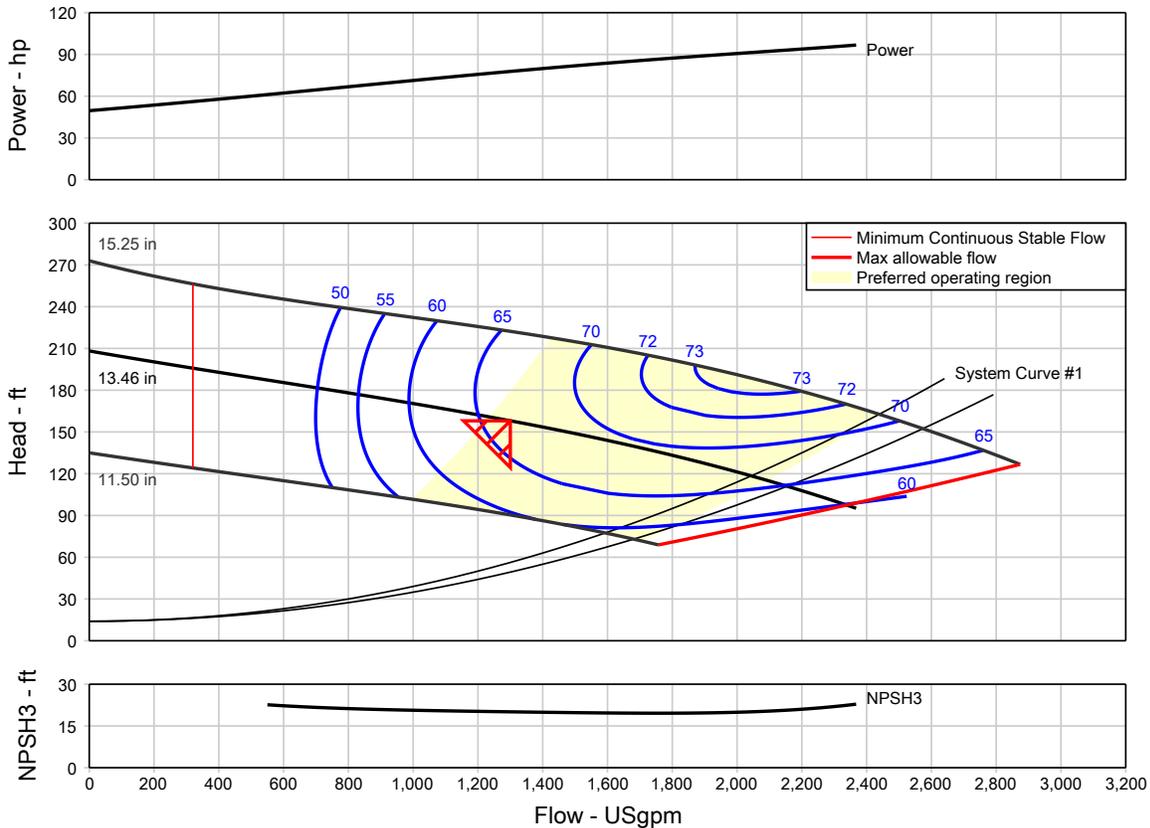
Material selected	: Ductile Iron
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Pressure Data

Maximum working pressure	: 90.10 psi.g
Maximum allowable working pressure	: 187.5 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: 190.0 psi.g

Driver & Power Data (@Max density)

Driver sizing specification	: Max Power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 51.86 hp
Power, rated	: 77.80 hp
Power, maximum, rated diameter	: 96.74 hp
Minimum recommended motor rating	: 100.00 hp / 74.57 kW



2 Pumps, Full Speed

Item number	: 001	Size	: 5" 5436MV
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: 5-5436MV-1800-T5D1AS
Quote number	: 386164	Date last saved	: 27 Oct 2020 10:11 AM

Operating Conditions

Flow, rated	: 1,300.0 USgpm
Differential head / pressure, rated (requested)	: 158.0 ft
Differential head / pressure, rated (actual)	: 158.3 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Performance

Speed criteria	: Synchronous
Speed, rated	: 1780 rpm
Impeller diameter, rated	: 13.46 in
Impeller diameter, maximum	: 15.25 in
Impeller diameter, minimum	: 11.50 in
Efficiency	: 66.66 %
NPSH required / margin required	: 20.08 / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 30 / 164 Metric units
Minimum Continuous Stable Flow	: 320.0 USgpm
Head, maximum, rated diameter	: 208.2 ft
Head rise to shutoff	: 31.74 %
Flow, best eff. point	: 1,689.1 USgpm
Flow ratio, rated / BEP	: 76.96 %
Diameter ratio (rated / max)	: 88.26 %
Head ratio (rated dia / max dia)	: 71.09 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Material

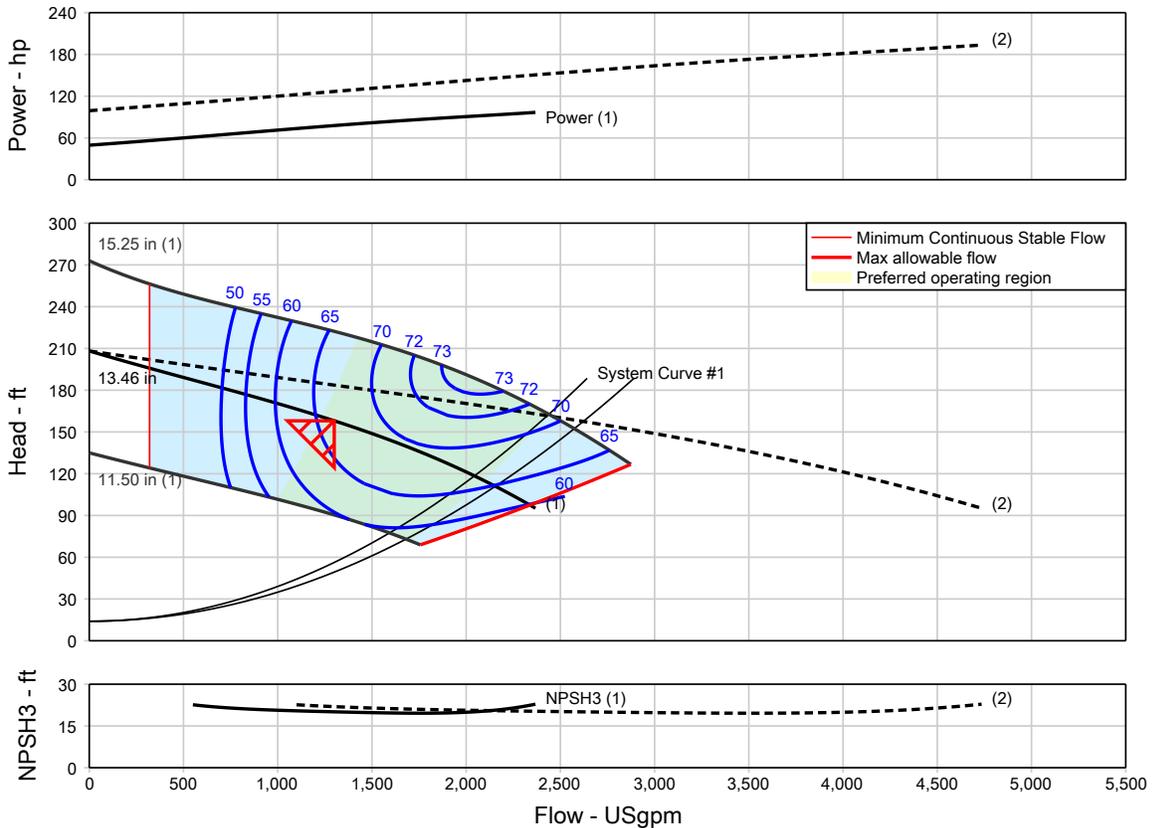
Material selected	: Ductile Iron
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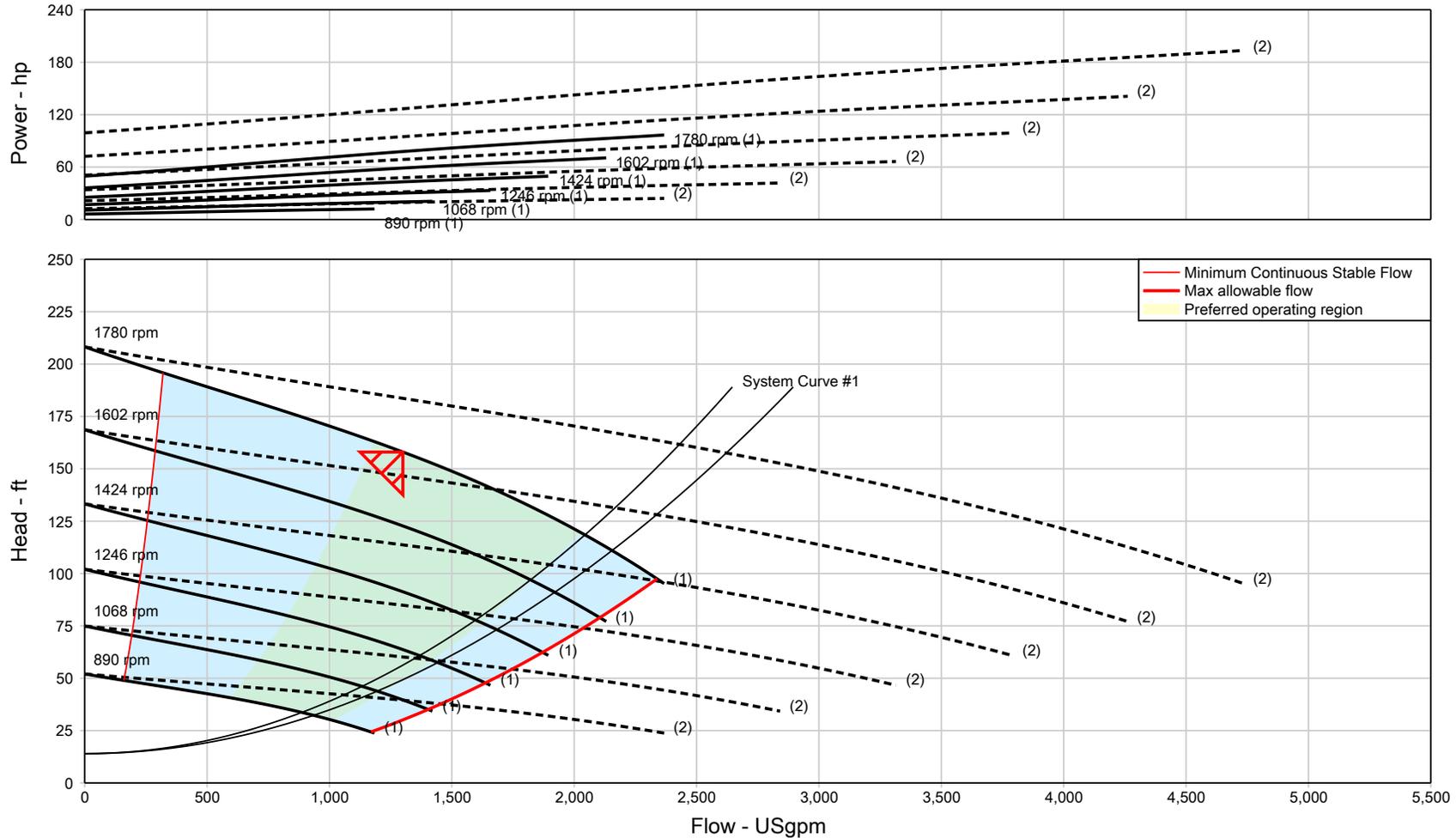
Pressure Data

Maximum working pressure	: 90.10 psi.g
Maximum allowable working pressure	: 187.5 psi.g
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: 190.0 psi.g

Driver & Power Data (@Max density)

Driver sizing specification	: Max Power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 51.86 hp
Power, rated	: 77.80 hp
Power, maximum, rated diameter	: 96.74 hp
Minimum recommended motor rating	: 100.00 hp / 74.57 kW

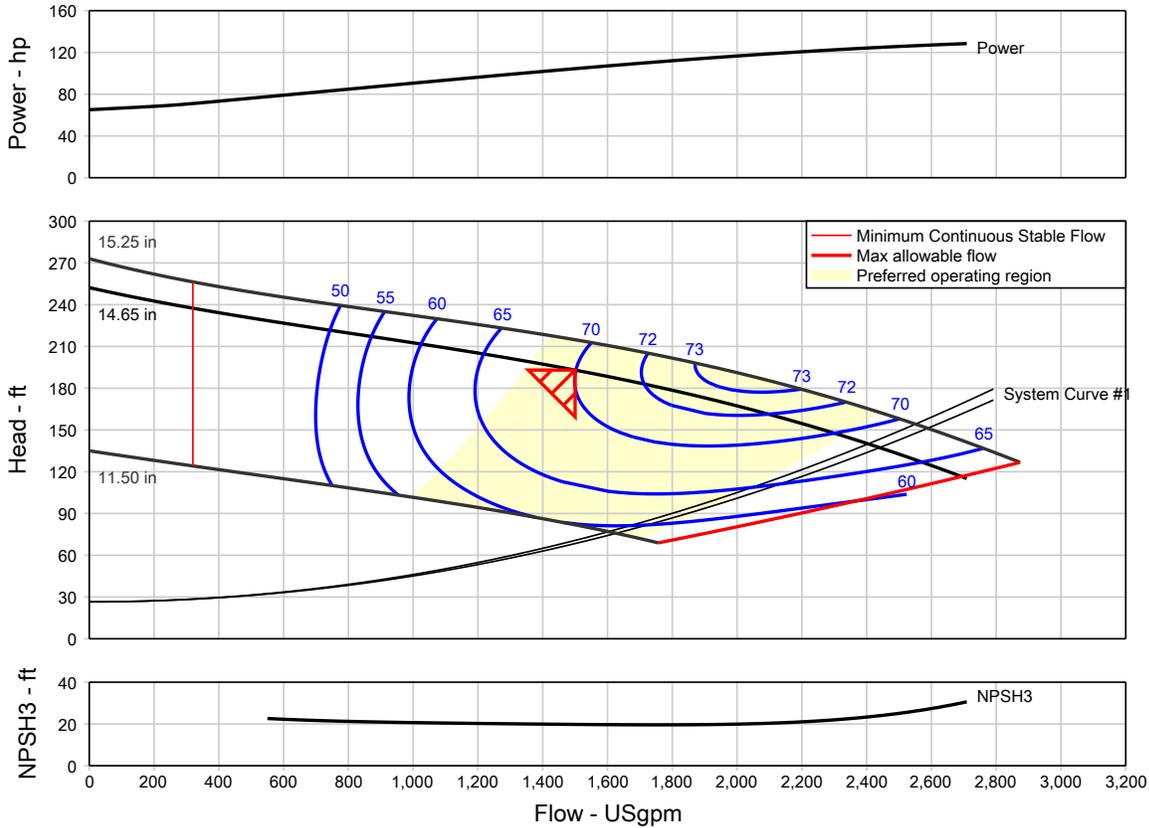


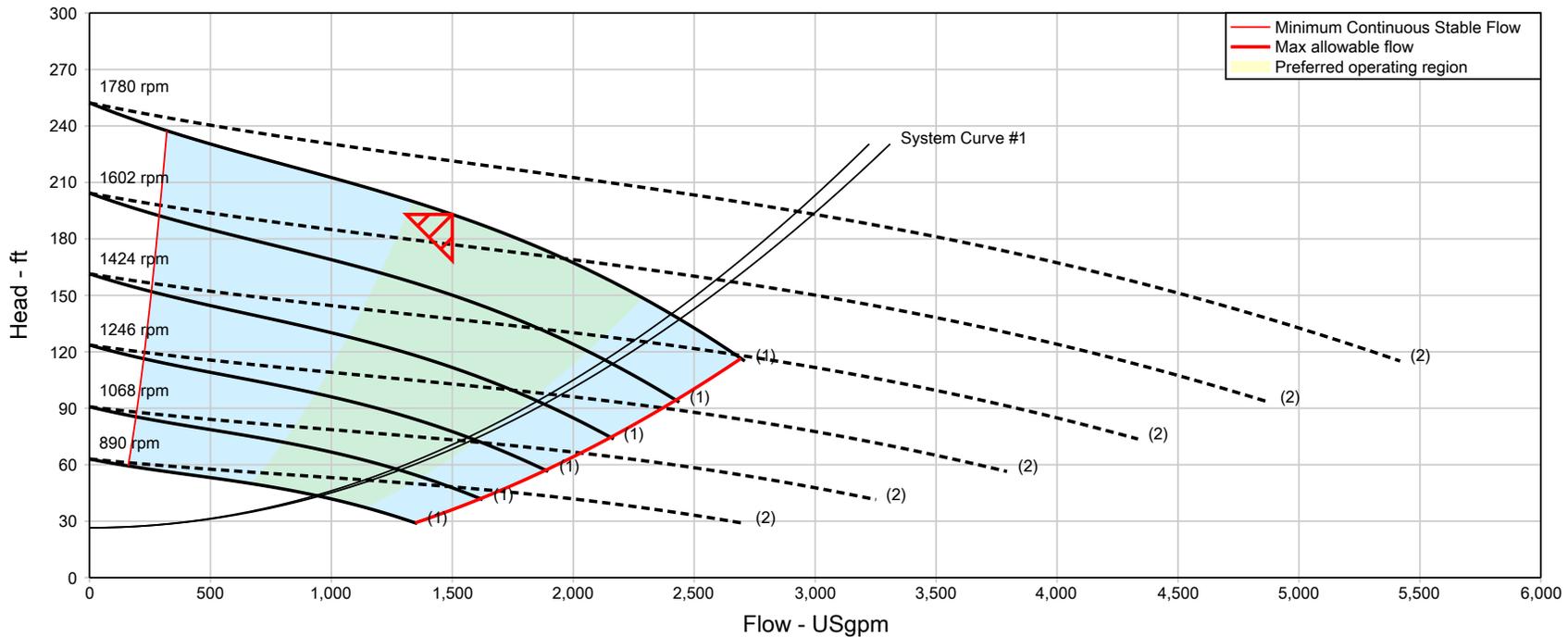
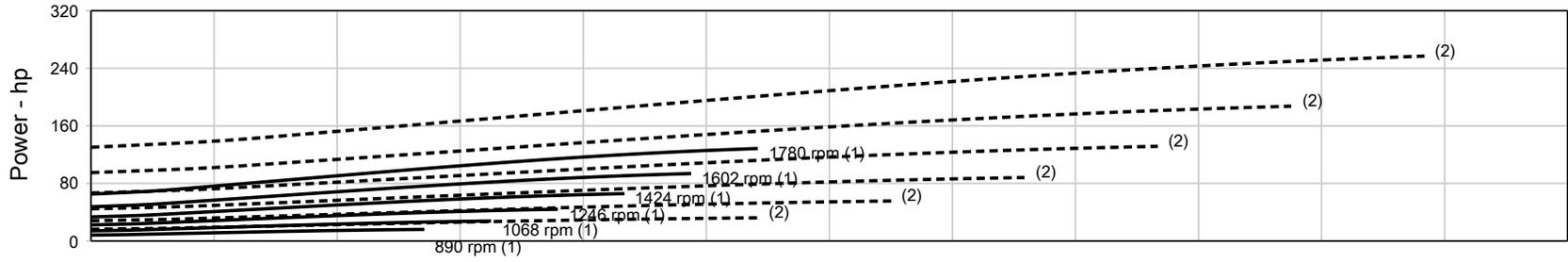


Item number	: 001	Size	: 5" 5436MV	Flow, rated	: 1,300.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 158.0 ft
Quantity	: 1	Efficiency	: 66.66 %	Speed, rated	: 1780 rpm
Quote number	: 386164	Power, rated	: 77.80 hp	Impeller diameter, rated	: 13.46 in
Based on curve number	: 5-5436MV-1800-T5D1AS	NPSH required	: 20.08 ft	Fluid density, rated / max	: 1.000 / 1.000 SG
Date last saved	: 27 Oct 2020 10:11 AM	Site Supply Frequency	: 60 Hz	Viscosity	: 1.00 cP
		Nominal speed	: 1800 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Item number	: 001	Size	: 5" 5436MV
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: 5-5436MV-1800-T5D1AS
Quote number	: 386164	Date last saved	: 27 Oct 2020 10:02 AM

Operating Conditions		Liquid	
Flow, rated	: 1,500.0 USgpm	Liquid type	: Water
Differential head / pressure, rated (requested)	: 193.0 ft	Additional liquid description	:
Differential head / pressure, rated (actual)	: 193.2 ft	Solids diameter, max	: 0.00 in
Suction pressure, rated / max	: 0.00 / 0.00 psi.g	Solids diameter limit	: 3.00 in
NPSH available, rated	: Ample	Solids concentration, by volume	: 0.00 %
Site Supply Frequency	: 60 Hz	Temperature, max	: 68.00 deg F
Performance		Fluid density, rated / max	: 1.000 / 1.000 SG
Speed criteria	: Synchronous	Viscosity, rated	: 1.00 cP
Speed, rated	: 1780 rpm	Vapor pressure, rated	: 0.34 psi.a
Impeller diameter, rated	: 14.65 in	Material	
Impeller diameter, maximum	: 15.25 in	Material selected	: Cast Iron
Impeller diameter, minimum	: 11.50 in	Pressure Data	
Efficiency	: 69.97 %	Maximum working pressure	: 109.2 psi.g
NPSH required / margin required	: 19.78 / 0.00 ft	Maximum allowable working pressure	: 125.0 psi.g
nq (imp. eye flow) / S (imp. eye flow)	: 30 / 164 Metric units	Maximum allowable suction pressure	: N/A
Minimum Continuous Stable Flow	: 320.0 USgpm	Hydrostatic test pressure	: 190.0 psi.g
Head, maximum, rated diameter	: 252.2 ft	Driver & Power Data (@ Max density)	
Head rise to shutoff	: 30.68 %	Driver sizing specification	: Max Power
Flow, best eff. point	: 1,906.9 USgpm	Margin over specification	: 0.00 %
Flow ratio, rated / BEP	: 78.66 %	Service factor	: 1.00
Diameter ratio (rated / max)	: 96.07 %	Power, hydraulic	: 73.09 hp
Head ratio (rated dia / max dia)	: 89.85 %	Power, rated	: 104 hp
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00	Power, maximum, rated diameter	: 128 hp
Selection status	: Acceptable	Minimum recommended motor rating	: 135 hp / 101 kW





Item number	: 001	Size	: 5" 5436MV	Flow, rated	: 1,500.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 193.0 ft
Quantity	: 1	Efficiency	: 69.97 %	Speed, rated	: 1780 rpm
Quote number	: 386164	Power, rated	: 104 hp	Impeller diameter, rated	: 14.65 in
Based on curve number	: 5-5436MV-1800-T5D1AS	NPSH required	: 19.78 ft	Fluid density, rated / max	: 1.000 / 1.000 SG
Date last saved	: 27 Oct 2020 10:02 AM	Site Supply Frequency	: 60 Hz	Viscosity	: 1.00 cP
		Nominal speed	: 1800 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Alternative 4: Capacity Step Graph

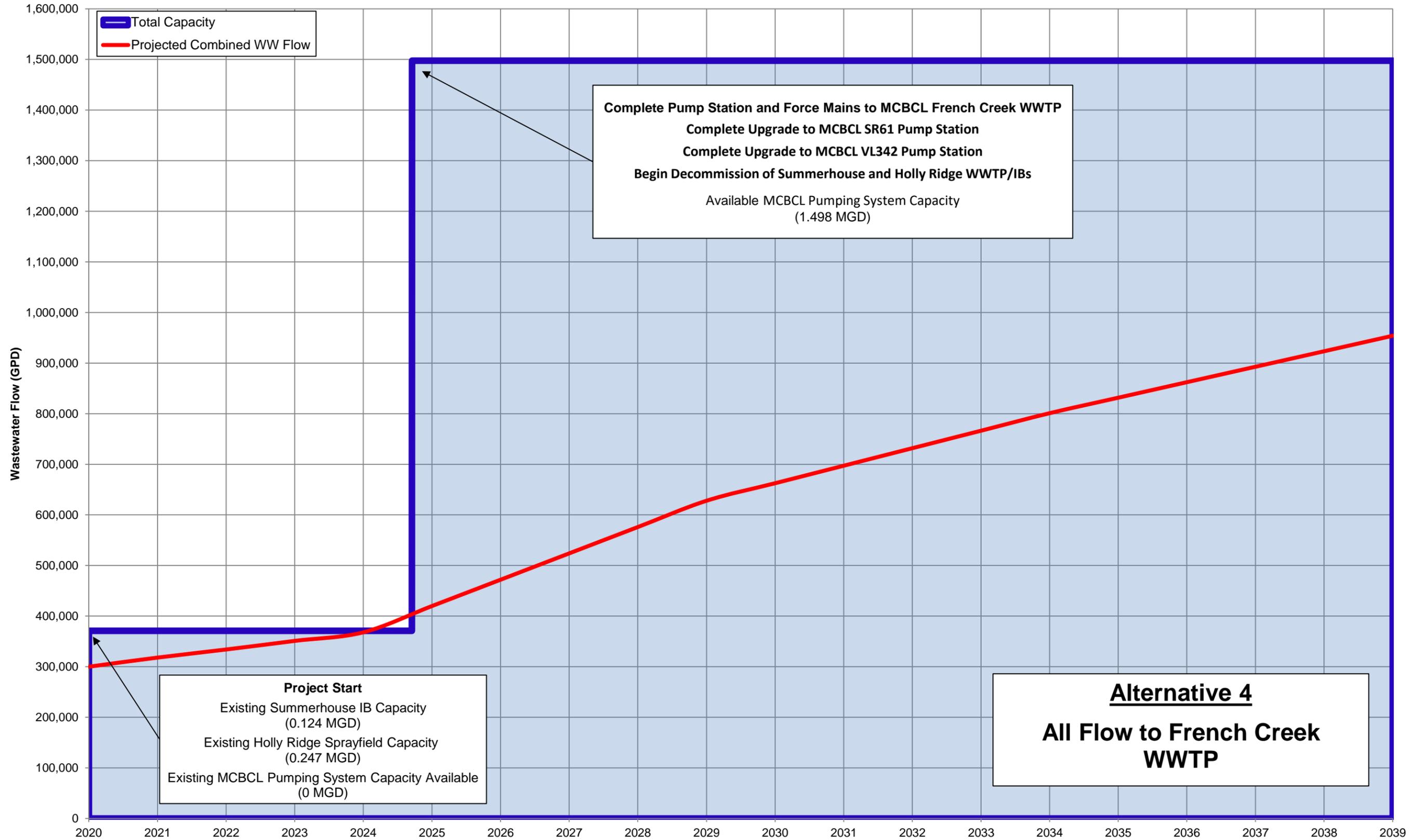


Table 4.0
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation Study

Estimated Capital Costs - October 2020	2021 Cost Capital Cost
Item	
ONWASA Wastewater Pumping System Improvements	
Summerhouse Pump Station, Table 4.1	\$620,000
Transmission from Summerhouse PS to Holly Ridge PS, Table 4.2	\$1,300,000
Holly Ridge Pump Station, Table 4.3	\$2,040,000
Forcemain to SR61 PS, Table 4.4	\$10,400,000
Decommission Holly Ridge WWTP	\$80,000
Decommission Summerhouse WWTP	\$500,000
Construction Subtotal	\$14,940,000
Capital Contingencies (20%)	\$2,988,000
Subtotal	\$17,928,000
Project Administration (design, permitting, bidding, bond counsel, attorney, construction admin/observation)	\$1,793,000
Total Estimated ONWASA Improvements Capital Cost	\$19,800,000
MCBCL Wastewater Pumping System Improvements	
MCBCL Wastewater Pumping System Improvements, Table 4.5	\$8,980,000
Construction Subtotal	\$8,980,000
Capital Contingencies (20%)	\$1,796,000
Subtotal	\$10,776,000
Project Administration (design, permitting, bidding, bond counsel, attorney, construction admin/observation)	\$1,167,000
Total Estimated MCBCL Improvements Capital Cost	\$12,000,000
(2021 Costs) Total Estimated Project Capital Costs	
	\$31,800,000

Table 4.1 - Summerhouse Pump Station
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation

Estimated Capital Costs - October 2020				2020 Costs
Item	Units	Quantity	Unit Price	Capital Cost
Submersible Duplex, 700 gpm Total Capacity, New Wet Well				
Duplex Station - 700 gpm pumps, VFDs, motors	LS	1	\$170,000	\$170,000
Meter Vault with Flow Meter	LS	1	\$20,000	\$20,000
Valve Vault	LS	1	\$20,000	\$20,000
Davit Lift Cranes & Hatches	LS	1	\$45,000	\$45,000
Station Piping & Valves	LS	1	\$30,000	\$30,000
Wet Well	LS	1	\$45,000	\$45,000
Backup Generator	LS	1	\$50,000	\$50,000
SCADA	LS	1	\$40,000	\$40,000
Equipment Installation	LS	1	\$46,000	\$46,000
Component Subtotal				\$470,000
Electrical (22% of Comp. Subtotal)				\$74,000
Site Work (10% of Comp. Subtotal)				\$47,000
(2020 Cost) Estimated Construction Total Cost				\$600,000
(2021 Cost) Estimated Construction Total Cost				\$620,000

**Table 4.2 - Transmission from Summerhouse PS to Holly Ridge PS
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation**

Estimated Capital Costs - October 2020				2020 Costs
Item	Units	Quantity	Unit Price	Capital Cost
12" Forcemain Extension				
12" C900 PVC Forcemain by Open Cut	LF	8,880	\$85	\$755,000
Air Release Manhole w/ Air Release Valve	EA	4	\$10,000	\$40,000
24" Steel Encasement w/ 12" RJDIP Bore and Jack	LF	120	\$420	\$50,000
New Forcemain Connection Box	EA	2	\$35,000	\$70,000
Valves	EA	5	\$17,000	\$85,000
Undercut Unstable Pipe Foundation	CY	590	\$45	\$27,000
Select Backfill	CY	2,000	\$35	\$70,000
Concrete Pavement Patching	SY	90	\$100	\$9,000
Gravel Driveway Repair	SY	90	\$50	\$5,000
Erosion Control	LF	9,000	\$5	\$45,000
Easements	LS	1	\$112,000	\$112,000
(2020 Cost) Estimated Construction Total Cost				\$1,270,000
(2021 Cost) Estimated Construction Total Cost				\$1,300,000

Table 4.3 - Holly Ridge Pump Station
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation

Estimated Capital Costs - October 2020				2020 Costs
Item	Units	Quantity	Unit Price	Capital Cost
Submersible, 1,800 gpm Total Capacity, New Wet Well				
Pumps, VFDs, motors	LS	1	\$380,000	\$380,000
Meter Vault with Flow Meter	LS	1	\$30,000	\$30,000
Valve Vault	LS	1	\$30,000	\$30,000
Davit Lift Cranes & Hatches	LS	1	\$45,000	\$45,000
Station Piping & Valves	LS	1	\$75,000	\$75,000
Pump Station Building	LS	1	\$75,000	\$75,000
Wet Well	LS	1	\$55,000	\$55,000
Odor Control System (Bioxide Type)	LS	1	\$75,000	\$75,000
Backup Generator	LS	1	\$80,000	\$80,000
SCADA	LS	1	\$50,000	\$50,000
Equipment Installation	LS	1	\$81,000	\$81,000
New Influent Headworks				
New Influent Climber Screen	LS	1	\$220,000	\$220,000
New Grit Pump, Cyclone, and Classifier	LS	1	\$200,000	\$200,000
Concrete below grade structure	LS	1	\$75,000	\$75,000
Channel Slide Gate (2 @ \$2,500 each)	EA	2	\$5,000	\$10,000
Equipment Installation	LS	1	\$75,000	\$75,000
Component Subtotal				\$1,560,000
Electrical (22% of Comp. Subtotal)				\$281,000
Site Work (10% of Comp. Subtotal)				\$156,000
(2020 Cost) Estimated Construction Total Cost				\$2,000,000
(2021 Cost) Estimated Construction Total Cost				\$2,040,000

Table 4.4 - Forcemain to SR61 PS
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation

Estimated Capital Costs - October 2020				2020 Costs
Item	Units	Quantity	Unit Price	Capital Cost
14" Forcemain Extension				
14" C900 PVC Forcemain by Open Cut	LF	40,490	\$105	\$4,252,000
Air Release Manhole w/ Air Release Valve	EA	14	\$10,000	\$140,000
28" Steel Encasement w/ 14" RJDIP Bore and Jack	LF	710	\$480	\$341,000
Horizontal Directional Drilling	LF	11,800	\$240	\$2,832,000
Valves	EA	35	\$17,000	\$595,000
Undercut Unstable Pipe Foundation	CY	2,630	\$45	\$119,000
Select Backfill	CY	9,000	\$35	\$315,000
Asphalt Pavement Patching	SY	60	\$125	\$8,000
Concrete Driveway Repair	SY	20	\$100	\$2,000
Gravel Driveway Repair	SY	450	\$50	\$23,000
Erosion Control	LF	40,490	\$5	\$203,000
Tree Clearing	LF	46,460	\$25	\$1,162,000
Easements	LS	1	\$211,000	\$211,000
(2020 Cost) Estimated Construction Total Cost				\$10,200,000
(2021 Cost) Estimated Construction Total Cost				\$10,400,000

Table 4.5 - MCBCL Wastewater Pumping System Improvements
Alternative 4: Southeast Transmission to MCBCL
ONWASA: Holly Ridge and Summerhouse WWTPs Capacity Evaluation

Estimated Capital Costs - October 2020				2020 Costs
Item	Units	Quantity	Unit Price	Capital Cost
SR61 Pump Station Upgrade (Submersible, 2,600 gpm Total Capacity, New Wet Well)				
Large Pumps, VFDs, motors	LS	1	\$460,000	\$460,000
Jockey Pumps, VFDs, motors	LS	1	\$30,000	\$30,000
Flow Meter	LS	1	\$30,000	\$30,000
Davit Lift Cranes & Hatches	LS	1	\$30,000	\$30,000
Station Piping & Valves	LS	1	\$162,000	\$162,000
Grinder in Influent Channel	LS	1	\$100,000	\$100,000
Forcemain Connector Box	LS	1	\$5,000	\$5,000
Equipment Installation	LS	1	\$83,000	\$83,000
Electrical	LS	1	\$788,700	\$789,000
Upsizing Forcemain, ~30,600 LF of 16-inch PVC	LS	1	\$5,380,000	\$5,380,000
VL342 Pump Station Upgrade (Submersible, 3,000 gpm Total Capacity, New Wet Well)				
Large Pumps, VFDs, motors	LS	1	\$460,000	\$460,000
Jockey Pumps, VFDs, motors	LS	1	\$30,000	\$30,000
Flow Meter	LS	1	\$30,000	\$30,000
Davit Lift Cranes & Hatches	LS	1	\$30,000	\$30,000
Station Piping & Valves	LS	1	\$26,000	\$26,000
Grinder in Influent Channel	LS	1	\$100,000	\$100,000
Forcemain Connector Box	LS	1	\$5,000	\$5,000
Equipment Installation	LS	1	\$83,000	\$83,000
Electrical	LS	1	\$788,700	\$789,000
Component Subtotal				\$8,630,000
Site Work (5% of PS work)				\$163,000
(2020 Cost) Estimated Construction Total Cost				\$8,800,000
(2021 Cost) Estimated Construction Total Cost				\$8,980,000

EXHIBIT B CONTINUED

ALTERNATIVE 4: PUMP ALL FLOW (0.95 MGD) TO FRENCH CREEK WWTP
TOTAL O&M COST PROJECTIONS

New Service Areas Online

Stop Treatment, Pump All Flows To French Creek WWTP

WASTEWATER TREATMENT PLANT ITEM	FY20/21	ANNUAL ESCALATOR	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
SALARIES AND BENEFITS	\$159,000	3%	\$164,000	\$169,000	\$174,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MISCELLANEOUS (OPERATIONS)	\$35,000	2%	\$36,000	\$37,000	\$38,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MISC. MAINTENANCE AND REPAIR	\$30,000	2%	\$31,000	\$32,000	\$32,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
UTILITIES	\$120,000	4%	\$146,000	\$120,000	\$137,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MAINTENANCE AND REPAIR - WWTP	\$50,000	2%	\$51,000	\$53,000	\$54,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TREATMENT SUPPLIES	\$74,000	4% / 2%	\$94,000	\$68,000	\$80,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
SLUDGE DISPOSAL	\$42,000	2%	\$53,000	\$38,000	\$43,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL WWTP ANNUAL O&M COSTS	\$510,000		\$575,000	\$517,000	\$558,000	\$0														

FRENCH CREEK USAGE FEE ITEM	FY20/21	ANNUAL ESCALATOR	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
FRENCH CREEK WWTP FEE	\$0	\$0.20 / 3yrs	\$0	\$0	\$0	\$665,000	\$780,000	\$904,000	\$993,000	\$1,083,000	\$1,190,000	\$1,252,000	\$1,314,000	\$1,431,000	\$1,495,000	\$1,553,000	\$1,671,000	\$1,730,000	\$1,790,000	\$1,917,000
TOTAL FRENCH CREEK USAGE ANNUAL O&M COSTS	\$0		\$0	\$0	\$0	\$665,000	\$780,000	\$904,000	\$993,000	\$1,083,000	\$1,190,000	\$1,252,000	\$1,314,000	\$1,431,000	\$1,495,000	\$1,553,000	\$1,671,000	\$1,730,000	\$1,790,000	\$1,917,000

PUMP STATION ITEMS	FY20/21	ANNUAL ESCALATOR	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
SALARIES AND LABOR	\$0	3%	\$0	\$0	\$0	\$20,000	\$21,000	\$22,000	\$22,000	\$23,000	\$24,000	\$24,000	\$25,000	\$26,000	\$26,000	\$27,000	\$28,000	\$29,000	\$30,000	\$31,000
UTILITIES	\$0	4%	\$0	\$0	\$0	\$34,000	\$40,000	\$47,000	\$54,000	\$61,000	\$68,000	\$74,000	\$82,000	\$89,000	\$98,000	\$106,000	\$114,000	\$123,000	\$133,000	\$143,000
TREATMENT SUPPLIES	\$0	2%	\$0	\$0	\$0	\$45,000	\$51,000	\$58,000	\$65,000	\$73,000	\$78,000	\$84,000	\$90,000	\$96,000	\$102,000	\$108,000	\$114,000	\$121,000	\$127,000	\$134,000
MAINTENANCE AND REPAIR - PUMP STATIONS	\$0	2%	\$0	\$0	\$0	\$12,000	\$12,000	\$12,000	\$13,000	\$13,000	\$13,000	\$13,000	\$14,000	\$14,000	\$14,000	\$15,000	\$15,000	\$15,000	\$15,000	\$16,000
TOTAL PUMP STATIONS ANNUAL O&M COSTS	\$0		\$0	\$0	\$0	\$111,000	\$124,000	\$139,000	\$154,000	\$170,000	\$183,000	\$195,000	\$211,000	\$225,000	\$240,000	\$256,000	\$271,000	\$288,000	\$305,000	\$324,000

New Service Areas Online

Stop Treatment, Pump All Flows To French Creek WWTP

ALTERNATIVE NO. 4 O&M ITEMS	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
WASTEWATER TREATMENT PLANT	\$510,000	\$575,000	\$517,000	\$558,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
FRENCH CREEK WWTP FEE	\$0	\$0	\$0	\$0	\$665,000	\$780,000	\$904,000	\$993,000	\$1,083,000	\$1,190,000	\$1,252,000	\$1,314,000	\$1,431,000	\$1,495,000	\$1,553,000	\$1,671,000	\$1,730,000	\$1,790,000	\$1,917,000
PUMP STATIONS	\$0	\$0	\$0	\$0	\$111,000	\$124,000	\$139,000	\$154,000	\$170,000	\$183,000	\$195,000	\$211,000	\$225,000	\$240,000	\$256,000	\$271,000	\$288,000	\$305,000	\$324,000
ALTERNATIVE NO. 4 TOTAL ANNUAL O&M COSTS	\$510,000	\$575,000	\$517,000	\$558,000	\$776,000	\$904,000	\$1,043,000	\$1,147,000	\$1,253,000	\$1,373,000	\$1,447,000	\$1,525,000	\$1,656,000	\$1,735,000	\$1,809,000	\$1,942,000	\$2,018,000	\$2,095,000	\$2,241,000

**ALTERNATIVE 4: PUMP ALL SOUTHEAST AREA FLOW (0.95 MGD) TO FRENCH CREEK WWTP
PUMP STATION O&M CALCULATIONS**

SOUTHEAST AREA ANNUAL FLOW ROUTING

New Service Areas Online → Stop Treatment at WWTPs, Pump All Flows To French Creek WWTP

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
Summerhouse Subdivision	0.11	0.14	0.09	0.11	0.12	0.13	0.14	0.15	0.17	0.18	0.19	0.20	0.21	0.23	0.23	0.24	0.25	0.25	0.26
Kings Creek Crossing	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.10	0.11	0.12
Preserve at Morris Landing	0.00	0.00	0.00	0.00	0.01	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09
Tumbling Brook Area	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Holly Ridge Road Area	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.07
Holly Ridge Collection System	0.21	0.20	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.36
Total	0.32	0.33	0.35	0.37	0.42	0.47	0.52	0.58	0.63	0.66	0.70	0.73	0.77	0.80	0.83	0.86	0.89	0.92	0.95
Flow Treated at Summerhouse WWTP	0.11	0.14	0.09	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flow Treated at Holly Ridge WWTP	0.21	0.20	0.26	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flow Pumped from Summerhouse PS to Holly Ridge PS	0.00	0.00	0.00	0.00	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.26	0.28	0.30	0.32	0.33	0.35	0.36	0.38
Flow Pumped from Holly Ridge PS to French Creek WWTP	0.00	0.00	0.00	0.00	0.42	0.47	0.52	0.58	0.63	0.66	0.70	0.73	0.77	0.80	0.83	0.86	0.89	0.92	0.95

PUMP STATION ANNUAL USAGE INFORMATION

SUMMERHOUSE PS

700 gpm
1.01 MGD
60 kW
0 gal Odor Control/MGD
0.17 No. of Employees

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
Flow at Summerhouse PS (MGD)	0.00	0.00	0.00	0.00	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.26	0.28	0.30	0.32	0.33	0.35	0.36	0.38
Daily Run Time (hrs)	0.00	0.00	0.00	0.00	3.00	3.48	3.95	4.43	4.90	5.37	5.84	6.30	6.77	7.24	7.60	7.95	8.31	8.67	9.02
kW*hr/yr	0	0	0	0	65,700	76,129	86,557	96,986	107,414	117,634	127,854	138,074	148,294	158,514	166,336	174,157	181,979	189,800	197,621
Summerhouse PS Chem. Used (gal/yr)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. of Full Time Employees	0	0	0.00	0.00	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

HOLLY RIDGE PS

1,800 gpm
2.59 MGD
230 kW
90 gal Odor Control/MGD
0.17 No. of Employees

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
Flow at Holly Ridge PS (MGD)	0.00	0.00	0.00	0.00	0.42	0.47	0.52	0.58	0.63	0.66	0.70	0.73	0.77	0.80	0.83	0.86	0.89	0.92	0.95
Daily Run Time (hrs)	0.00	0.00	0.00	0.00	3.89	4.37	4.85	5.33	5.81	6.14	6.46	6.78	7.10	7.42	7.70	7.98	8.27	8.55	8.83
kW*hr/yr	0	0	0	0	326,472	366,893	407,313	447,733	488,154	515,049	541,944	568,839	595,734	622,629	646,415	670,201	693,987	717,773	741,558
Holly Ridge PS Chem. Used (gal/yr)	0	0	0	0	13,797	15,505	17,213	18,922	20,630	21,766	22,903	24,040	25,176	26,313	27,318	28,323	29,328	30,334	31,339
No. of Full Time Employees	0	0	0.00	0.00	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

SUMMERHOUSE PS O&M LINE ITEMS	UNIT	FY20/21 UNIT COST	ANNUAL UNIT	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
SALARIES AND BENEFITS	FT Employees	\$53,000	3%	\$0	\$0	\$0	\$0	\$10,141	\$10,445	\$10,758	\$11,081	\$11,414	\$11,756	\$12,109	\$12,472	\$12,846	\$13,231	\$13,628	\$14,037	\$14,458	\$14,892	\$15,339
UTILITIES	kW-hr/yr	\$0.075	4%	\$0	\$0	\$0	\$0	\$5,764	\$6,947	\$8,214	\$9,572	\$11,025	\$12,557	\$14,194	\$15,942	\$17,807	\$19,795	\$21,603	\$23,524	\$25,563	\$27,728	\$30,026
TREATMENT SUPPLIES	Gallon	\$3.00	2%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
MAINTENANCE AND REPAIR - PUMP STATION	Lump Sum	\$4,000	2%	\$0	\$0	\$0	\$0	\$4,330	\$4,416	\$4,505	\$4,595	\$4,687	\$4,780	\$4,876	\$4,973	\$5,073	\$5,174	\$5,278	\$5,383	\$5,491	\$5,601	\$5,713
TOTAL SUMMERHOUSE PS O&M COSTS				\$0	\$0	\$0	\$0	\$20,235	\$21,808	\$23,477	\$25,248	\$27,126	\$29,094	\$31,179	\$33,387	\$35,726	\$38,201	\$40,509	\$42,944	\$45,513	\$48,221	\$51,078

HOLLY RIDGE PS O&M LINE ITEMS	UNIT	FY20/21 UNIT COST	ANNUAL UNIT	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39
SALARIES AND BENEFITS	FT Employees	\$53,000	3%	\$0	\$0	\$0	\$0	\$10,141	\$10,445	\$10,758	\$11,081	\$11,414	\$11,756	\$12,109	\$12,472	\$12,846	\$13,231	\$13,628	\$14,037	\$14,458	\$14,892	\$15,339
UTILITIES	kW-hr/yr	\$0.075	4%	\$0	\$0	\$0	\$0	\$28,644	\$33,479	\$38,654	\$44,189	\$50,105	\$54,981	\$60,166	\$65,678	\$71,534	\$77,754	\$83,954	\$90,525	\$97,487	\$104,861	\$112,670
TREATMENT SUPPLIES	Gallon	\$3.00	2%	\$0	\$0	\$0	\$0	\$44,803	\$51,357	\$58,155	\$65,205	\$72,513	\$78,039	\$83,756	\$89,671	\$95,789	\$102,115	\$108,137	\$114,358	\$120,785	\$127,423	\$134,279
MAINTENANCE AND REPAIR - PUMP STATION	Lump Sum	\$7,000	2%	\$0	\$0	\$0	\$0	\$7,577	\$7,729	\$7,883	\$8,041	\$8,202	\$8,366	\$8,533	\$8,704	\$8,878	\$9,055	\$9,236	\$9,421	\$9,609	\$9,802	\$9,998
TOTAL HOLLY RIDGE PS O&M COSTS				\$0	\$0	\$0	\$0	\$91,165	\$103,009	\$115,450	\$128,516	\$142,234	\$153,141	\$164,563	\$176,524	\$189,047	\$202,156	\$214,955	\$228,341	\$242,340	\$256,979	\$272,285

COMBINED PUMP STATION O&M COSTS BY BUDGET ITEM

New Service Areas Online → Stop Treatment at WWTPs, Pump All Flows To French Creek WWTP

ALTERNATIVE NO. 4 PUMP STATION O&M LINE ITEMS	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	FY30/31	FY31/32	FY32/33	FY33/34	FY34/35	FY35/36	FY36/37	FY37/38	FY38/39	
SALARIES AND BENEFITS	\$0	\$0	\$0	\$0	\$20,000	\$21,000	\$22,000	\$22,000	\$23,000	\$24,000	\$24,000	\$25,000	\$26,000	\$26,000	\$27,000	\$28,000	\$29,000	\$30,000	\$30,000	\$31,000
UTILITIES	\$0	\$0	\$0	\$0	\$34,000	\$40,000	\$47,000	\$54,000	\$61,000	\$68,000	\$74,000	\$82,000	\$89,000	\$98,000	\$106,000	\$114,000	\$123,000	\$133,000	\$143,000	
TREATMENT SUPPLIES	\$0	\$0	\$0	\$0	\$45,000	\$51,000	\$58,000	\$65,000	\$73,000	\$78,000	\$84,000	\$90,000	\$96,000	\$102,000	\$108,000	\$114,000	\$121,000	\$127,000	\$134,000	
MAINTENANCE AND REPAIR - PUMP STATION	\$0	\$0	\$0	\$0	\$12,000	\$12,000	\$12,000	\$13,000	\$13,000	\$13,000	\$13,000	\$14,000	\$14,000	\$14,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$16,000
ALTERNATIVE NO. 4 PS O&M COSTS	\$0	\$0	\$0	\$0	\$111,000	\$124,000	\$139,000	\$154,000	\$170,000	\$183,000	\$195,000	\$211,000	\$225,000	\$240,000	\$256,000	\$271,000	\$288,000	\$305,000	\$324,000	

EXHIBIT B CONTINUED

Technical Memorandum
Holly Ridge/Summerhouse WWTP Capacity Study-Alternatives
November 2, 2020 ONWASA



THE WOOTEN COMPANY

ATTACHMENT 2

MCBCL WASTEWATER PUMPING SYSTEM INFORMATION

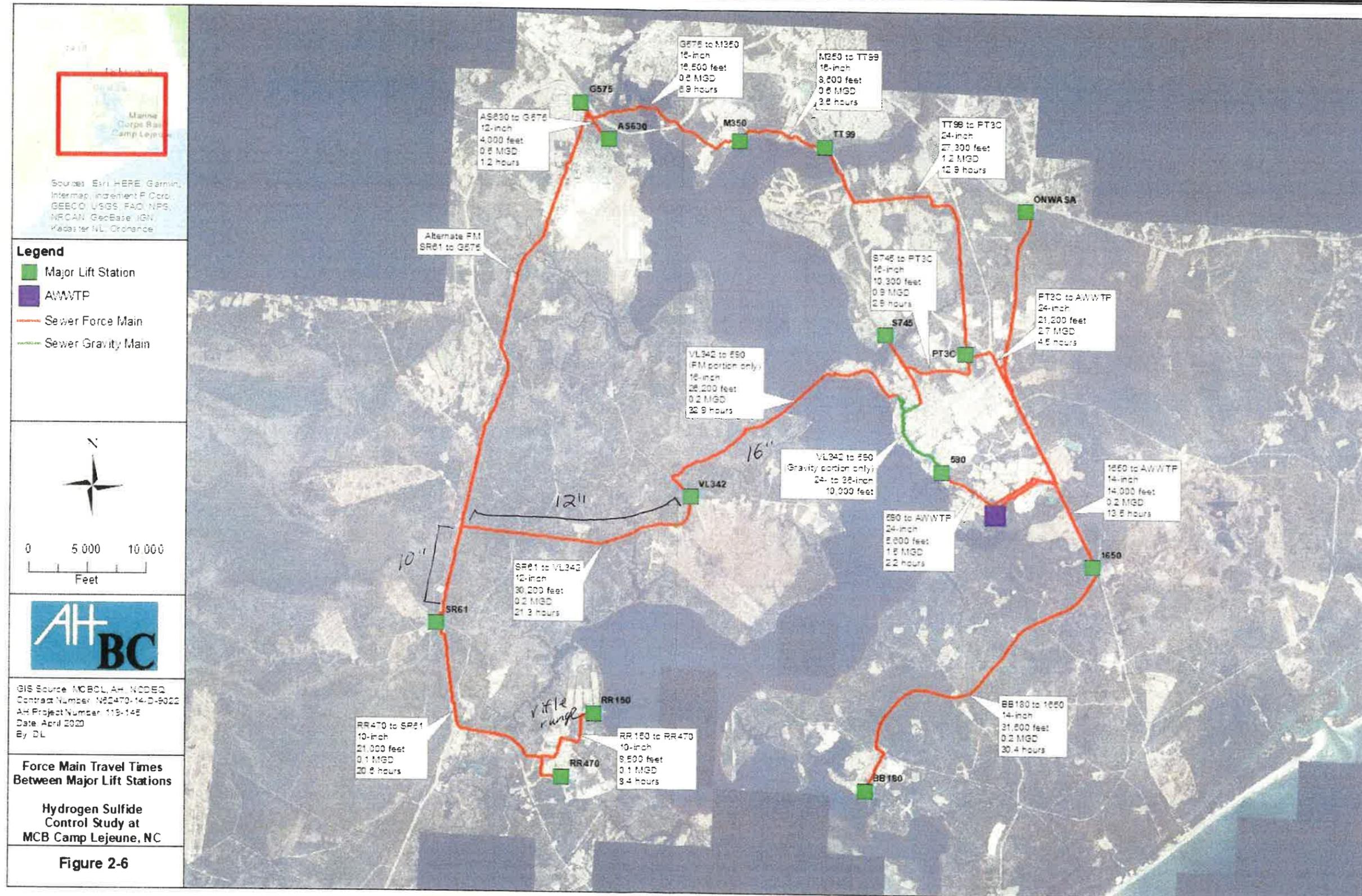


EXHIBIT B CONTINUED

Communications Electrical Gas POL Thermal Wastewater Water

ng

Verona Loop Rd

FM TO VL342

Verona Loop Rd

US-17

Zoom to

Wastewater Utility Segment (In Service)

IDPK	WWSEG_09929
Name	Wastewater Collection System
Description	
Segment Type	sForceMain
networkSubType	
pipeLocation	
diameter	12.00
diameterUOM	inch
material	C900
facilityIDFK	
facilityNumber	
RPUID	

Legend

Electrical

SR61

US-17

Wastewater Utility Segment (In Service)

IDPK	WWSEG_00262
Name	Wastewater Collection System
Description	GSRA
Segment Type	sForceMain
networkSubType	
pipeLocation	
diameter	10.00
diameterUOM	inch
material	C900
facilityIDFK	NFA100000308525
facilityNumber	UN240
RPUID	

Legend

EXHIBIT B CONTINUED

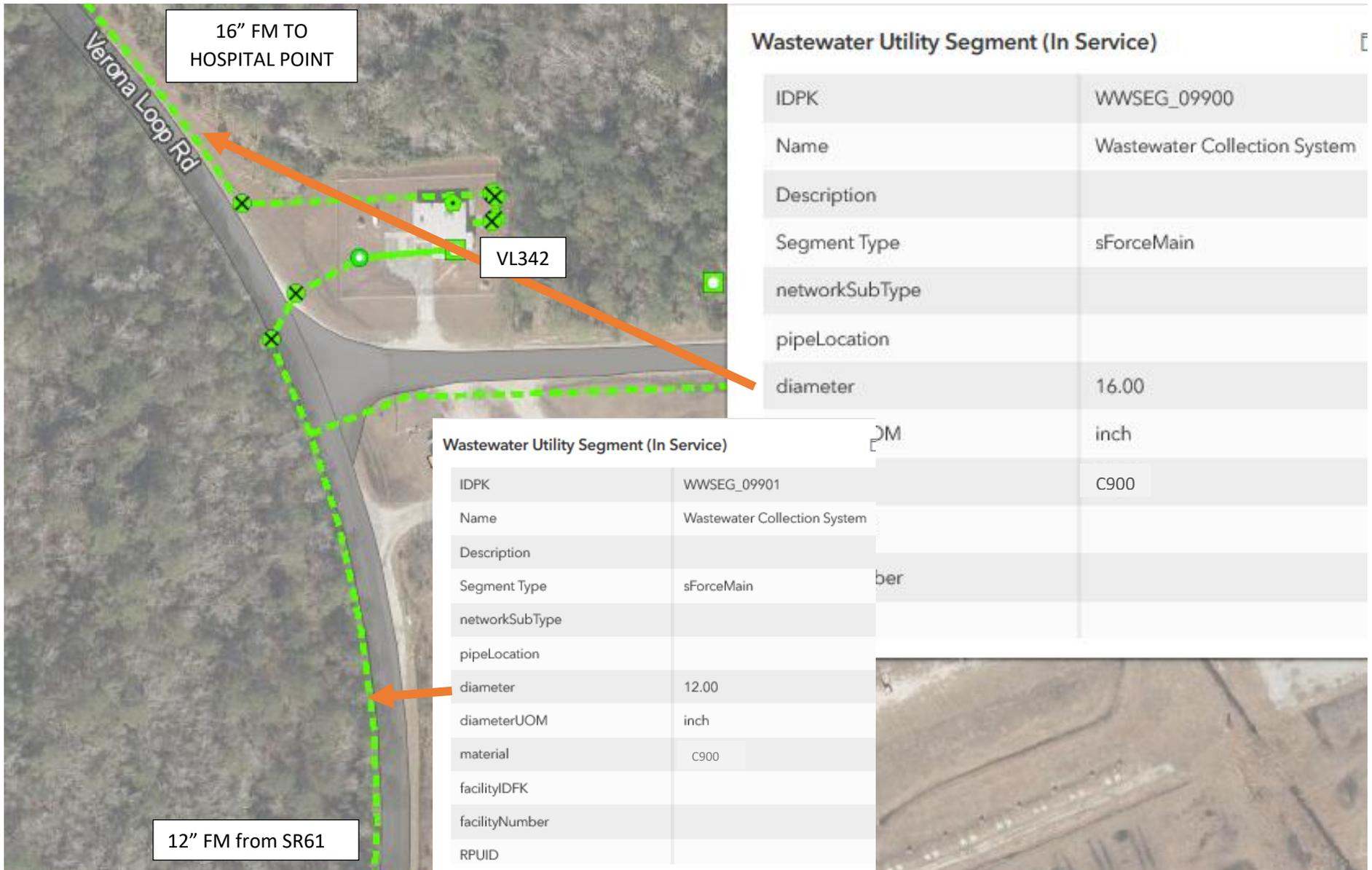


EXHIBIT B CONTINUED



EXHIBIT B CONTINUED

*Pump Station	Large Pumps, gpm	Small Pumps, gpm	Capacity, MGD	Firm/Design Capacity, MGD
RR470	792	----		1.14
SR61	500**	350	0.72	1.01
VL342	1,153***	----	1.66	1.30
745-2	1,880	1,000	2.71	2.88
745-1	1,280	740	1.84	2.13
590	10,300	4,500	14.83	12.96

*FTSE 2017

Notes added by the Wooten Company:

**Based on drawdown tests performed by base personnel from the WWTP, the current discharge flow rate with one (1) large pump running is 800 gpm

***Based on drawdown tests performed by base personnel from the WWTP, the current discharge flow rate with one (1) large pump running is 2,100 gpm

PUMP STATION SR61

Rifle Range – US Hwy 17 Pump Station SR61

Existing Conditions

Pump Station SR61 is located off CC Road, just off U.S. Highway 17 South and North of the new Marine Special Operations Command (MARSOC) Compound. This station is comprised of a concrete wet well, comminutor and manual bar screen channels, four (4) submersible pumps (two large, two small), a brick building housing the discharge control valves and pump controls, backup power generator with automatic transfer switch, monorail system, security fencing and SCADA system.

The station receives flow via force main from both pump stations RR470 and SR56. The discharge location for the force main from this station was changed during the construction of the MARSOC Complex. The old discharge location was into the gravity collection system for Pump Station AS630. The new location is pump station VL342. The station utilizes both an existing 10-inch and 12-inch force main before discharging into Pump Station VL342. Based on draw down tests performed by base personnel from the WWTP, the current discharge flow rate with one (1) large pump running is 800 gpm or 1,152,000 gpd. The current discharge flow rate of both small pumps running at the same time is approximately 635 gpm or 914,400 gpd. The current average daily flow based on data provided by base personnel is 78,615 gpd with a peak flow rate of around 121,242 gpd.

This pump station including pumps, electrical wiring, backup power generator and structure are in good condition.

Future Conditions

The only future expansions of flow for this station are the currently ongoing improvements at the MARSOC Compound. The total build out flow rate for the MARSOC Compound as provided by the Base is 209,365 gpd (non-peaked). All improvements at the MARSOC Compound have to come through Pump Station RR470 before being pumped to Pump Station SR61.

Recommendations

The existing flow rate of 800 gpm for the large pumps at Pump Station SR61 is large enough to handle all of the currently planned development at the MARSOC Complex plus the Greater Sandy Run area without upgrade. Based on the planned maximum build out of the MARSOC Complex and Greater Sandy Run, there still would be approximately 900,000 gpd of capacity remaining for future growth.

However, this current scenario would not be possible with the current discharge rate of approximately 1,400 gpm of flow coming in from Pump Station RR470. The flow rate of pump station RR470 must be reduced to just above the minimum 2 fps velocity required for a 10-inch force main at a pumping rate of around 500 gpm. See recommendations for Pump Station RR470.

If the recommendations for Pump Station RR470 are implemented, then there are no recommended upgrades to Pump Station SR61 at this time.

EXHIBIT B CONTINUED

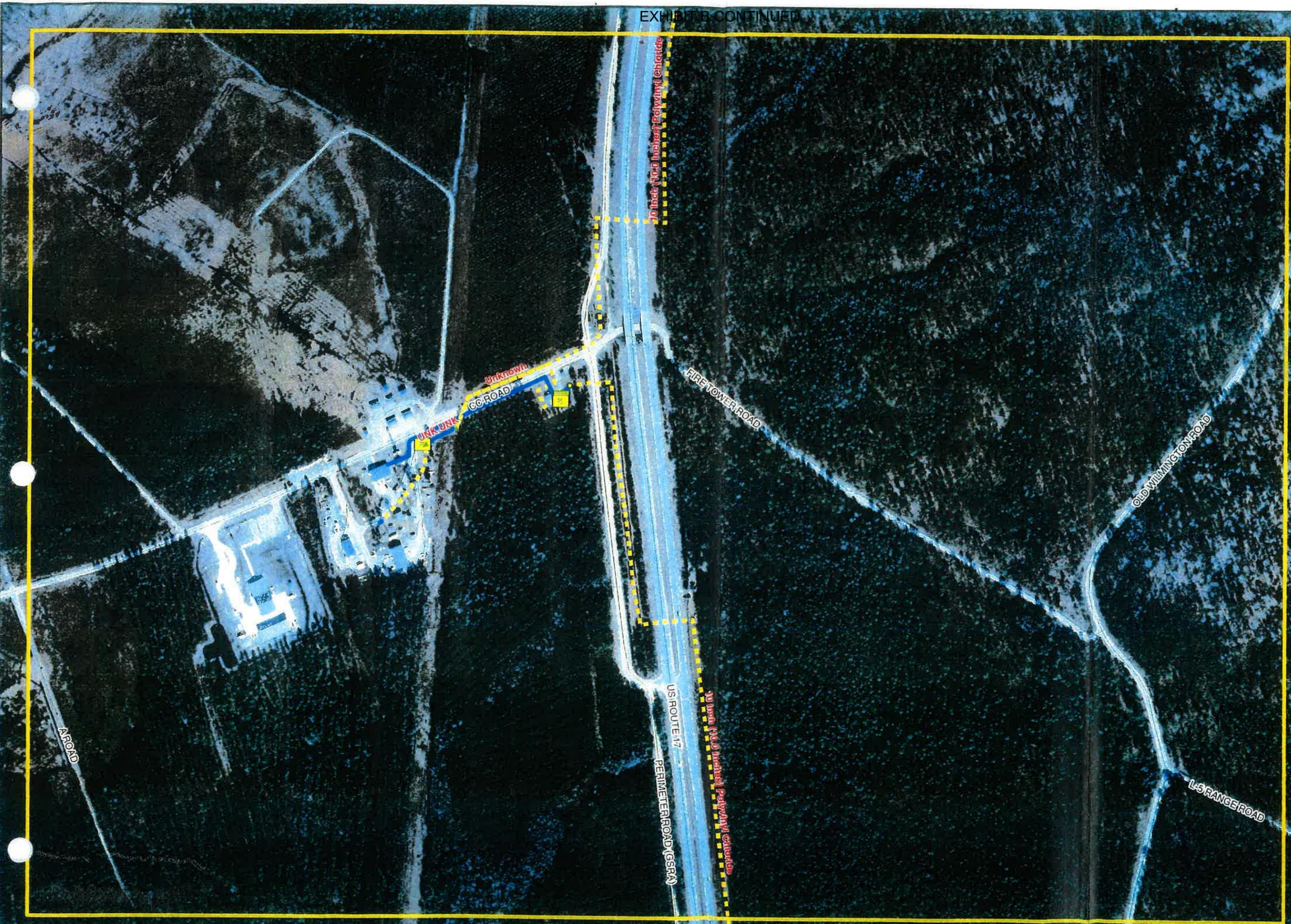
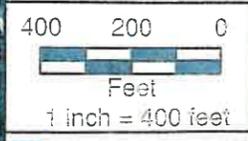




Rifle Range Area Map
(Projects 2011 - 2014)

Legend

- MANHOLE
- VALVE BOX
- Pump Stations
- Sewer Lines**
- ABANDONED
- FORCE MAIN
- GRAVITY
- Future Projects**
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015



PUMP STATION VL342

Verona Loop Pump Station VL342

Existing Conditions

The existing sewer Pump Station VL342 is located off Verona Loop Road near the intersection of Rhodes Point Road. This station only receives flow from Pump Station SR61. The station utilizes an existing 16-inch polyvinylchloride (PVC) force main for which the maximum pumping rate originally was designed to be approximately 1,800 gpm or 2,592,000 gpd.

The average daily flow based on flow rates provided by base personnel at the WWTP is approximately 79,778 gpd. The peak flow observed was approximately 188,960 gpd.

This pump station is relatively brand new. This station is comprised of a concrete wet well with concrete influent channels which are in good condition. The influent channels are equipped with a comminutor and manual bar screen. This station is equipped with four (4) submersible non-clog sewage pumps for which the original design condition stated the two (2) large pumps were to be 1,800 gpm and the two (2) small pumps were to be 900 gpm. Both Hobbs, Upchurch & Associates, P.A. and base personnel from the WWTP performed draw down tests on Pump Station VL 342. Both draw down tests resulted in approximately the same results. The two (2) large pumps were found to pump 2,324 gpm and 2,124 gpm, respectively; and, the two (2) small pumps were found to pump 467 gpm and 367 gpm, respectively. Please note that the flow rates for the two (2) small pumps do not meet NCDENR requirements for minimum flow rates for a 16-inch force main.

The station has a brick building which houses the backup power generator, discharge valves and controls pump controls, automatic transfer switch, SCADA and flow metering monitoring equipment. The station also has a monorail hoist system, surge control valves, bypass pump connection and security fencing.

Future Conditions

The original design of this station was included under the "P1182B Stone Bay sewer to Mainside & P1147 Wastewater System Improvements" projects which included all future projects planned for this entire collection system including the "MARSOC Complex Final Site Civil & Infrastructure Plans". There are no additional future projects planned for this collection system prior to 2014.

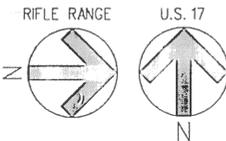
Recommendations

The large pumps in the existing pump station and the existing force main have the capacity to handle the current design flow with additional capacity for growth without upgrades at this time.

However, the small pumps do not meet current NCDENR required minimum flow rates for a 16-inch force main. This station is new enough that the design engineer needs to be contacted to reevaluate the pumps' performance.

VI 312
EXHIBIT B-CONTINUED

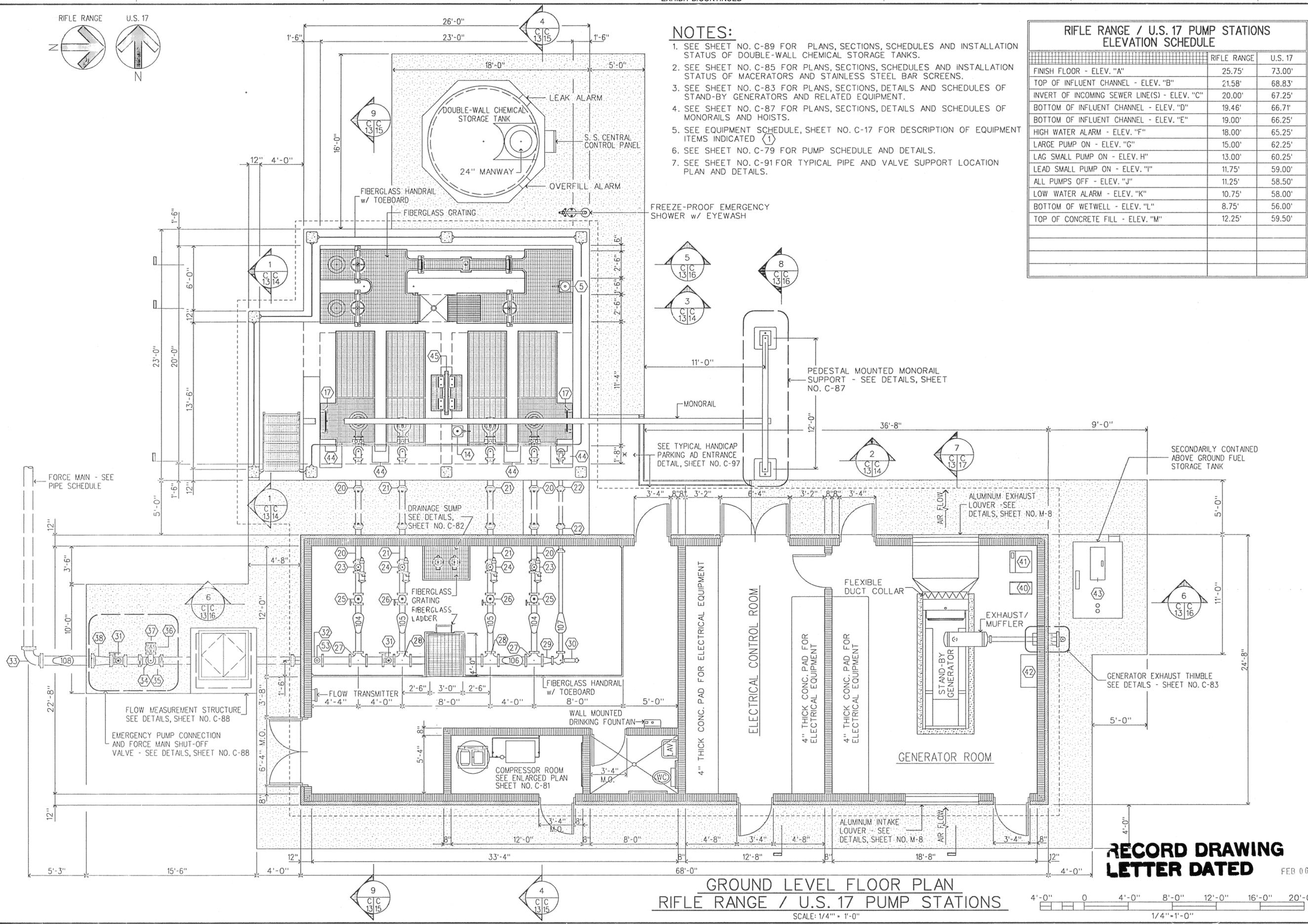




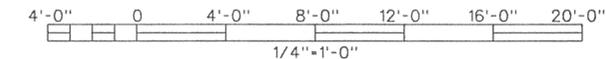
NOTES:

1. SEE SHEET NO. C-89 FOR PLANS, SECTIONS, SCHEDULES AND INSTALLATION STATUS OF DOUBLE-WALL CHEMICAL STORAGE TANKS.
2. SEE SHEET NO. C-85 FOR PLANS, SECTIONS, SCHEDULES AND INSTALLATION STATUS OF MACERATORS AND STAINLESS STEEL BAR SCREENS.
3. SEE SHEET NO. C-83 FOR PLANS, SECTIONS, DETAILS AND SCHEDULES OF STAND-BY GENERATORS AND RELATED EQUIPMENT.
4. SEE SHEET NO. C-87 FOR PLANS, SECTIONS, DETAILS AND SCHEDULES OF MONORAILS AND HOISTS.
5. SEE EQUIPMENT SCHEDULE, SHEET NO. C-17 FOR DESCRIPTION OF EQUIPMENT ITEMS INDICATED (1).
6. SEE SHEET NO. C-79 FOR PUMP SCHEDULE AND DETAILS.
7. SEE SHEET NO. C-91 FOR TYPICAL PIPE AND VALVE SUPPORT LOCATION PLAN AND DETAILS.

RIFLE RANGE / U.S. 17 PUMP STATIONS ELEVATION SCHEDULE		
	RIFLE RANGE	U.S. 17
FINISH FLOOR - ELEV. "A"	25.75'	73.00'
TOP OF INFLUENT CHANNEL - ELEV. "B"	21.58'	68.83'
INVERT OF INCOMING SEWER LINE(S) - ELEV. "C"	20.00'	67.25'
BOTTOM OF INFLUENT CHANNEL - ELEV. "D"	19.46'	66.71'
BOTTOM OF INFLUENT CHANNEL - ELEV. "E"	19.00'	66.25'
HIGH WATER ALARM - ELEV. "F"	18.00'	65.25'
LARGE PUMP ON - ELEV. "G"	15.00'	62.25'
LAG SMALL PUMP ON - ELEV. "H"	13.00'	60.25'
LEAD SMALL PUMP ON - ELEV. "I"	11.75'	59.00'
ALL PUMPS OFF - ELEV. "J"	11.25'	58.50'
LOW WATER ALARM - ELEV. "K"	10.75'	58.00'
BOTTOM OF WETWELL - ELEV. "L"	8.75'	56.00'
TOP OF CONCRETE FILL - ELEV. "M"	12.25'	59.50'



**GROUND LEVEL FLOOR PLAN
RIFLE RANGE / U.S. 17 PUMP STATIONS**



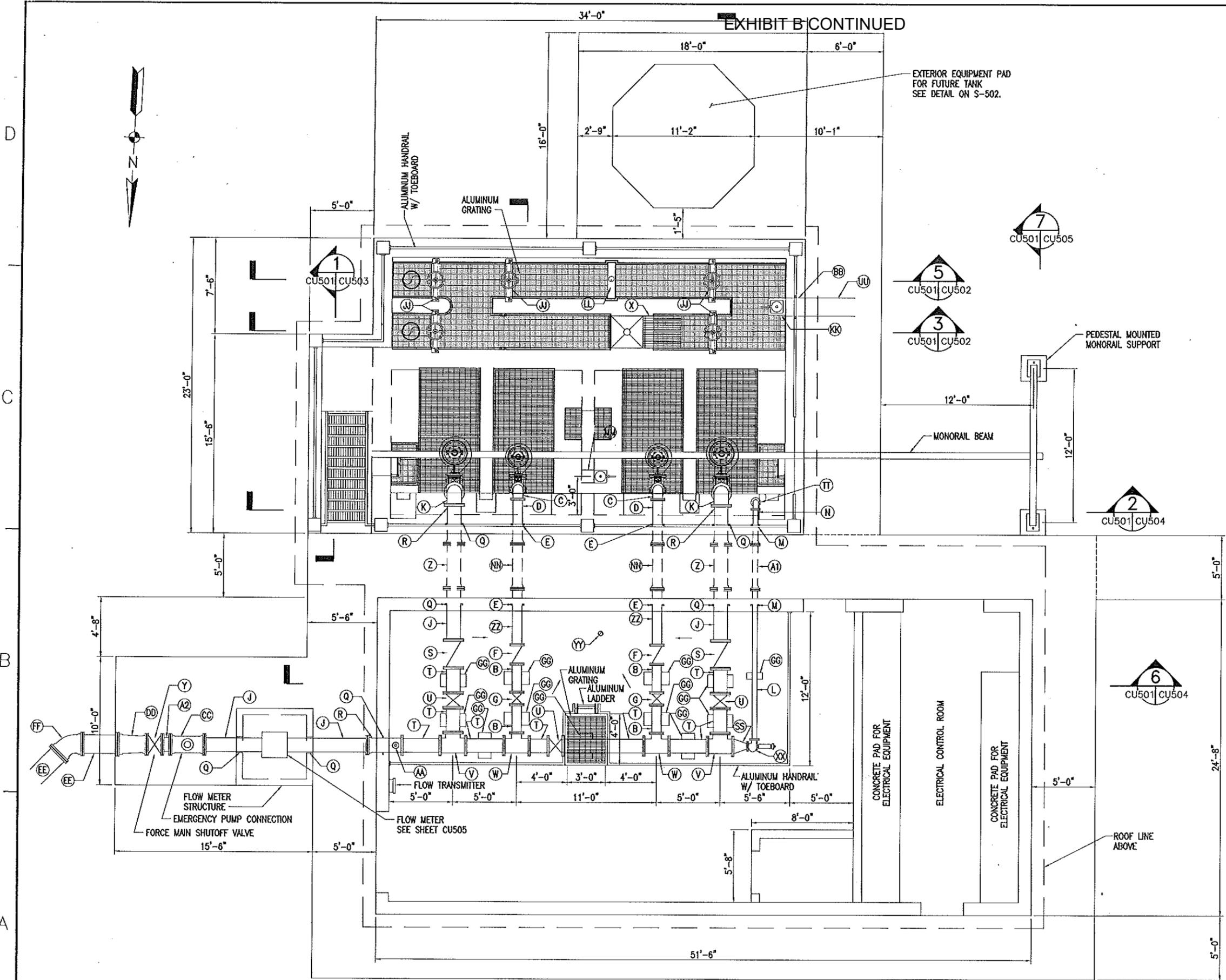
**RECORD DRAWING
LETTER DATED**

FEB 06 13

W.A.H. DESIGNS AS BUILT		DATE APPROVED
W.A.H. DESIGNS J.W.A. DESIGN B.V.P. REVIEW J.P.T. PROJECT MANAGER PROJECT MANAGER	DATE APPROVED	DATE APPROVED
DAVIS & FLOYD, INC. ENGINEERS / ARCHITECTS GREENWOOD, SOUTH CAROLINA N 62470-91-C-6078 DATE		
ACTIVITY - SATISFACTORY TO APPROVED BY DATE		
DIVISION ATLANTIC NAVAL FACILITIES ENGINEERING DIVISION NORFOLK, VIRGINIA CAMP LEJEUNE, NORTH CAROLINA BASEWIDE WASTE TREATMENT UPGRADE - PHASE I RIFLE RANGE / U.S. 17 PUMP STATIONS GROUND LEVEL FLOOR PLAN		
CODE ID. NO. 80091 SCALE: AS NOTED EFD NO. 376472 STA. PROJ. NO. P-947 SPEC. NO. 05-92-2159 CONSTR. CONTR. NO. N 62470-92-B-2159 NAVFAC DRAWING NO. 4278472	SHEET 28 OF 533	SIZE D DATE

D & F JOB NO. 5661 - FINAL SUBMITTAL

EXHIBIT B CONTINUED



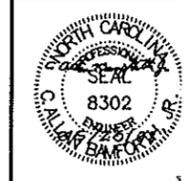
PIPE SCHEDULE - VERONA LOOP			
NO.	QTY.	SIZE	DESCRIPTION
A	2	8"X6"	FLANGED ECCENTRIC REDUCER
B	-	8"	FLANGE X FLANGE SPOOL PIECE
C	2	8"	FLANGED 90° BEND
D	-	8"	M.J. X THREADED FLANGE SPOOL PIECE
E	4	8"	WALL SLEEVE W/ LINK SEAL
F	2	8"	FLANGED CHECK VALVE
G	2	8"	FLANGED GATE VALVE
H	2	12"X10"	FLANGED ECCENTRIC REDUCER
J	-	12"	FLANGED X PLAIN END SPOOL PIECE
K	2	12"	FLANGED 90° BEND
L	-	4"	FLANGED X PLAIN END SPOOL PIECE
M	2	4"	WALL SLEEVE W/ LINK SEAL
N	3	4"	M.J. X THREADED FLANGE SPOOL PIECE
P	-	16"	FLANGED X FLANGED SPOOL PIECE
Q	5	12"	WALL SLEEVE W/ LINK SEAL
R	-	12"	M.J. X THREADED FLANGE SPOOL PIECE
S	2	12"	FLANGED CHECK VALVE
T	-	12"	FLANGED X FLANGED SPOOL PIECE
U	2	12"	FLANGED GATE VALVE
V	2	12"X12"	FLANGED TEE
W	2	12"X8"	FLANGED TEE
X	1	-	BAR SCREEN - SEE SHEET CU505
Y	1	12"	M.J. GATE VALVE W/ FLOOR STAND & WHEEL ACTUATOR
Z	-	12"	M.J. X PLAIN END SPOOL PIECE
AA	1	-	PRESSURE SENSOR
BB	4	16"	WALL SLEEVE W/ LINK SEAL
CC	1	12"X8"	M.J. TEE
DD	1	16"X12"	M.J. REDUCER
EE	2	16"	PLAIN END X PLAIN END SPOOL PIECE
FF	1	16"	45° M.J. BEND
GG	15	-	CONCRETE PIPE SUPPORTS
HH	3	16"	FLANGED SHORT RADIUS BASE ELBOW
JJ	5	-	SLUICE GATE
KK	1	16"	SLIDE GATE W/ FLOOR STAND
LL	1	-	SEWAGE GRINDER
MM	1	12"	SLIDE GATE W/ FLOOR STAND
NN	-	8"	M.J. X PLAIN END SPOOL PIECE
PP	3	16"	FLANGED 90° BEND
QQ	3	16"	FLANGED X THREADED FLANGE SPOOL PIECE
RR	-	16"	FLANGED X PLAIN END DUCTILE IRON
SS	1	12"X4"	FLANGED ECCENTRIC REDUCER
TT	1	4"	FLANGED 90° BEND
UU	-	16"	M.J. DUCTILE IRON PIPE
XX	1	4"	ELBOW BODY SEWAGE SURGE RELIEF VALVE
YY	1	-	FLOOR DRAIN SEE P-101
ZZ	-	8"	FLANGED X PLAIN END SPOOL PIECE
A1	-	4"	M.J. X PLAIN END SPOOL PIECE
A2	-	12"	PLAIN END X PLAIN END SPOOL PIECE
A3	-	16"	FLANGED X PLAIN END SPOOL PIECE

FLOOR & MAIN PIPING PLAN
1/4" = 1'-0"

GRAPHIC SCALE



C. ALLAN BAWFORTH, JR.
ENGINEER - SURVEYOR, L.
NORFOLK, VIRGINIA



DESIGNED BY	DATE
APPROVED	
ACTIVITY - SUPERVISOR	DATE
APPROVED	
FOR DRAWING W/PIC	DATE
DES. ALB	DR. CAD
CHK. CAB	SC. REG.
DESIGNER	
REVIEWED BY	
QC	
AC/EC	
FIRE PROTECTION	
BRANCH MANAGER	
DESIGN DIRECTOR	

DEPARTMENT OF THE NAVY
NAVFAC MID-ATLANTIC
NAVAL FACILITIES ENGINEERING COMMAND
MARINE CORPS BASE
P1182B STONE BAY SEWER TO MAINSIDE
& P1147 WASTEWATER SYSTEM MODIFICATIONS
VERONA LOOP PUMP STATION FLOOR PLAN
CAMP LEJEUNE, NC.
NORFOLK, VIRGINIA
MONIC JPT
12517573
N40085-06-D-9999
NAVFAC DRAWING NO.
SHEET 135 OF 200
CU501

EXHIBIT B CONTINUED
PUMP PERFORMANCE CURVE

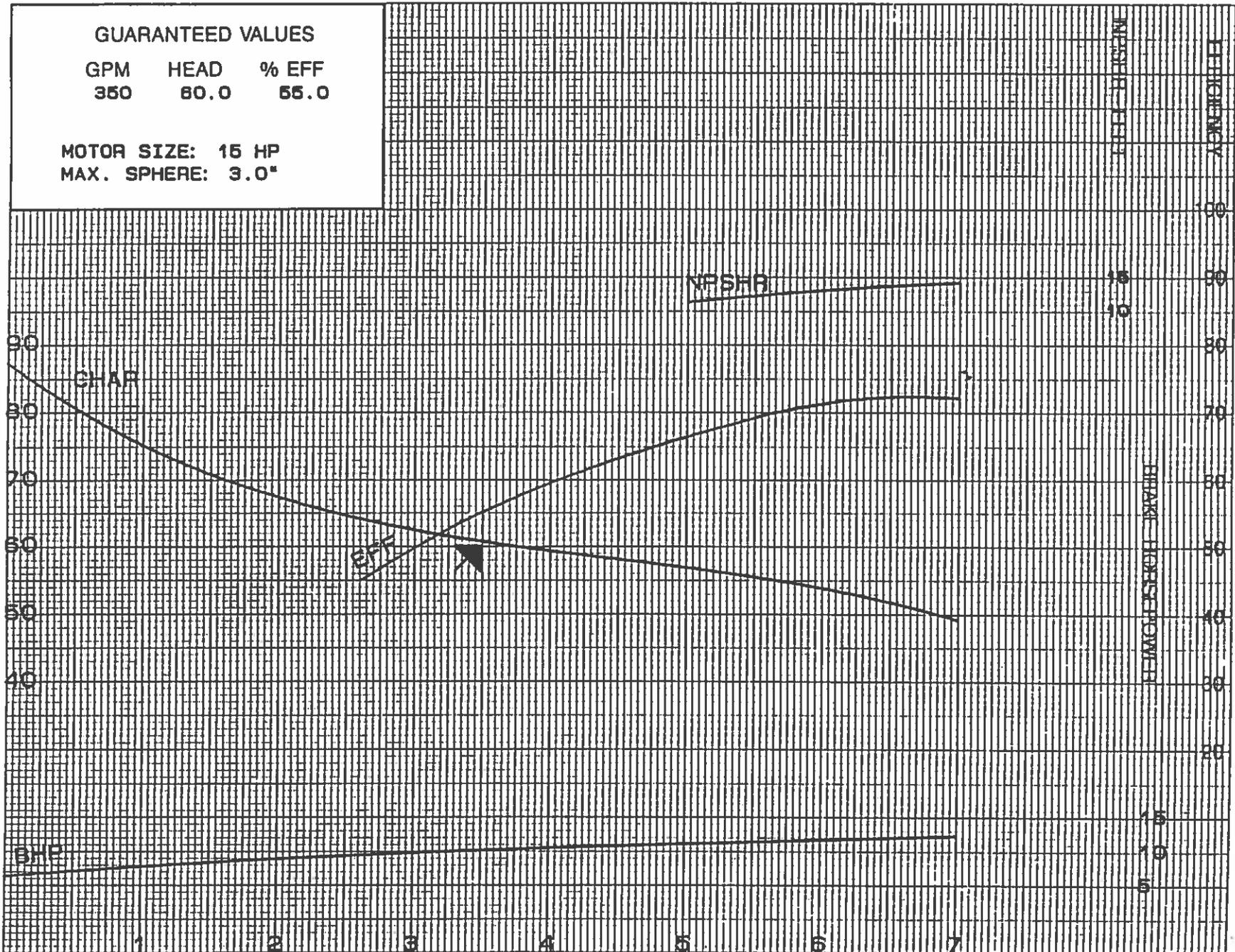
CURVE NO. JK4D1-062124

GUARANTEED VALUES

GPM	HEAD	% EFF
350	80.0	55.0

MOTOR SIZE: 15 HP
MAX. SPHERE: 3.0"

TOTAL PUMP HEAD IN FEET (HEAD)



THIS CURVE IS BASED ON ACTUAL TEST PERFORMANCE OF A SIMILAR PUMP. ONLY THE INDICATED POINT(S) IS GUARANTEED.

NO. STAGES ONE
REFERENCE 073639
PLOTTED BY TR
DATE 1-13-95

SIZE - MODEL 4-05432MV
IMPELLER DES. T4B1A
IMPELLER DIA. 8.60"
RPM(S) 1750



SUBMITTAL CURVE

E-4 (7/90)

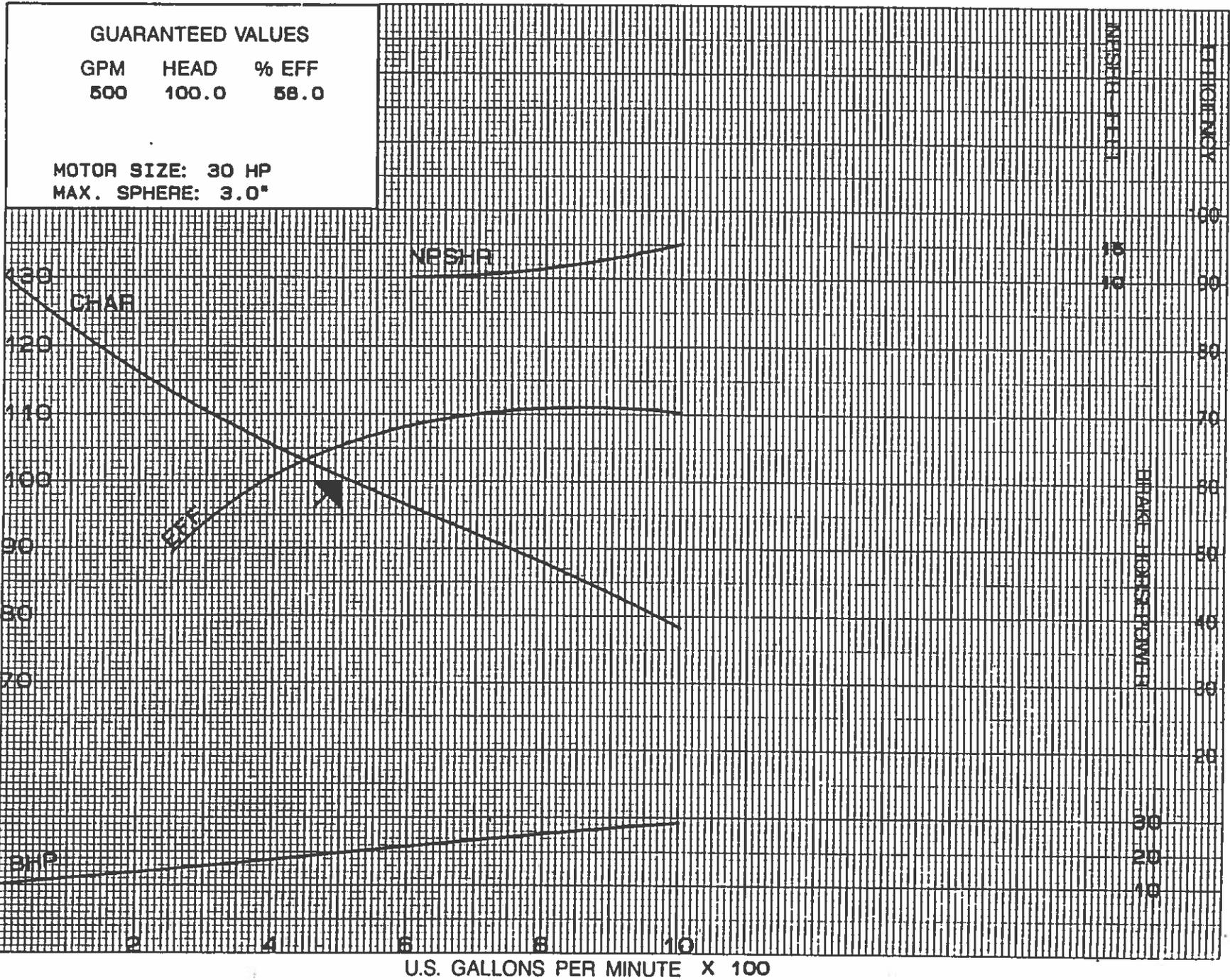
THIS CURVE IS BASED ON ACTUAL TEST PERFORMANCE OF A SIMILAR PUMP. ONLY THE INDICATED POINT(S) IS GUARANTEED.

NO. STAGES ONE
REFERENCE 061634
PLOTTED BY TR
DATE 1-23-95

SIZE - MODEL 4-DJ5433MV
IMPELLER DES. T4C1A
IMPELLER DIA. 10.70"
RPM(S) 1760

EXHIBIT B CONTINUED
PUMP PERFORMANCE CURVE

CURVE NO. JK4D1-062123



GUARANTEED VALUES
GPM HEAD % EFF
500 100.0 58.0

MOTOR SIZE: 30 HP
MAX. SPHERE: 3.0"

FA 7/7/01

HEAD IN FEET (VERTICAL PUMP HEAD)

U.S. GALLONS PER MINUTE X 100

EXHIBIT B CONTINUED

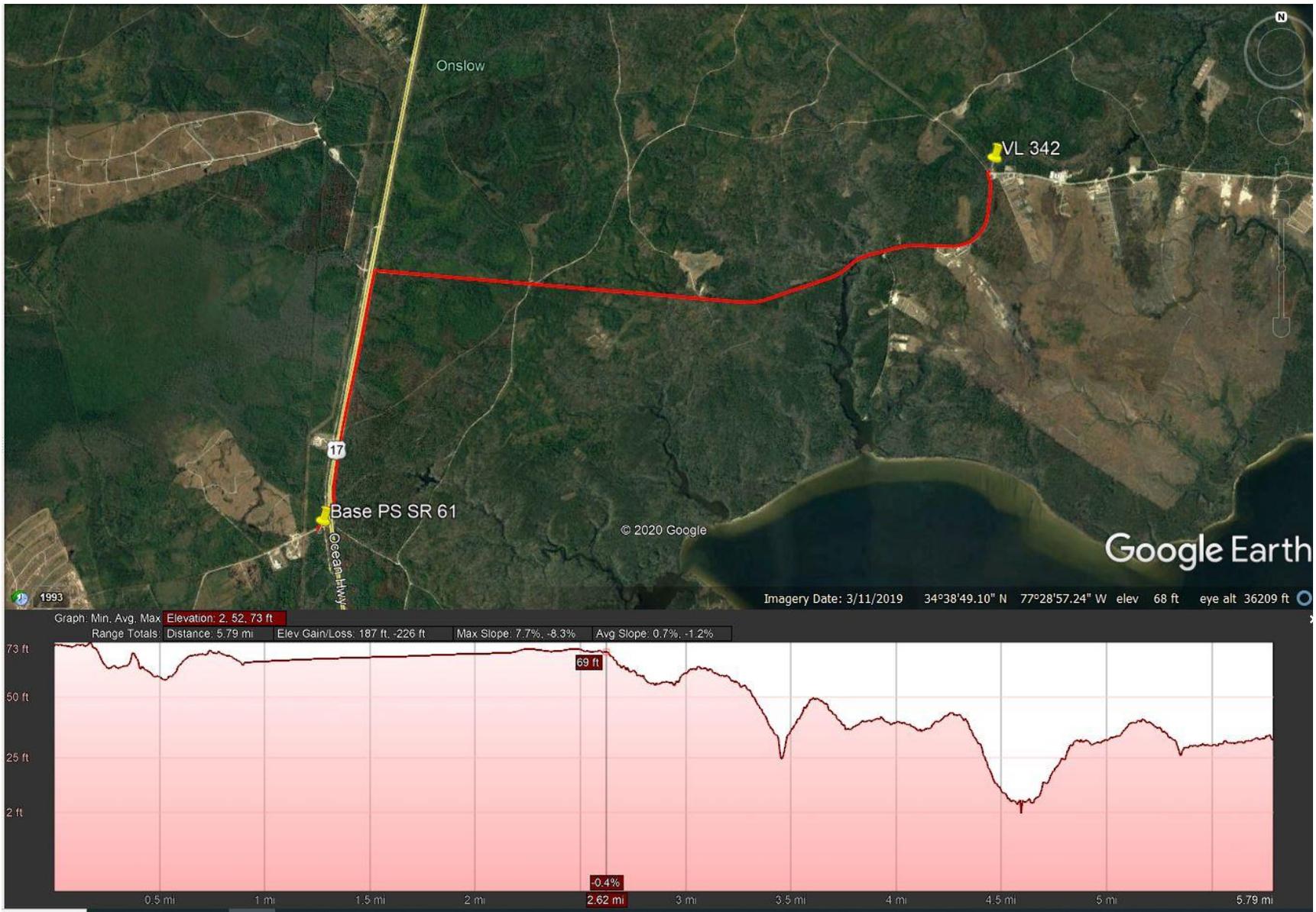
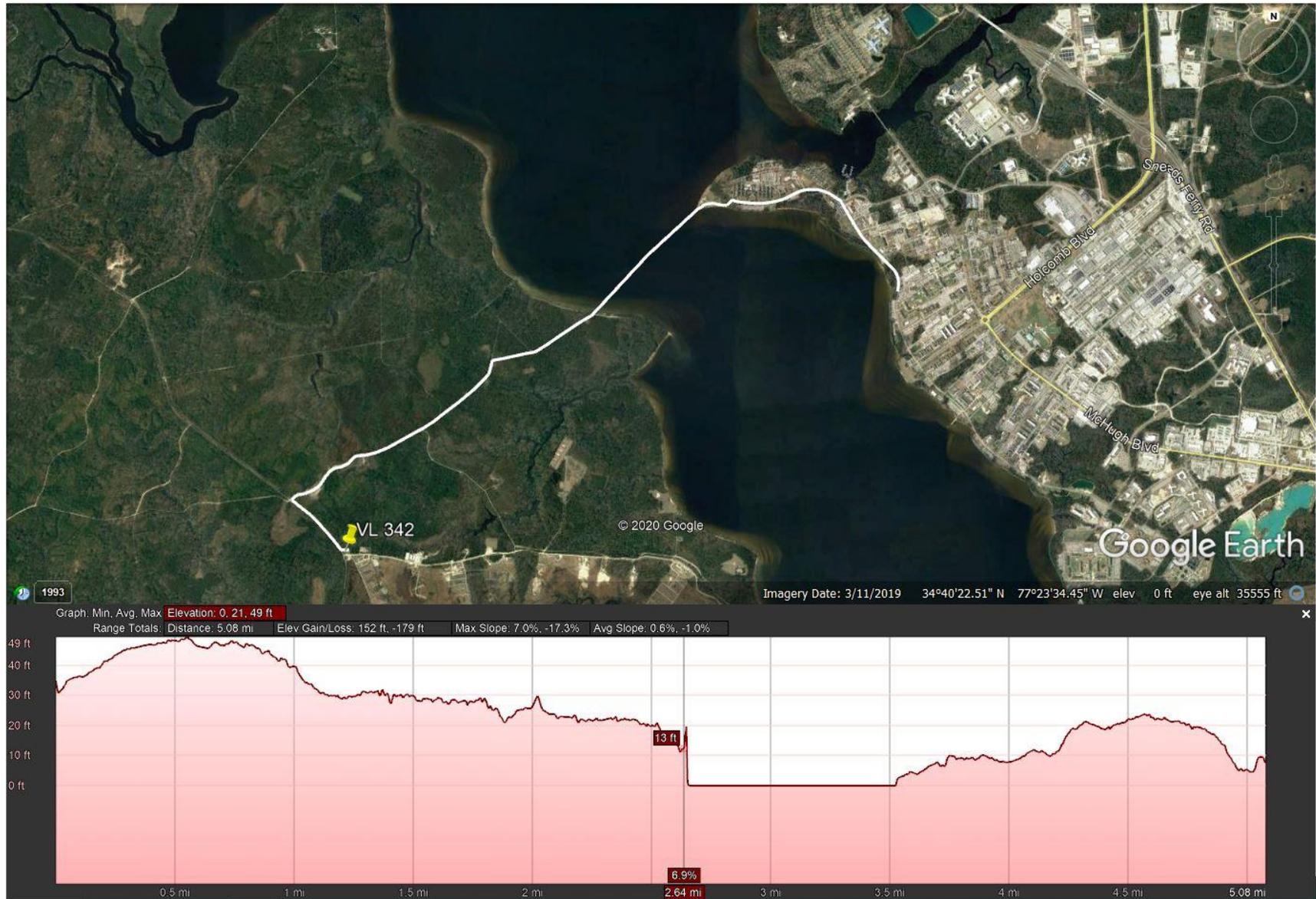


EXHIBIT B CONTINUED



Technical Memorandum
Holly Ridge/Summerhouse WWTP Capacity Study-Alternatives
November 2, 2020 ONWASA



THE WOOTEN COMPANY

ATTACHMENT 3
COMPARISON TO PREVIOUS ALTERNATIVES

EXHIBIT B CONTINUED

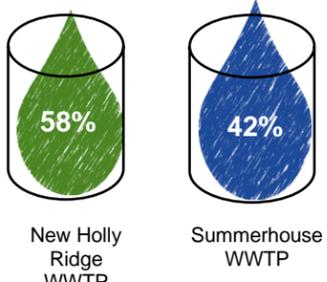
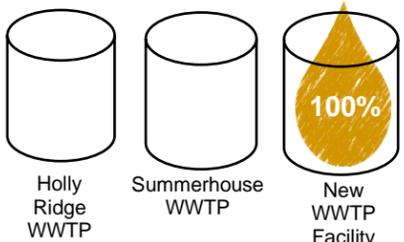
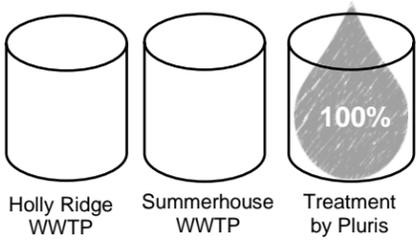
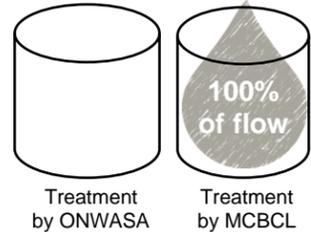
HOLLY RIDGE/SUMMERHOUSE UPDATED ALTERNATIVE SUMMARY TABLE (MARCH 2020)							
Alternative	Flow Routing	Description	Refined Alternative Changes and Timelines	Estimated Capital Cost (\$ Millions)	Estimated Annual O&M Cost (\$ Millions)	Pros	Cons
<p>Alternative No. 1</p> <p>Construct New Holly Ridge WWTP and Expand Summerhouse WWTP</p>	 <p>New Holly Ridge WWTP Summerhouse WWTP</p>	<ul style="list-style-type: none"> Upgrade and operate existing Summerhouse WWTP Rehabilitate Infiltration Basin #1 at Summerhouse New Holly Ridge WWTP at existing Holly Ridge Site (non-lagoon WWTP) Convert spray fields to infiltration basins Decommission Holly Ridge WWTP lagoon 	<ul style="list-style-type: none"> Replace existing 8" discharge forcemain from Holly Ridge WWTP to irrigation site facility with new 10". Relocation of four (4) infiltration basins to northeast corner of irrigation site. Developed infiltration basin construction sequencing plan. Use common drain piping between infiltration basins. <p>Design Start: June 1, 2020</p> <p>Design and Regulatory Approval: 18 months</p> <p>Construction and Start-Up: 32 months</p> <p>Operational: March 2023 (0.65 MGD) January 2024 (1.0 MGD)</p>	\$28.1 M	<p>Start: \$0.98 M/yr</p> <p>Year 20: \$2.7 M/yr</p>	<ul style="list-style-type: none"> New WWTP does not require land acquisition or significant modifications to the Holly Ridge collection system. Opportunity to utilize modern treatment technologies and produce higher quality effluent at Holly Ridge WWTP. ONWASA retains total control over treatment process and rate charges to customers. 	<ul style="list-style-type: none"> The existing spray fields needs to be kept operational (for effluent disposal) during construction increasing costs and duration of the project. Conversion of spray fields to infiltration basins is dependent on suitable soil conditions at the spray field site. Requires extensive excavation and repair work at Summerhouse Infiltration Basin #1, located within the development.
<p>Alternative No. 2</p> <p>ONWASA Constructs and Operates New WWTP to Replace Existing Facilities</p>	 <p>Holly Ridge WWTP Summerhouse WWTP New WWTP Facility</p>	<ul style="list-style-type: none"> Construct new WWTP on spray field site New Holly Ridge Pump Station and existing forcemain to new Summerhouse Pump Station New Summerhouse Pump Station and forcemain to new WWTP Convert spray fields to infiltration basins Decommission existing WWTPs 	<ul style="list-style-type: none"> Need to operate Summerhouse WWTP until new WWTP at full capacity (4/5 years). Need to operate Holly Ridge WWTP until new WWTP is constructed (3 years). Move Summerhouse PS inside WWTP property. Developed infiltration basin construction sequencing plan. Use common drain piping between infiltration basins. <p>Design Start: June 1, 2020</p> <p>Design and Regulatory Approval: 18 months</p> <p>Construction and Start-Up: 36 months</p> <p>Operational: February 2023 (0.5 MGD) July 2024 (1.0 MGD)</p>	\$31.6 M	<p>Start: \$0.84 M/yr</p> <p>Year 20: \$1.4 M/yr</p>	<ul style="list-style-type: none"> Replaces two existing plants with a single new facility that has a potential for future expansion as demand warrants. Eliminates need for further renovations to the Summerhouse WWTP and Infiltration Basin #1. ONWASA retains total control over treatment process and rate charges to customers. 	<ul style="list-style-type: none"> The existing spray fields needs to be kept operational (for effluent disposal) during construction increasing costs and duration of the project. Conversion of spray fields to infiltration basins is dependent on suitable soil conditions at the spray field site. Will require land acquisition to construct additional infiltration basins if flow exceeds disposal capacity.
<p>Alternative No. 3</p> <p>Pluris Constructs and Operates New WWTP to Replace Existing Facilities</p>	 <p>Holly Ridge WWTP Summerhouse WWTP Treatment by Pluris</p>	<ul style="list-style-type: none"> Pluris construct new WWTP New Holly Ridge Pump Station and existing forcemain to new Summerhouse Pump Station New Summerhouse Pump Station and forcemain to new WWTP Decommission existing WWTPs 	<ul style="list-style-type: none"> ONWASA will only design and construct <u>transmission system only</u>. Move Summerhouse PS inside WWTP property. Forcemain to Pluris WWTP is one (1) mile versus 0.5 mile previously. <p>TRANSMISSION SYSTEM ONLY</p> <p>Design Start: June 1, 2020</p> <p>Design and Regulatory Approval: 12 months</p> <p>Construction Complete: 10 months</p> <p>Ready for Operation: April 2022</p>	<p>TRANSMISSION ONLY</p> <p>\$5.4 M</p>	<p>TRANSMISSION ONLY</p> <p>Start: \$0.08 M/yr</p> <p>Year 20: \$0.21 M/yr</p>	<ul style="list-style-type: none"> ONWASA only operates the collection system and pump stations, eliminating two WWTPs. Existing WWTPs remain in operation and are not affected by new plant construction (at a Pluris site only, not existing spray fields) Pluris is responsible for creating plant capacity to treat present and projected flow volumes. 	<ul style="list-style-type: none"> Must obtain approval of NC Utilities Commission to provide dedicated service or pay substantial connection charges. Future sewer rates would be directly affected by Pluris service agreement and treatment charges. ONWASA pays for treatment of every gallon of wastewater sent to Pluris, including storm water due to I/I.

EXHIBIT B CONTINUED

HOLLY RIDGE/SUMMERHOUSE UPDATED ALTERNATIVE #4 SUMMARY TABLE (OCTOBER 2020)							
Alternative	Flow Routing	Description	Refined Alternative Changes and Timelines	Estimated Capital Cost (\$ Millions)	Estimated Annual O&M Cost (\$ Millions)	Pros	Cons
<p>Alternative No. 4 (SE)</p> <p>Send All Flow to MCBCL</p>		<ul style="list-style-type: none"> • New Wastewater Pump Station at Summerhouse WWTP and Forcemains • New Wastewater Pump Station at Holly Ridge WWTP and Forcemains • Upgrade Existing MCBCL SR61 and New Discharge Forcemain • Upgrade Existing MCBCL VL342 Pump Stations • Decommission Summerhouse and Holly Ridge WWTPs 	<ul style="list-style-type: none"> • Refined alignment of the forcemain connecting the Holly Ridge Pump Station to the MCBCL SR61 Pump Station. • Increased the MCBCL SR61 and VL342 Pump Station capacity for future flow increase. • Increased the diameter of the forcemain connecting the SR61 Pump Station to the VL342 Pump Station to 16 inches. <p>Design Start: March 2021</p> <p>Design and Regulatory Approval: 29 months</p> <p>Construction and Start-Up: 18 months</p> <p>Operational: December 2024</p>	\$31.8 M	<p>Start: \$0.51 M/yr</p> <p>Year 20: \$2.2 M/yr</p>	<ul style="list-style-type: none"> • ONWASA operates only the collection system and pump stations, not WWTPs. • MCBCL French Creek WWTP currently has the capacity to treat present and future flow volumes. • Hwy 17 forcemain creates the potential for expanding sewer service along that corridor. 	<ul style="list-style-type: none"> • Design and construction times are reliant on MCBCL approvals. • Future sewer rates would be directly affected by MCBCL treatment charges. • ONWASA will pay for treatment of every gallon of wastewater sent to MCBCL, including stormwater due to I/I.