PRELIMINARY ENGINEERING REPORT

DECEMBER, 2023

MELBOURNE

WASTEWATER TREATMENT PLANT

PREPARED FOR:

CITY OF MELBOURNE, ARKANSAS
451 College Dr.
P.O. Box 800
Melbourne, AR 72556

PREPARED BY:

SALT
ENGINEERS & PLANNERS

CERTIFICATE OF AUTHORIZATION
SALT ENGINEERS & PLANNERS, INC.
No. 4011
ARKANSAS

STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 13831
KYLE BRECKENRIDGE

C. Kyle Breckenridge

12/15/23

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1.0 PROJECT PLANNING

1.1 LOCATION

The project is located at the existing City of Melbourne Wastewater Treatment Plant (WWTP) located at the end of AR Hwy 9 Spur. The WWTP property is bordered on the South and West by Mill Creek. A location/topographical map is included in Appendix A.

The WWTP facility has a current NPDES Permit Number: AR0020036 with a facility ID number (AFIN): 33-00026, as assigned by the Arkansas Department of Environmental Quality (DEQ). The facility is authorized to discharge treated municipal wastewater from the location as follows: Arkansas Highway 9 Spur (Circle Drive), Melbourne, AR, in Izard County. From the intersection of Arkansas Highway 9 (Main Street) and Arkansas Highway 9 Spur (Circle Drive), travel west on Arkansas Highway 9 Spur for approximately 0.8 miles.

Facility Coordinates: Latitude: 36° 03′ 33.23″N ; Longitude: 91° 55′ 34.07″W

Receiving stream: Mill Creek, thence to Piney Creek, thence to the White River in Segment 4F of the White River Basin.

The permitted outfall is located at the following coordinates:

Outfall 001: Latitude: 36° 03′ 33.70″ N ; Longitude: 91° 55′ 37.40″ W

1.2 ENVIRONMENTAL RESOURCES PRESENT

The facility and all improvements are located on City owned property. The property lies on Sandy-Loam soils that border the Mill Creek floodplain. There are no known cultural, biological, or environmental resources that will be affected by this project. The project is expected to fall under a categorical exclusion.

1.3 POPULATION TRENDS

The City of Melbourne 2020 Census Population was 1,830. The table below summarizes the census population data for the previous two decades.

Year	Population	% Increase (Decrease)	Annualized Growth Rate (%)
2020	1,830	(0.99%)	(0.1%)
2010	1,848	10.46%	1.00%
2000	1,673	-	-

The City Median Household Income (MHI) is $39,032. It is projected that future population trends will be flat or slightly negative.

1.4 Community Engagement

The City will conduct a public meeting to explain the need for the project and the required rate increase to supply the necessary revenue to cover the additional debt serve costs to fund the project. The meeting will be held prior to the regularly scheduled Melbourne City Council Meeting.

2.0 EXISTING FACILITIES

2.1 LOCATION

The existing WWTP facilities location was described in Part 1.1, above, and a location map is included in Appendix A.

2.2 HISTORY

The existing WWTP facilities were constructed in the early 1980s, with a sludge drying bed expansion in 2003.

2.3 CONDITION OF EXISTING FACILITIES

2.3.1 Flow Data

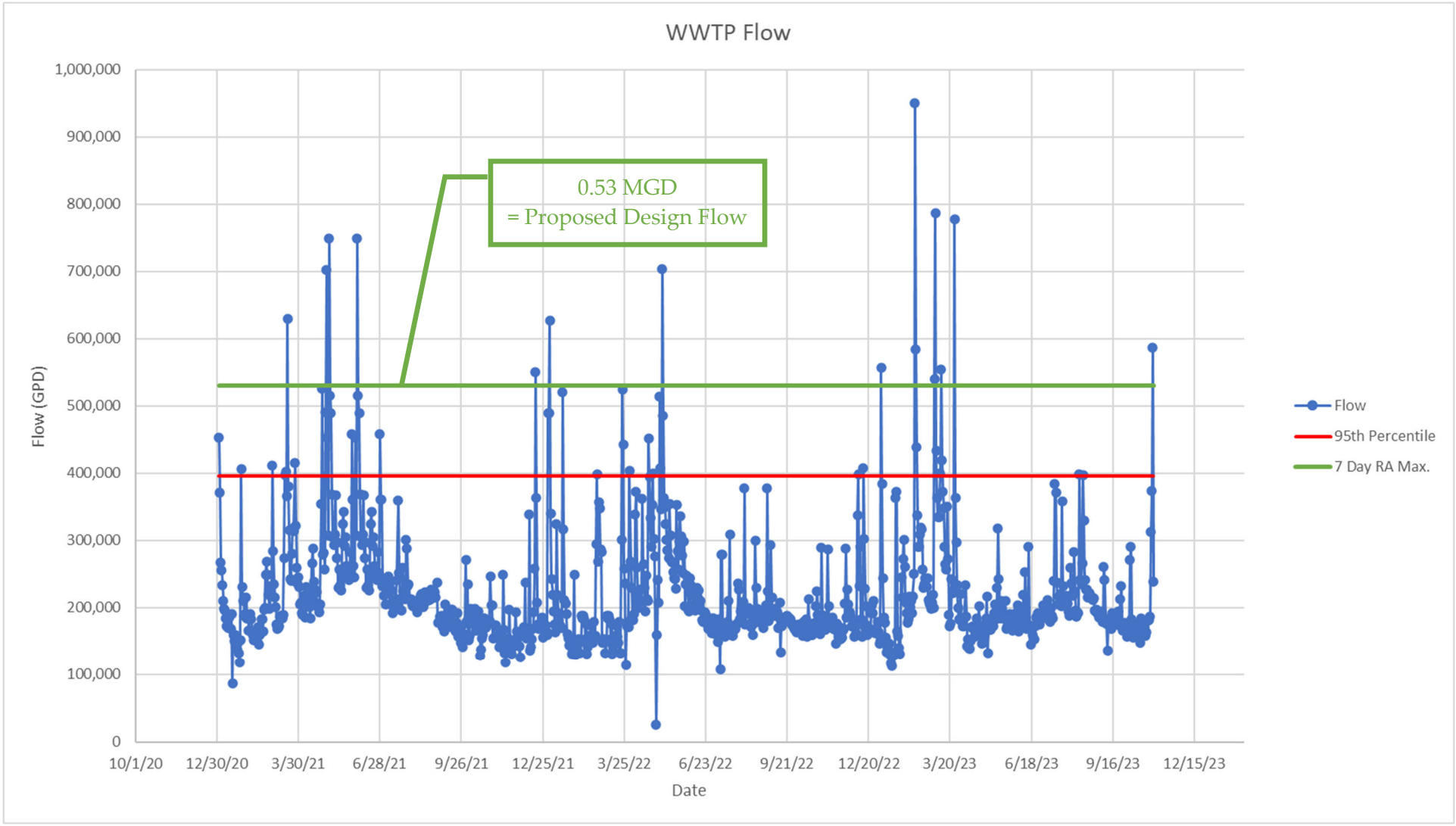
The WWTP design flow is currently 0.4 MGD. The 10 State Standards recommends that the minimum hydraulic capacity design for facilities serving new collection systems be based on a 100-gallon per capita per day (gpcd) base flow with I/I peaking factor as follows:

$$\frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

Where, P = population served (in thousands)

Based on the above, the min. design average daily flow (ADF) for the Melbourne WWTP should be 0.66 MGD.

The flow date from January 2021 to October 2023 is shown in the chart below. The maximum flow for the period was 0.95 MGD. The 95th Percentile flow was found to be 0.396 MGD with an average flow of 0.221 MGD. Effluent flow records indicate that the maximum 30-day rolling average flow was 0.353 MGD. The maximum 7-day rolling average flow was 0.53 MGD. This should be used as the condition which represents the current required design flow for the WWTP biological processes. A growth factor encompassing the design life (20-years) is typically added to the current flow, however, the City has experienced a loss of population over the previous decade. For this reason, the maximum 7-day rolling average WWTP Flow of 0.53 MGD will be assumed as adequate for the biological processes. Wet weather flows above 0.53 MGD can be bypassed around the biological process, and treated as dilute flows, in order to prevent biomass washout.


WWTP Flow
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Flow (GPD)
0.53 MGD
= Proposed Design Flow
10/1/20
12/30/20
3/30/21
6/28/21
9/26/21
12/25/21
3/25/22
6/23/22
9/21/22
12/20/22
3/20/23
6/18/23
9/16/23
12/15/23
Date
Flow
95th Percentile
7 Day RA Max.

2.3.2 Existing Loads

The Melbourne WWTP influent raw wastewater is characterized as typical domestic sewage flow on the weaker side of the typical range. This is due to the consistent infiltration that occurs in the gravity system since large portions are composed of concrete and clay pipe. The assumptions outlined in the table below were used for the calculations in this PER. Adequate raw wastewater testing will be performed before the detailed design of the plant improvements begin.

Parameter	Assumed Concentration	Assumed Loading at Existing Average Inflow (0.221 MGD)	Assumed Loading at Design Flow (0.53 MGD)
BOD5	150 mg/L	277 lb/day	663 lb/day
TSS	150 mg/L	277 lb/day	663 lb/day
TKN	30 mg/L	55 lb/day	133 lb/day

2.3.3 Existing WWTP Process

All flow to the WWTP is pumped from a single pump station located just East of Hwy 9, SW of town, and just South of Mill Creek. Pumped flow is received into the headworks structure, which consists of only a manually cleaned bar screen. The normal treatment train includes the oxidation ditch, final clarifiers, chlorine contact chamber (chlorine disinfection), and cascade outfall into Mill Creek.

2.3.4 Headworks

The existing headworks equipment is a manual bar screen. This should be replaced with a mechanically cleaned bar screen or drum screen to provide more consistent trash removal and to ease maintenance requirements.

2.3.5 Oxidation Ditch

The existing oxidation ditch has a volume of approximately 44,752 cubic feet or 0.335 MG. The volume, approximate hydraulic retention times (HRTs), and organic loading rates (OLRs), at the proposed design flow of 0.53 MGD with varying BOD, are shown in the table below.

BOD	Volume (MG)	HRT at Design Flow of 0.53 MGD (hours)	OLR at Design Flow of 0.53 MGD (ppd/mcf)	10 SS Design OLR (ppd/mcf)
150 mg/L	0.335	15.1	14.82	< 15
200 mg/L	0.335	15.1	19.75	<15

The existing ditch will accommodate a max flow of 0.536 MGD using the 15 ppd/mcf Organic Loading Rate (10 SS Max. OLR) and assumed 150 mg/L influent BOD. The current permitted flow of 0.40 MGD appears to be based on the oxidation ditch organic loading at 200 mg/L influent BOD, as it is approximately 14.91 ppd/mcf.

The two (2) existing 15-HP aeration rotors need to be replaced due to age and wear. The air requirements for the activated sludge process are shown below, assuming a minimum required SRT of 15 days.

BOD In	Aeration Required for CBOD (PPD O2)	Aeration Required for NBOD (PPD O2)	Total Aeration Requirement (PPD O2)	Existing Aeration (PPD O2)
150	799	610	1,409	1,800*
200	1,065	610	1,675	1,800*

*Assuming 2.5 lb O2 per HP-HR

Wet weather peak flows are occasionally above the 0.53 MGD design capacity of the oxidation ditch. These peaks above the 7-Day rolling average occur on average about 5 times per year. Such flows are heavily diluted; therefore, consideration should be given to blending these flows to prevent biomass washout, rather than expanding the treatment capacity of the oxidation ditch.

2.3.6 Final Clarifiers

The existing final clarifiers are each 30-ft diameter peripheral feed clarifiers. Each clarifier can accommodate up to 0.70 MGD based on a 1,000 gpd/sf Surface Overflow Rate (SOR). The parameters for the clarifiers are shown below at the proposed 0.53 MGD design flow.

Clarifier	SOR (gpd/sf)	10 SS Design SOR (gpd/sf)	WLR (gpd/lf)	10 SS Design WLR (gpd/lf)	SLR (ppd/sf) 3,000 mg/L MLSS	10 SS Design SLR (ppd/sf)
Single	750	<1,000	5,624	<20,000	18.76	<35
Parallel	375	<1,000	2,812	<20,000	9.38	<35

The existing final clarifiers show signs of severe corrosion to the metal equipment parts and need to be rehabilitated with new mechanical equipment, weirs, baffles, and

troughs. The clarifiers should also be equipped with feed race skimmers to minimize foam/scum in the feed trough.

2.3.7 Chlorination/Disinfection

The existing chlorine contact chamber has adequate volume to accommodate up to a 0.75 MGD flow while maintaining the minimum 20-minute contact time. The main difficulty with the existing disinfection system is that it requires dechlorination. In order to alleviate the dechlorination requirement, UV disinfection should be considered.

2.3.8 Solids Handling

The existing solids handling treatment train consists of polymer addition and sludge drying beds. The dewatered sludge is then land applied to permitted fields near the Melbourne municipal airport. The limiting factor for this treatment train is that sludge must remain on the drying beds for a min. of 90-days in order to meet the pathogen reduction requirements for Class B sludge. In addition, the sludge must be incorporated into the soil to meet the vector attraction reduction requirements. Landfill disposal of sludge would not be required to meet Class B and should be investigated to reduce the labor involved for solids disposal. A covered storage area for dried biosolids is needed regardless of continued land application or landfilling. Polymer feed equipment upgrades are also required.

2.4 EXISTING FINANCIAL STATUS

The current wastewater utility rates were set in 2017 and the current water utility rates were set in 2021. A rate increase should be considered to adjust for recent inflation in the utility expenses and to provide for the additional debt service costs to finance these proposed improvements. The table below shows the current utility rates.

Rate	First 1,000 gallons	> 1000 gallons	Bill for 4,000 gallons usage	# of Customers	Est. Annual Revenue (4,000 gallons usage)
Water (inside City)	$25.50	$2.50 per thousand	$33.00	1,071	$424,116
Water (outside City)	$37.00	$3.00 per thousand	$46.00	732	$404,064
Sewer	$10.08	$2.10 per thousand	$16.38	861	$169,238
Combined			-	-	$997,418

The current rate schedules produce approximately $997,000 in combined gross revenues, based on an average usage of 4,000 gallons per month. ACT 605 of the Arkansas State Legislature mandates that 5% of the gross revenue be annually allocated to a set aside

reserve account. This will require $50,000 annually. The current annual operating expenses are approximately $867,000. Annual depreciation expense amounts to approximately $267,000, while the existing annual debt service cost is approximately $240,000. Therefore, the current earnings that are available to fund new debt are as follows:

Gross Revenue – Reserve – Expenses + Depreciation – Existing Debt Service – New Debt Service

The current rate structure yields approximately $107,000 of annual earnings available to fund new debt service. This would fund only $1.46 million in capital expenses at the expected loan terms of 4% interest for 20 years. A substantial sewer rate increase will be required to finance the necessary debt service for the proposed improvements. For instance, a $4 million capital expense would require an $18 per month increase to the monthly sewer rate (110% increase), if financed only through a sewer rate increase. A $6 million capital expense (Alt. 4.2 + 4.5 + 4.6 below) would require a $32 per month increase to the monthly sewer rate (195% increase), if financed only through a sewer rate increase.

Capital Expense	Annual Debt Service	Current Sewer Bill for 4,000 gallons usage	Est. Req. Sewer Bill for 4,000 gallons usage
$4 million	$294,327	$16.38	**$34.38**
$6 million	$441,491	$16.38	**$48.38**

3.0 NEED FOR PROJECT

3.1 HEALTH & SANITATION

The City of Melbourne WWTP discharges to Mill Creek under NPDES Permit # AR0020036. The current permit has seasonal limits. A summary of the most restrictive season (May – October) permit parameters is shown below.

Parameter	Mass (monthly)	Concentration (monthly)	Concentration (7-day)	Monitoring
BOD_5	34	10	15	2/month
TSS	51	15	22.5	2/month
NH3-N	13.3	3.9	3.9	2/month
D.O.	7.0 Inst. Min. (Nov-Apr)			2/month
FCB	-	1000	2000	2/month
TRC	0.011 Inst. Max.			2/month
pH	-	6.0 (min.)	9.0 (max.)	2/month

The WWTP has reported various permit violations over the past permit cycle. The reported violations consist of FCB, TRC, TSS, D.O., and NH_3-N.

3.2 AGING INFRASTRUCTURE

The existing WWTP is aged, and various wear components are in need of immediate replacement. The concrete and clay pipes within the collection system (and resulting dry and missing gaskets) contribute to excessive I&I and need replacement. Future projects should consider the collection system rehabilitation as a means of allowing for expanded capacity without a treatment expansion.

3.3 REASONABLE GROWTH

Based on the previous 10-year period a negligible growth rate or slight decline is expected over the next 20 years. This allows the current maximum 7-day rolling average to be used as the design flow for the WWTP. This should accommodate the small growth rate expected over the 20-year planning period. Peak wet weathers flows are proposed to be blended as detailed below in Part 4.2.

4.0 ALTERNATIVES CONSIDERED

4.1 NO ACTION

This alternative would consist in taking no corrective actions for past permit violations and wet-weather capacity issues of the existing WWTP process. Continuing to incur permit violations is not a viable alternative, and as such, this alternative will not be considered for further development.

4.2 PERMITTED WET WEATHER BLENDING UPGRADE

4.2.1 Description

The Melbourne WWTP biological treatment train is adequately sized for treating the peak 7-day rolling average flow. Problems are encountered when short duration peak wet weather flows washout the biomass. Blending is an operational strategy for managing high treatment plant flows which occur during major storm events due to infiltration and inflow (I & I) of rainwater into the sewer system. During extreme wet weather events, wastewater becomes a small portion of the total treatment plant flow. Blending protects the treatment plant's secondary (biological) treatment process from flows that would damage the process and/or exceed its design capacity. During a proposed blending event, all treatment plant flows would undergo primary treatment, which is proposed as screening, and cloth media filtration. A portion of the flow then continues on to the secondary treatment process, where dissolved organic material is removed (oxidized) by bacteria and other microorganisms. A portion of the flow (that flow in excess of the biological process capacity) is routed around secondary treatment, and then recombines with the main flow prior to disinfection. When blending, all flows undergo disinfection, and the treatment plant is still required to meet all applicable regulatory limits in its discharge permit.

4.2.2 Design Criteria

The proposed wet weather blending project will require rehabilitation and upsizing of the existing headworks and disinfection system. In addition, new infrastructure, including a splitter box and cloth media filter will be required. The biological process will be rehabilitated with new aeration and clarifier equipment. These systems may also be re-rated for design flow based on influent sampling data for BOD and TSS. It is anticipated that the existing systems, after rehabilitation, can be rated for the maximum 7-day rolling average flow of 0.53 MGD.

4.2.3 Site Plan & Process Flow Diagram

Both a Site Plan and Process Flow Diagram are shown for this alternative in Appendix B.

4.2.4 Environmental Impacts

All work for this alternative would be within the bounds of the existing WWTP facility with no known impacts upon floodplains, wetlands, or other environmental, cultural, or historical resources.

4.2.5 Land Requirements

No additional land will be required for this alternative.

4.2.6 Potential Construction Problems

The primary construction-related difficulty for this alternative will be to construct the necessary upgrades and connections with the existing treatment train while maintaining adequate wastewater treatment.

4.2.7 Cost Estimate

The detailed cost estimate for this alternative is included in Appendix C. The table below summarizes the cost items by Construction, Non-Construction (includes 30% contingency), and Annual O&M categories.

Category	Estimated Cost
Construction	$3,480,000
Non-Construction (inc. 30% contingency)	$1,477,000
Total Project Cost	$4,957,000

4.3 OXIDATION DITCH EXPANSION (0.95 MGD) UPGRADE

4.3.1 Description

This project entails expansion of the existing biological process (oxidation ditch and final clarifiers) to accommodate the Maximum Day Flow, and, therefore, to prevent biomass washout during wet weather flow events. The existing clarifiers, when operated in parallel, are adequately sized to handle this flow. Therefore, only the oxidation ditch requires expansion.

4.3.2 Design Criteria

In order to remain under the 10 SS peak organic loading rate of 15 ppd/mcf, an additional 3,867 cf of oxidation ditch capacity is required, when assuming an inlet BOD

of 150 mg/L. Increasing the existing oxidation ditch depth is not feasible because the depth would have to increase from the existing 9-ft to 16-ft. The existing concrete walls were not designed to handle the resulting moment from such an increase and the structural additions that would be required are not as feasible as the construction of a consecutive ditch to increase the treatment volume.

4.3.3 Site Plan & Process Flow Diagram

Both a Site Plan and Process Flow Diagram are shown for this alternative in Appendix B.

4.3.4 Environmental Impacts

All work for this alternative would be within the bounds of the existing WWTP facility with no known impacts upon floodplains, wetlands, or other environmental, cultural, or historical resources.

4.3.5 Land Requirements

No additional land will be required for this alternative. The SBR improvements would be constructed within the extents of the existing WWTP.

4.3.6 Potential Construction Problems

The primary construction-related difficulty for this alternative will be working in and around existing treatment trains that must remain in operation. Tight clearances are expected during the construction of the consecutive Oxidation Ditch.

4.3.7 Cost Estimate

The detailed cost estimate for this alternative is included in Appendix C. The table below summarizes the cost items by Construction, Non-Construction, and Annual O&M categories.

Category	Estimated Cost
Construction	$3,990,000
Non-Construction (inc. 30% contingency)	$1,691,000
Total Project Cost	$5,681,000

4.4 ACTIVATED SLUDGE TREATMENT (SEQUENCING BATCH REACTOR) UPGRADE

4.4.1 Description

This project entails replacement of the existing biological process (oxidation ditch and final clarifiers) with a sequencing batch reactor type process. Typically, the most economical activated sludge process is the Sequencing Batch Reactor (SBR).

4.4.2 Design Criteria

The SBR process would require 2 – 250,000 gallon reactor tanks and 75,000 gallons of post-equalization volume. The existing final clarifier volumes may be repurposed as post-equalization storage. This will allow a mitigate and more consistent flow to the UV disinfection system, instead of the batch flows that would come from the SBR during the decant cycle. Retrievable fine bubble diffusers and positive displacement blowers were assumed for the aeration system.

4.4.3 Site Plan & Process Flow Diagram

Both a Site Plan and Process Flow Diagram are shown for this alternative in Appendix B.

4.4.4 Environmental Impacts

All work for this alternative would be within the bounds of the existing WWTP facility with no known impacts upon floodplains, wetlands, or other environmental, cultural, or historical resources.

4.4.5 Land Requirements

No additional land will be required for this alternative. The SBR improvements would be constructed within the extents of the existing WWTP.

4.4.6 Potential Construction Problems

The primary construction-related difficulty for this alternative will be working in and around existing treatment trains that must remain in operation. Tight clearances are expected during the construction of the SBR tanks.

4.4.7 Cost Estimate

The detailed cost estimate for this alternative is included in Appendix C. The table below summarizes the cost items by Construction, Non-Construction, and Annual O&M categories.

Category	Estimated Cost
Construction	$4,200,000
Non-Construction (inc. 30% contingency)	$1,784,000
Total Project Cost	$5,984,000

4.5 BIOSOLIDS HANDLING UPGRADES

4.5.1 Description

This project entails improvements to the polymer feed system used in the sludge drying bed process as well as construction of a covered storage area for biosolids. This work would be in addition to and common to all WWTP upgrade alternatives. Sludge disposal options include land application and/or landfill disposal. The land application of biosolids requires the material to meet Class B Biosolids Requirements. The current means of meeting these requirements include a minimum of 90-days drying time (to meet Process to Significantly Reduce Pathogens, PSRP) and incorporation of the biosolids within 6 hours of land application (to meet Vector Attraction Reduction Requirements).

4.5.2 Design Criteria

The amount of biosolids capable of being treated and disposed of is limited by the means of meeting the Class B Biosolids requirements. Class B requirements are not applicable to landfill disposal. Therefore, landfill disposal would allow for quicker processing of the produced biosolids. These two alternative disposal methods are compared below.

The estimated biosolids production rate is 8,000 pounds per month or 48 tons per year. To meet the 90-day dry time (as a PSRP), all 3 drying beds must be used on a rotating basis, and all 3 beds should be covered.

4.5.3 Cost Estimate

A hauling cost of $5 per mile was used to evaluate the alternatives. The landfill disposal cost was $110 per ton. The table below summarizes the expected construction costs and annual costs for each disposal option. The costs are relatively close with the landfill option having a slight advantage. The estimated Landfill Capital Costs of $200,000 were included in each treatment alternatives total project costs shown in Parts 4.2 through 4.4 above.

Category	Estimated Capital Cost	Estimated Annual Cost
Land Application		
3 Covers for Beds	$300,000	-
Sludge Application Buggy	$80,000	-
Used Tractor	$50,000	-
Hauling	-	$1,700
Application & Incorporation (including tractor fuel)	-	$22,000
Permitting Costs		$7500 (every 5 years)
20-YR NPV Land Application		**$847,529**
Category	Estimated Capital Cost	Estimated Annual Cost
Landfill		
1 Cover for Bed (storage)	$100,000	
Used Dump Truck	$100,000	
Hauling		$7,440
Disposal Fees		$27,370
TCLP Sampling		$1,000
20-YR NPV Landfill		**$785,545**

5.0 ALTERNATIVE ANALYSIS

5.1 LIFE CYCLE COST ANALYSIS

The Life-Cycle costs for each treatment alternative are expected to be similar and have therefore been excluded from the evaluation of the alternatives. The life cycle costs for the biosolids handling options were detailed above. The alternative with the lowest estimated construction cost is Alternative 4.2 – Permitted Wet Weather Blending Upgrades.

6.0 PROPOSED PROJECT

The treatment alternative with the lowest capital cost, and that presents the best value for the Melbourne wastewater rate payers is Alternative 4.2 – Permitted Wet-Weather Blending Upgrades. This work will be accompanied by Project 4.5 – Biosolids Handling Upgrades.

6.1 PRELIMINARY PROJECT DESIGN

The general description of these projects were provided above in Parts 4.2., and 4.5. Refer to Appendix B for exhibits of the Site Plan and Process Flow Diagram of the proposed treatment process.

6.2 PROJECT SCHEDULE

The estimated project schedule is summarized in the table below.

Milestone	Estimated Completion Date
Submit WWAC Pre-Application	December 31, 2023
Submit Clean Water Priority List Application	December 31, 2023
Submit ANRC Enable User Access Form	December 31, 2023
Submit ANRC Funding Application	January 31, 2024
Complete Final Plans & Specifications	October 31, 2024
Regulatory Review & Permitting	March 31, 2025
Bidding	May 31, 2025
Begin Construction	July 31, 2025
Substantial Completion/Start-up	December 31, 2026

6.3 PERMIT REQUIREMENTS

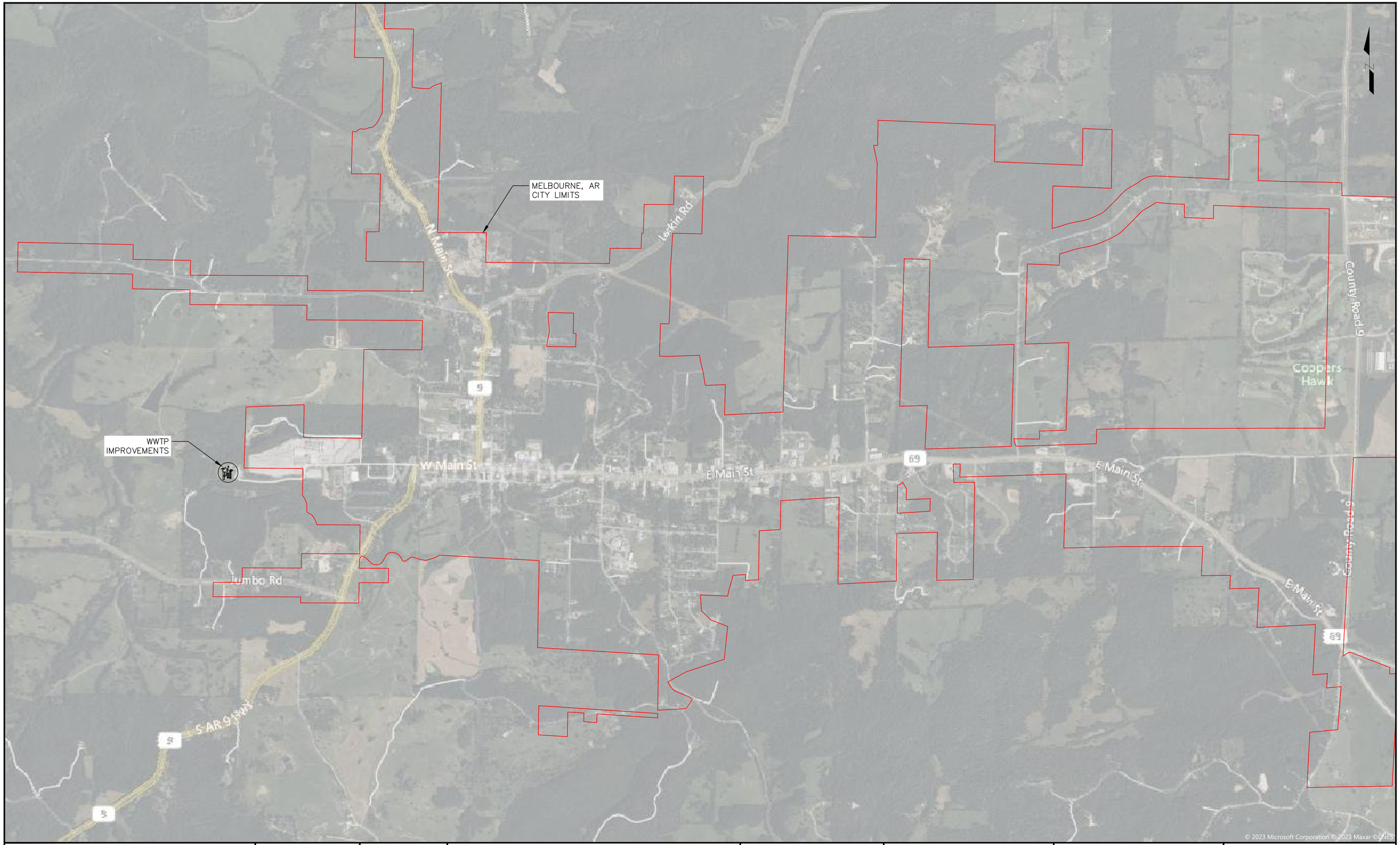
The project will require a Construction/Modification NPDES Permit as issued by the DEQ Permits Division. In addition, ADH approval will be required prior to bidding the WWTP Improvements Project.

6.4 PROJECT COST ESTIMATE

The estimated combined project costs are summarized in the table below.

Category	Estimated Cost
Construction (Alt. 4.2 + 4.5)	$3,680,000
Non-Construction	$1,477,000
Total Capital Cost	$5,157,000
Annual Biosolids O&M	$35,810

APPENDIX A:
SITE MAP



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SALT Engineers & Planners
saltengineers.com | 501-766-9832
kbreckenridge@saltengineers.com

0 1,000'
1" = 1,000'
THIS LINE MEASURES 1" WHEN PLOTTED FULL-SIZE

DATE:

CERTIFICATE OF AUTHORIZATION SALT ENGINEERS & PLANNERS, INC. No. 4011 ARKANSAS

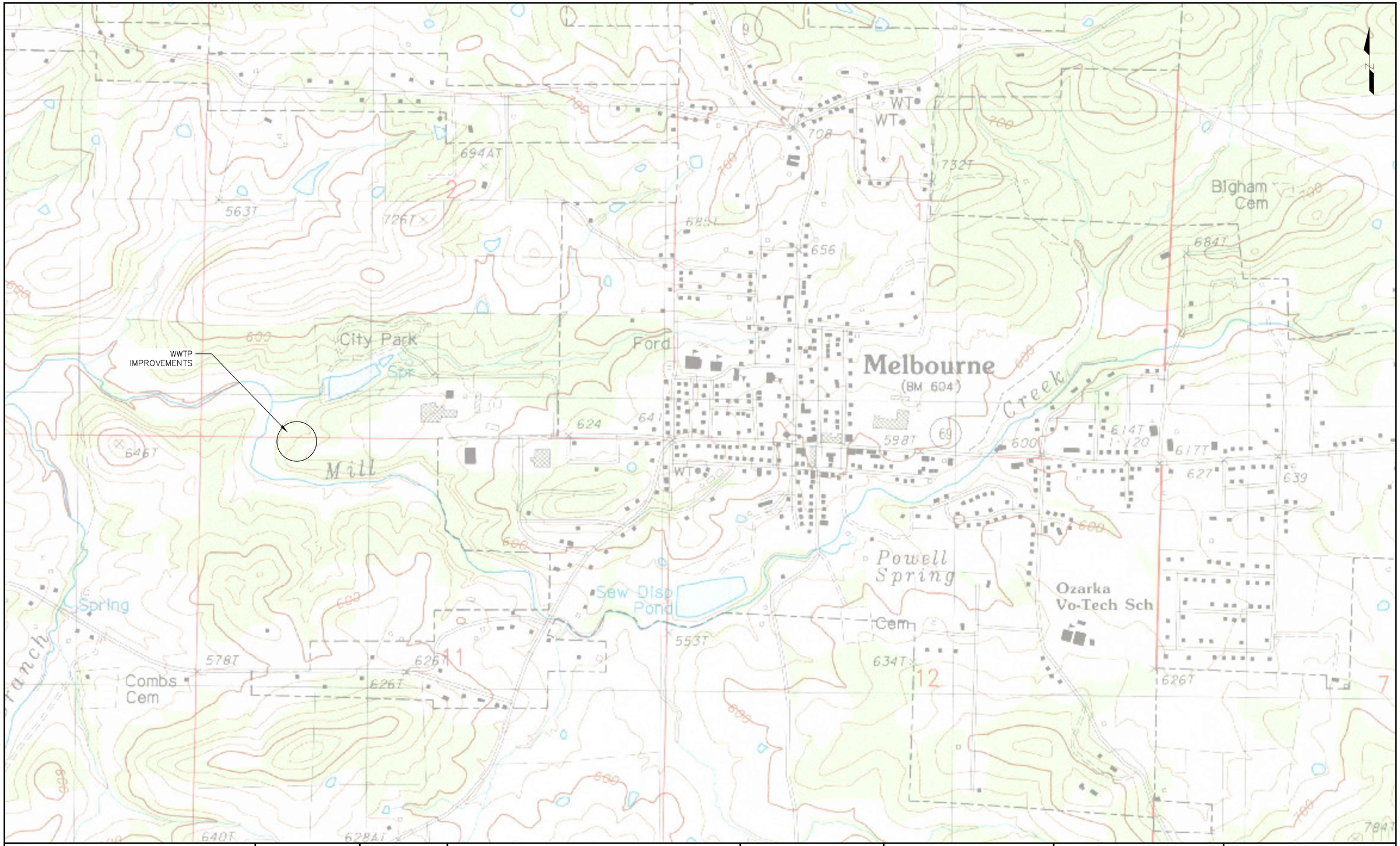
STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER Kyle Breckenridge No. 13831 BRECKENRIDGE
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

OVERALL IMPROVEMENTS PLAN

PROJECT #	SHEET
10-21-001	1



	Arkansas One Call 811 Know what's below. Call before you dig.		SALT Engineers & Planners saltengineers.com | 501-766-9832 kbreckenridge@saltengineers.com	0 500' 1" = 500' THIS LINE MEASURES 1" WHEN PLOTTED FULL-SIZE DATE:	CERTIFICATE OF AUTHORIZATION SALT ENGINEERS & PLANNERS, INC. No. 4011 ARKANSAS STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER No. 13831 KATE BRECKENRIDGE 11/30/23	CITY OF MELBOURNE **WWTP IMPROVEMENTS PER**	OVERALL SITE MAP PROJECT # 10-21-001 SHEET 2

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0 30'
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DATE: 11/30/23

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STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER No. 13831 KYLE BRECKENRIDGE

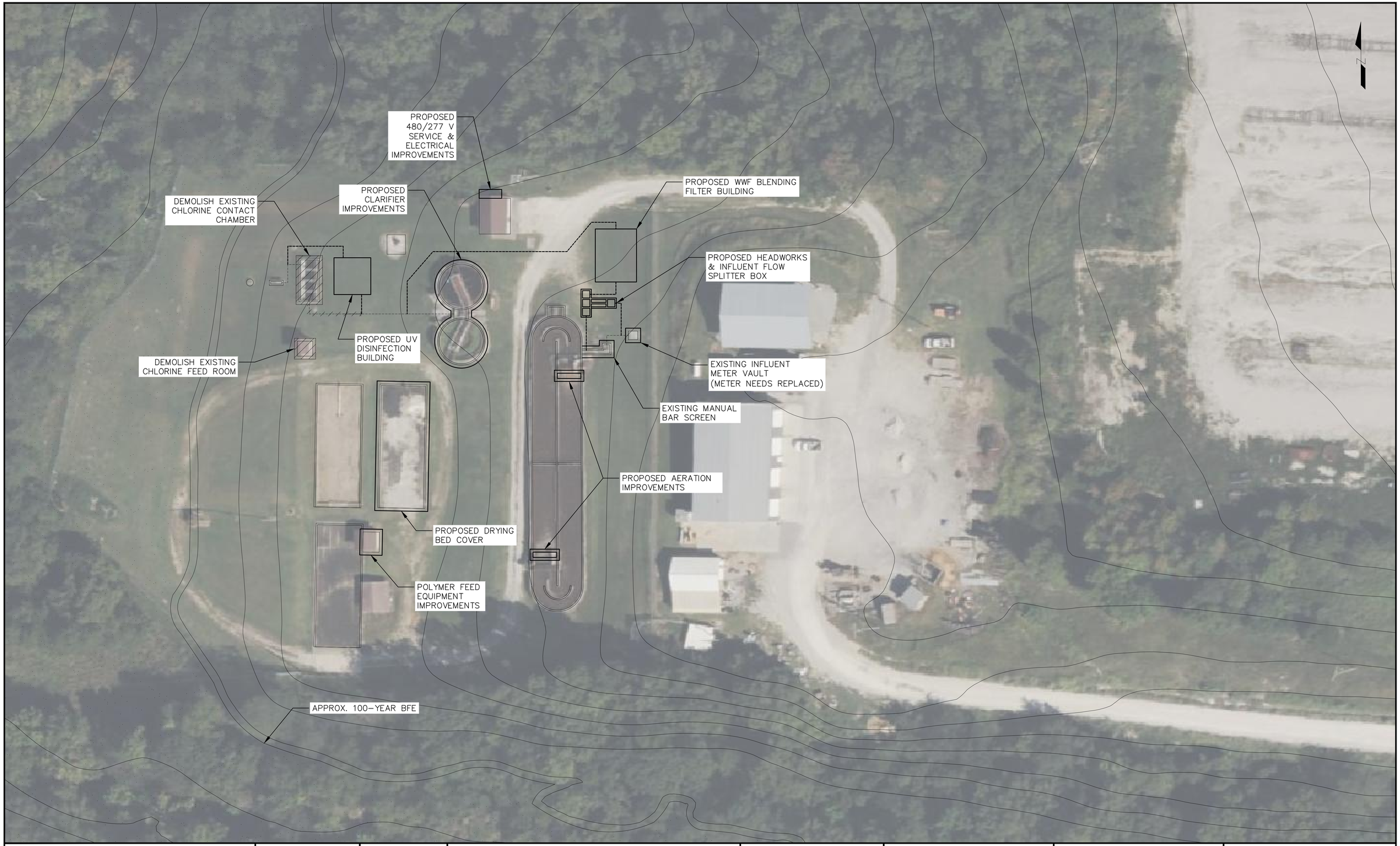
CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

100–YEAR FLOOD EXTENTS

PROJECT #	SHEET
10-21-001	3

APPENDIX B:
PROJECT ALTERNATIVE MAPS & EXHIBITS



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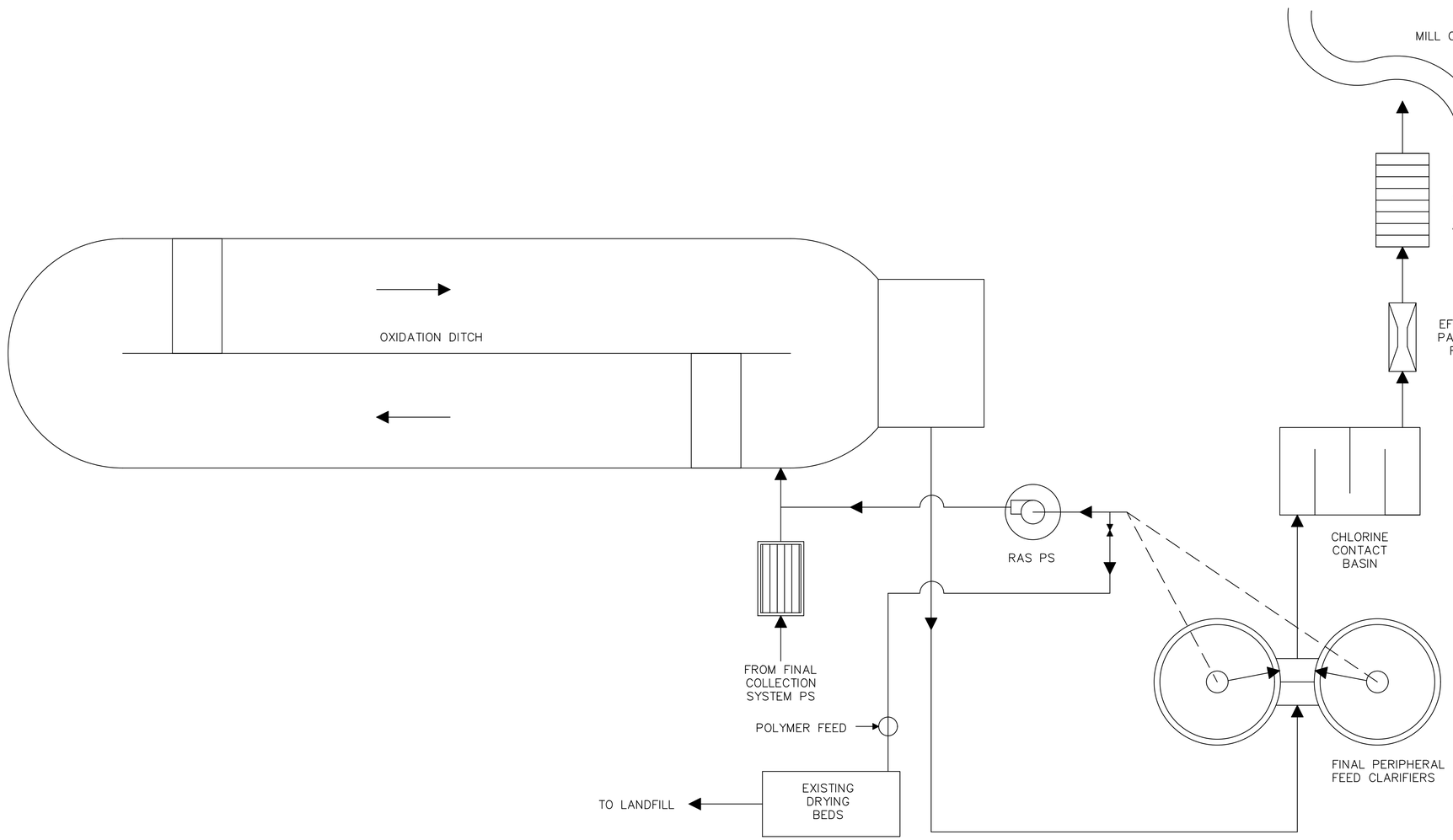
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

SITE PLAN
ALT. 2 – WWF BLENDING

PROJECT #	SHEET
10-21-001	4



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DATE:

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STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER No. 13831 KYLE BRECKENRIDGE

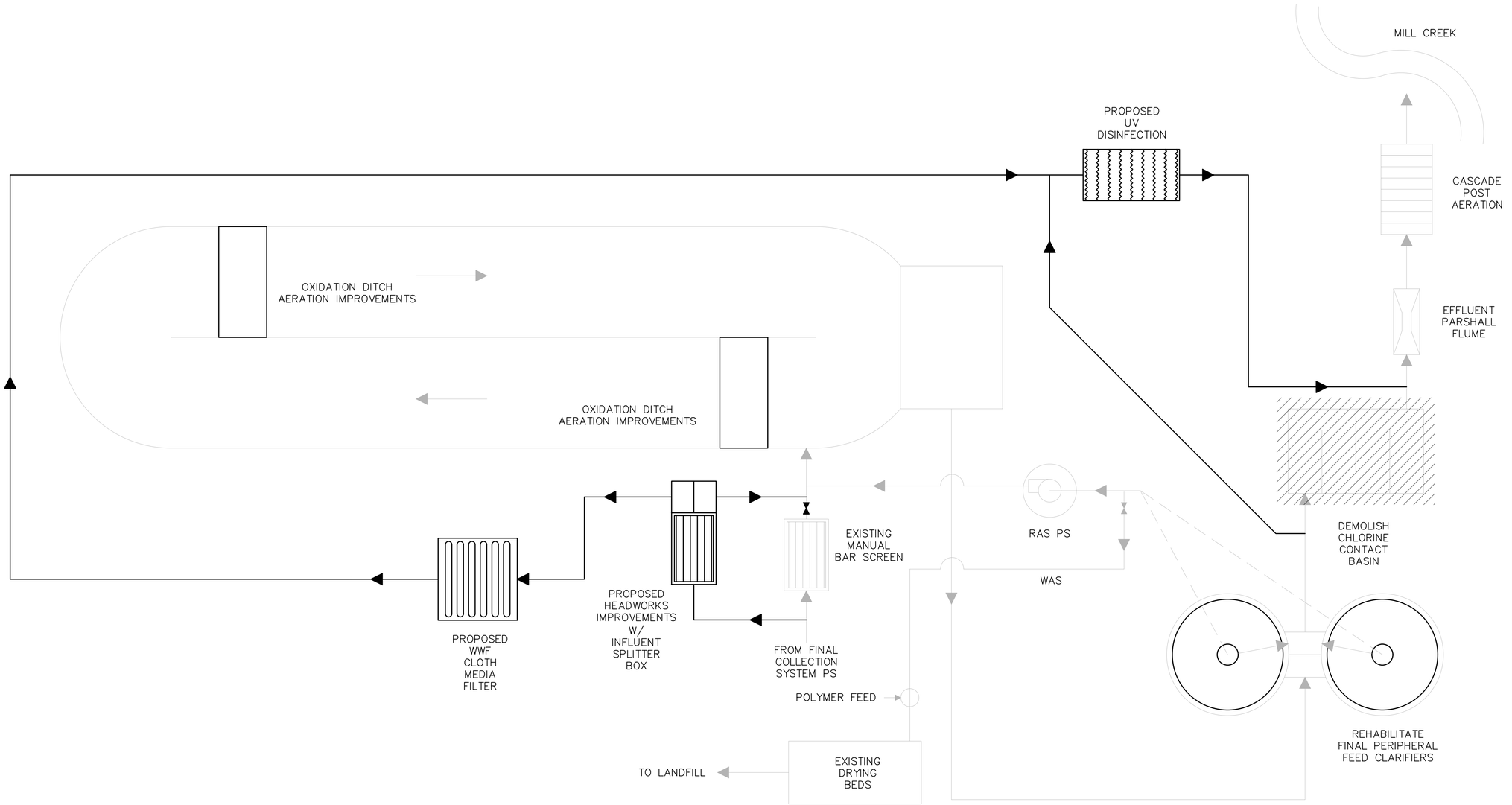
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

PROCESS FLOW DIAGRAM
EXISTING WWTP PROCESS

PROJECT #	SHEET
10-21-001	5



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

SALT Engineers & Planners
saltengineers.com | 501-766-9832
kbreckenridge@saltengineers.com

THIS LINE MEASURES 1" WHEN PLOTTED FULL-SIZE

DATE: 11/30/23

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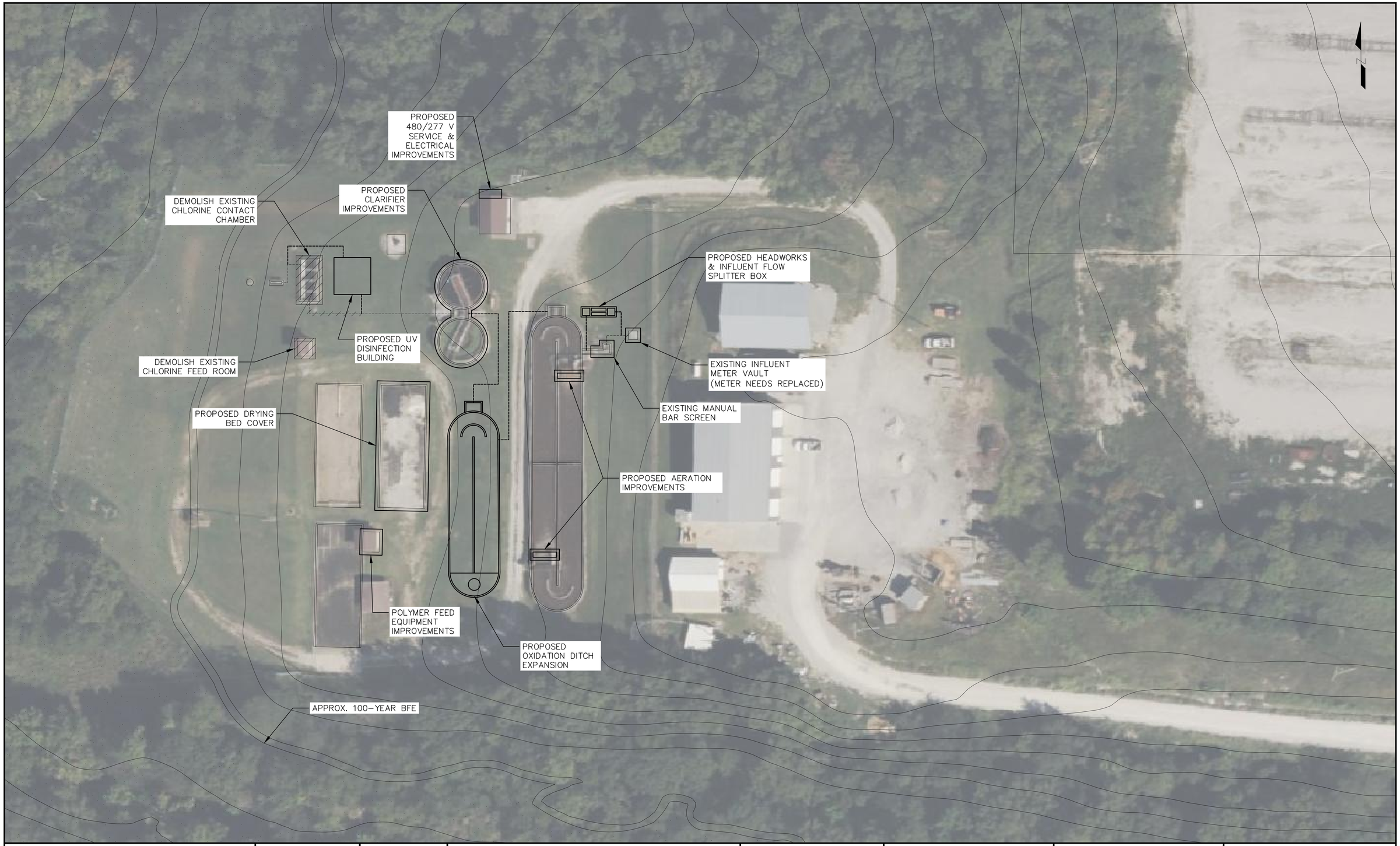
STATE OF ARKANSAS — LICENSED PROFESSIONAL ENGINEER — No. 13831 — KYLE BRECKENRIDGE

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

PROCESS FLOW DIAGRAM
ALT. 2 – WWF BLENDING

PROJECT #	SHEET
10-21-001	6



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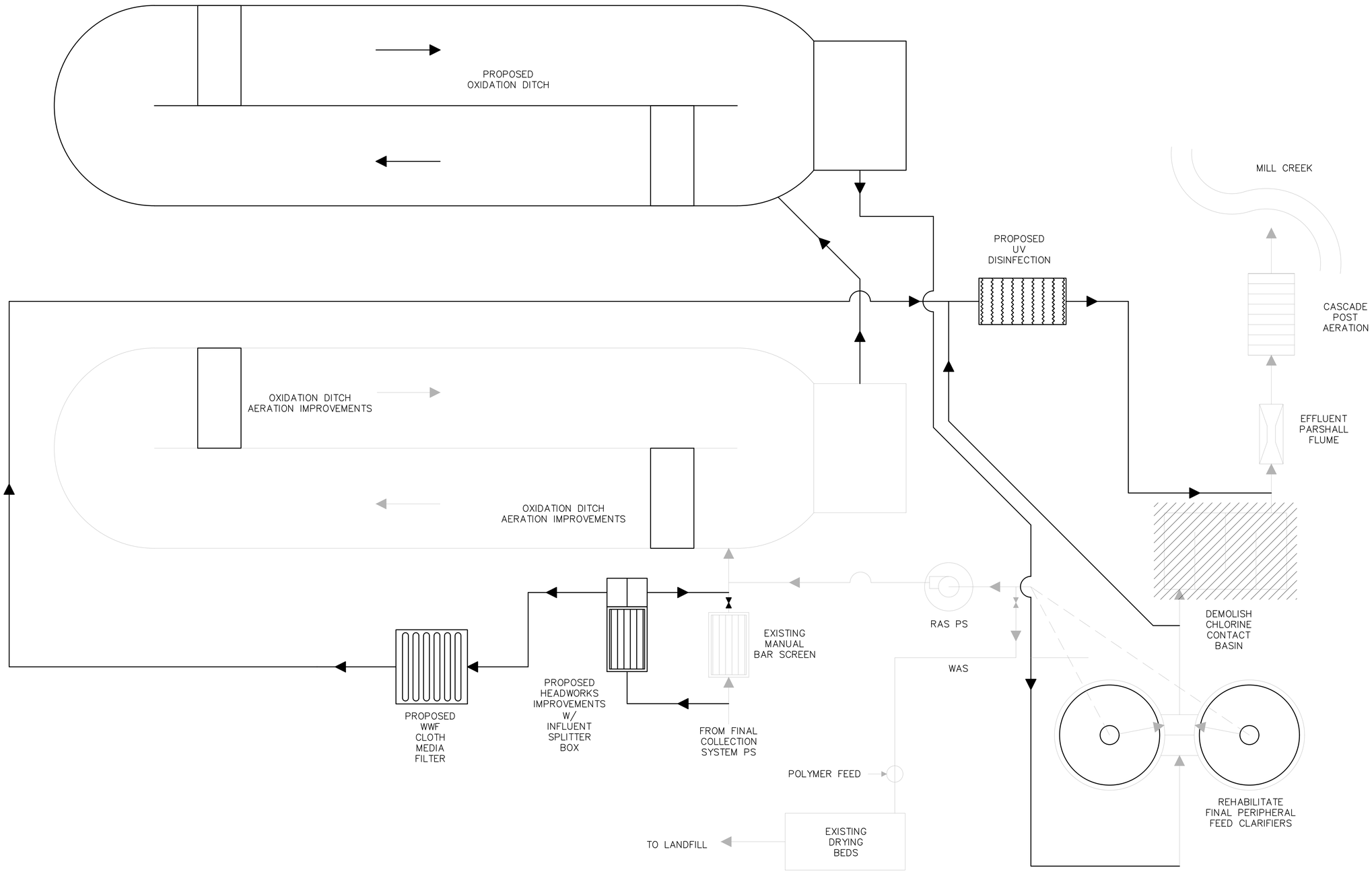
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

SITE PLAN
ALT. 3 – OD EXPANSION

PROJECT #	SHEET
10-21-001	7



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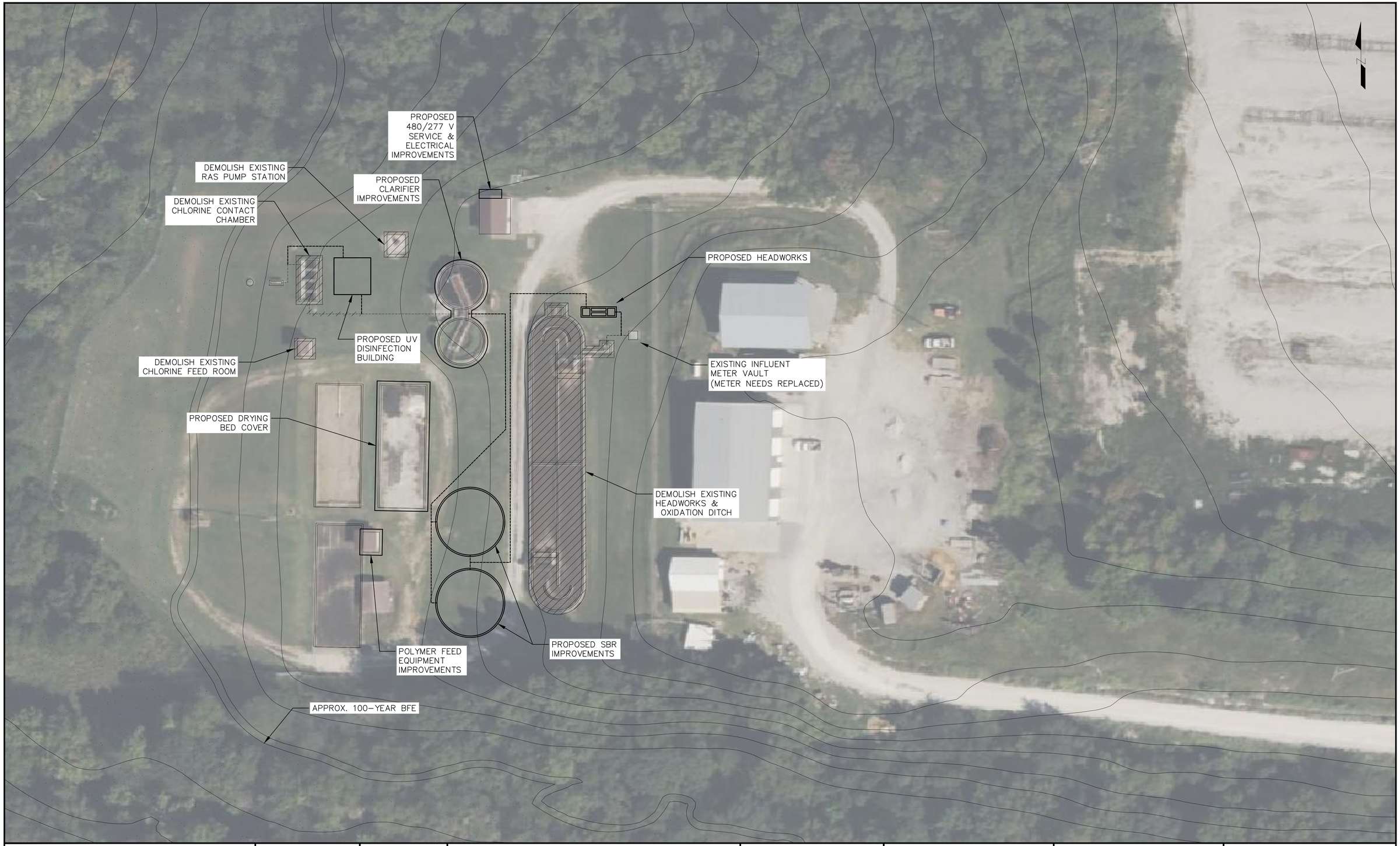
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

PROCESS FLOW DIAGRAM
ALT. 3 – OD EXPANSION

PROJECT #	SHEET
10-21-001	8



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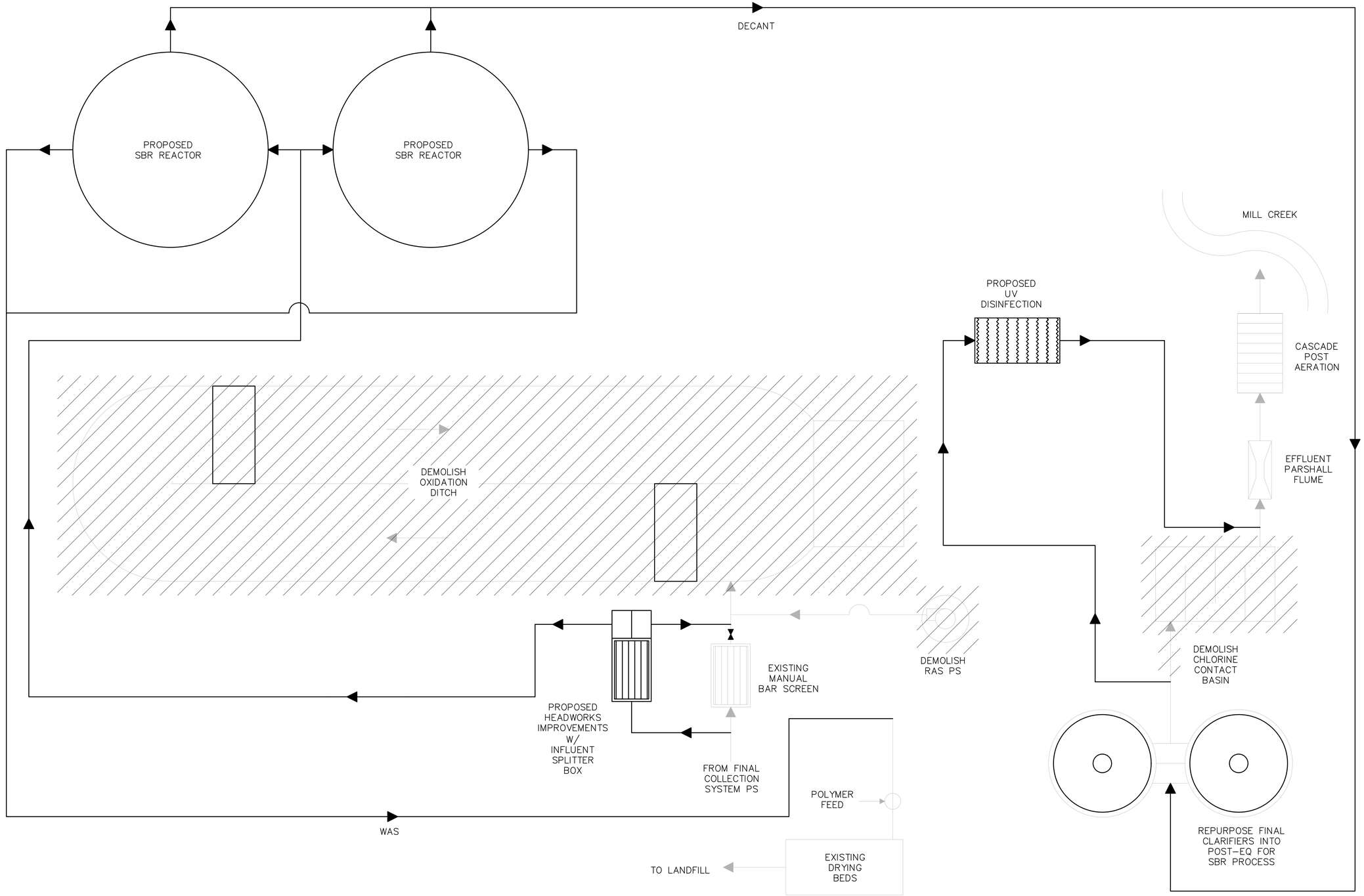
11/30/23

CITY OF MELBOURNE

WWTP IMPROVEMENTS PER

SITE PLAN
ALT. 4 – SBR PROCESS

PROJECT #	SHEET
10-21-001	9



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STATE OF ARKANSAS — LICENSED PROFESSIONAL ENGINEER — No. 13831 — KYLE W. BRECKENRIDGE — 11/30/23

CITY OF MELBOURNE
WWTP IMPROVEMENTS PER

PROCESS FLOW DIAGRAM
ALT. 4 – SBR PROCESS

PROJECT #	SHEET
10-21-001	10

APPENDIX C:
COST ESTIMATES

SALT
ENGINEERS & PLANNERS

Engineer's Preliminary Cost Estimate (4.2.7)

Owner: City of Melbourne, AR
Project: WWTP IMPROVEMENTS
Alternative: Wet Weather Blending
Date: December 2023

Item	Description	Quantity	Unit	Unit Cost	Total
1	Headworks Improvements	1	LS	$ 300,000.00	$ 300,000
2	Oxidation Ditch Aeration Improvements	1	LS	$ 250,000.00	$ 250,000
3	Final Clarifier Rehabilitation	1	LS	$ 500,000.00	$ 500,000
4	Cloth Media Filter for Blending WWF	1	LS	$ 625,000.00	$ 625,000
5	Filter Building & Ancillaries	1	LS	$ 150,000.00	$ 150,000
6	Influent Splitter Box	1	LS	$ 75,000.00	$ 75,000
7	UV Disinfection & Building	1	LS	$ 300,000.00	$ 300,000
8	Yard Piping	1	LS	$ 50,000.00	$ 50,000
9	Electrical	1	LS	$ 400,000.00	$ 400,000
10	Biosolids Storage Cover	1	LS	$ 100,000.00	$ 100,000
11	Polymer Feed Equipment Replacement	1	LS	$ 50,000.00	$ 50,000
12	Demolition	1	LS	$ 50,000.00	$ 50,000
13	Site Work and Grading	1	LS	$ 50,000.00	$ 50,000
					$ 2,900,000
	Contractor OH&P (20%)				$580,000
	Construction Total (rounded up to nearest thousand)				$ 3,480,000
	Non-Construction Costs				
	Contingency (30%)				$ 1,044,000
	Engineering - Design				$ 278,000
	Engineering - Construction & Inspection Services				$ 135,000
	Legal				$ 20,000
	Non-Construction Total (rounded up to nearest thousand)				$ 1,477,000
	Total Project Cost (rounded up to nearest thousand)				$ 4,957,000

SALT
ENGINEERS & PLANNERS

Engineer's Preliminary Cost Estimate (4.3.7)

Owner: City of Melbourne, AR
Project: WWTP IMPROVEMENTS
Alternative: Oxidation Ditch Expansion
Date: December 2023

Item	Description	Quantity	Unit	Unit Cost	Total
1	Headworks Improvements	1	LS	$ 300,000.00	$ 300,000
2	Oxidation Ditch Aeration Improvements	1	LS	$ 250,000.00	$ 250,000
3	Consecutive Oxidation Ditch	1	LS	$ 1,000,000.00	$ 1,000,000
4	Final Clarifier Rehabilitation	1	LS	$ 500,000.00	$ 500,000
5	Influent Splitter Box	1	LS	$ 75,000.00	$ 75,000
6	UV Disinfection & Building	1	LS	$ 300,000.00	$ 300,000
7	Yard Piping	1	LS	$ 100,000.00	$ 100,000
8	Electrical	1	LS	$ 500,000.00	$ 500,000
9	Biosolids Storage Cover	1	LS	$ 100,000.00	$ 100,000
10	Polymer Feed Equipment Replacement	1	LS	$ 50,000.00	$ 50,000
11	Demolition	1	LS	$ 50,000.00	$ 50,000
12	Site Work and Grading	1	LS	$ 100,000.00	$ 100,000
					$ 3,325,000
	Contractor OH&P (20%)				$665,000
	Construction Total (rounded up to nearest thousand)				$ 3,990,000
	Non-Construction Costs				
	Contingency (30%)				$ 1,197,000
	Engineering - Design				$ 315,000
	Engineering - Construction & Inspection Services				$ 159,000
	Legal				$ 20,000
	Non-Construction Total (rounded up to nearest thousand)				$ 1,691,000
	Total Project Cost (rounded up to nearest thousand)				$ 5,681,000

SALT
ENGINEERS & PLANNERS

Engineer's Preliminary Cost Estimate (4.4.7)

Owner: City of Melbourne, AR
Project: WWTP IMPROVEMENTS
Alternative: SBR Process
Date: December 2023

Item	Description	Quantity	Unit	Unit Cost	Total
1	SBR Tanks & Equipment	1	LS	$ 1,750,000.00	$ 1,750,000
2	Headworks	1	LS	$ 300,000.00	$ 300,000
3	Yard Piping	1	LS	$ 150,000.00	$ 150,000
4	UV Disinfection & Building	1	LS	$ 300,000.00	$ 300,000
5	Electrical	1	LS	$ 500,000.00	$ 500,000
6	Post Equalization (reuse of Final Clarifier Volume)	1	LS	$ 100,000.00	$ 100,000
7	Biosolids Storage Cover	1	LS	$ 100,000.00	$ 100,000
8	Polymer Feed Equipment Replacement	1	LS	$ 50,000.00	$ 50,000
9	Demolition	1	LS	$ 150,000.00	$ 150,000
10	Site Work & Grading	1	LS	$ 100,000.00	$ 100,000
					$ 3,500,000
	Contractor OH&P (20%)				$700,000
	Construction Total				$ 4,200,000
	Non-Construction Costs				
	Contingency (30%)				$ 1,260,000
	Engineering - Design				$ 336,000
	Engineering - Construction & Inspection Services				$ 168,000
	Legal				$ 20,000
	Non-Construction Total (rounded up to nearest thousand)				$ 1,784,000
	Total Project Cost (rounded up to nearest thousand)				$ 5,984,000