

San Jacinto River Authority

Phase I - Wastewater Strategic Plan and Phase II – Facility Master Plan

North Houston Association
September 14, 2023

PRESENTATION AGENDA



SJRA Infrastructure Background



Phase 1 - Wastewater Strategic Plan, Feasibility Study

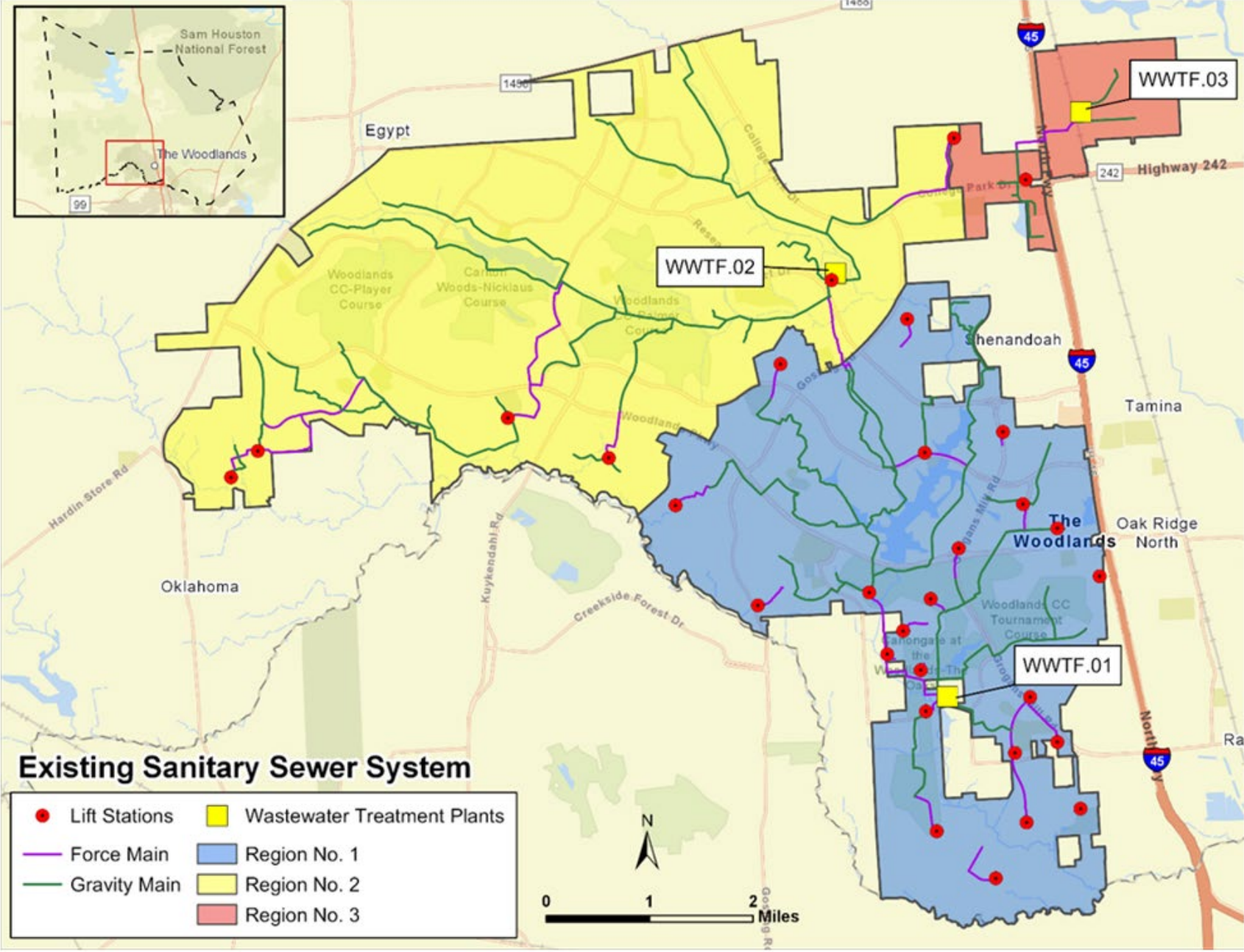


Phase 2 - Facility Master Plan & Capacity Optimization



Path Forward and Q&A

Existing System



OVERALL APPROACH: WW STRATEGIC PLANNING AND EXECUTION



OVERALL APPROACH: WW STRATEGIC PLANNING AND EXECUTION



Phase 1- Feasibility Study Approach



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist



Initial Alternatives Scoring



Final Alternative Selection

Stakeholders Established Project Goals, Level of Service

Collection System Surcharge

High LoS

Mid LoS

Low LoS

Odor

High LoS

Mid LoS

Low LoS

Effluent Quality

High LoS

Mid LoS

Low LoS

Noise

High LoS

Mid LoS

Low LoS

High LoS

Full noise mitigation, including placing equipment inside to achieve XX dBA at property line.

Mid LoS

Partial noise mitigation, including equipment enclosures to achieve 80 dBA at property line.

Low LoS

No noise Mitigation



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist

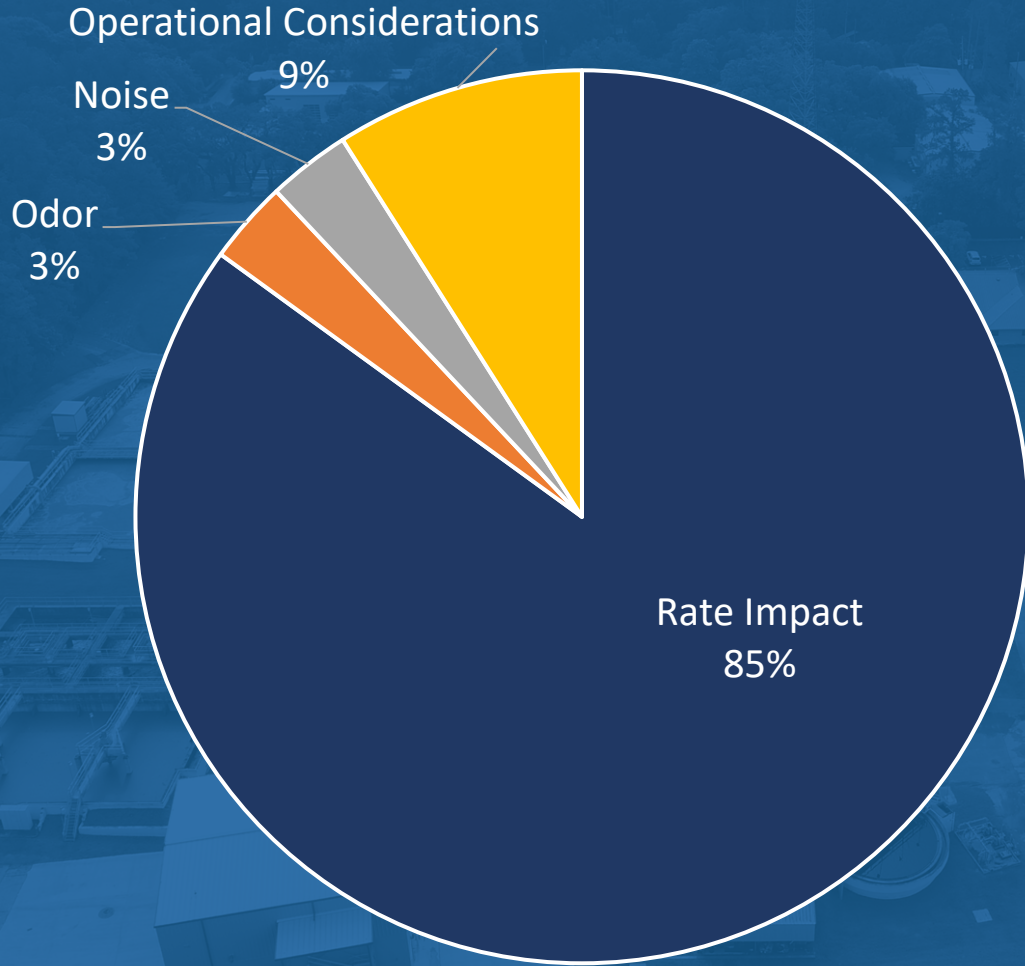


Initial Alternatives Scoring



Final Alternative Selection

Project Cost, Rate Impact Determined to be a Primary Factor



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist



Initial Alternatives Scoring



Final Alternative Selection

Existing Infrastructure Condition Informed the Project Needs



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



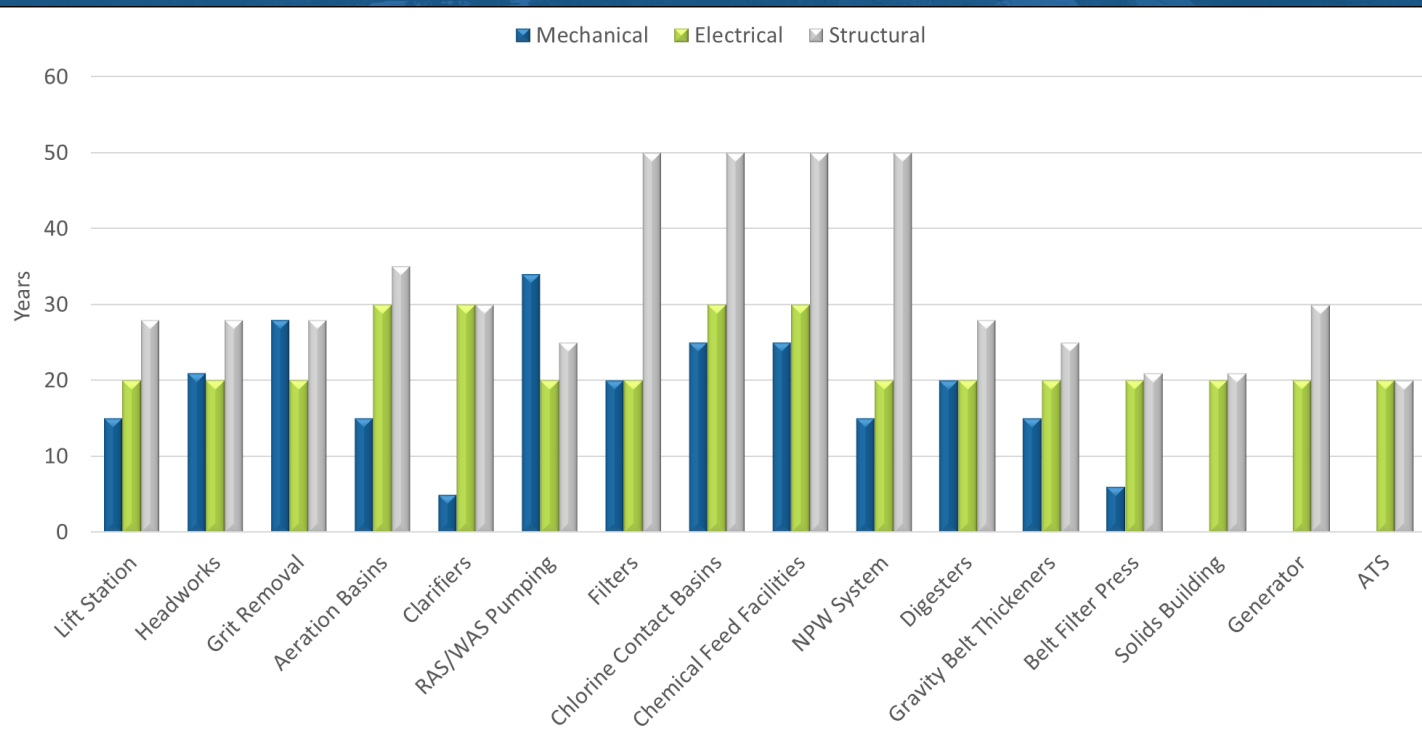
Alternatives Shortlist



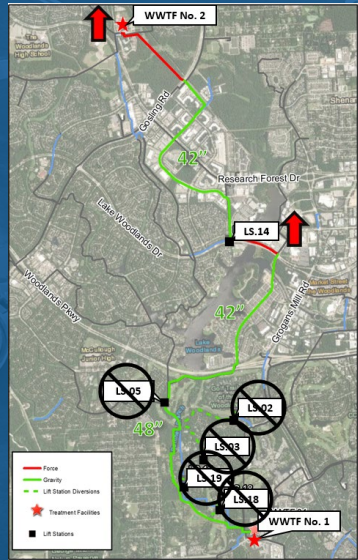
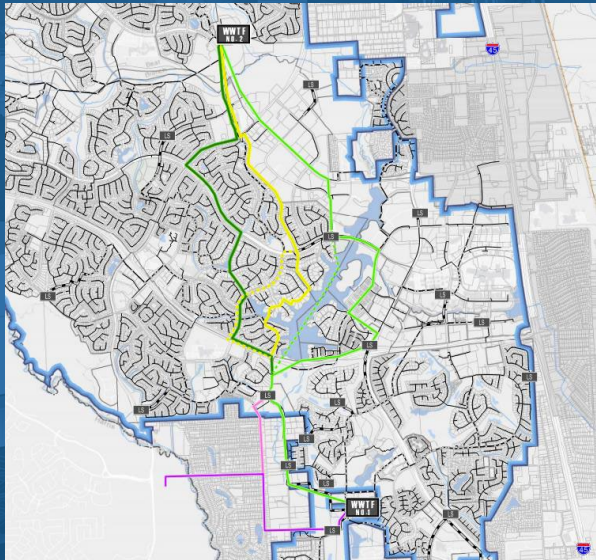
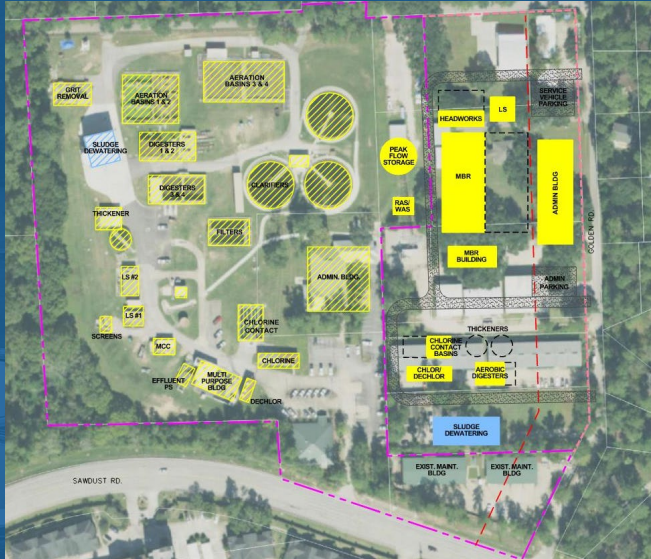
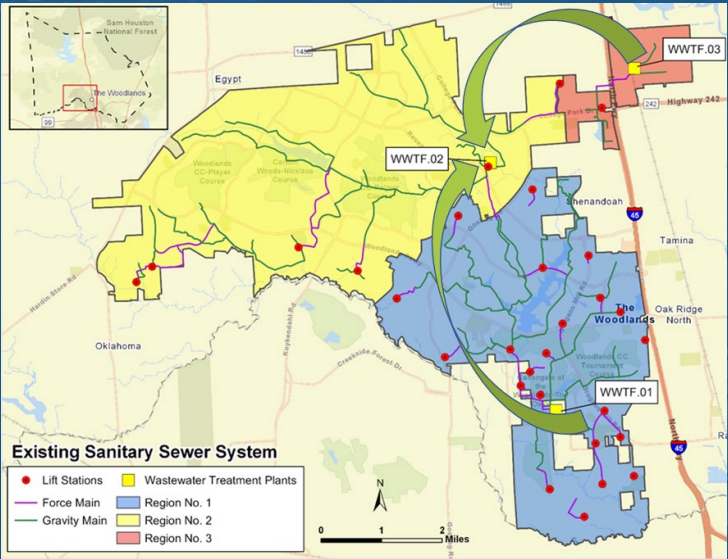
Initial Alternatives Scoring



Final Alternative Selection



Dozens of Potential Solutions Considered



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist



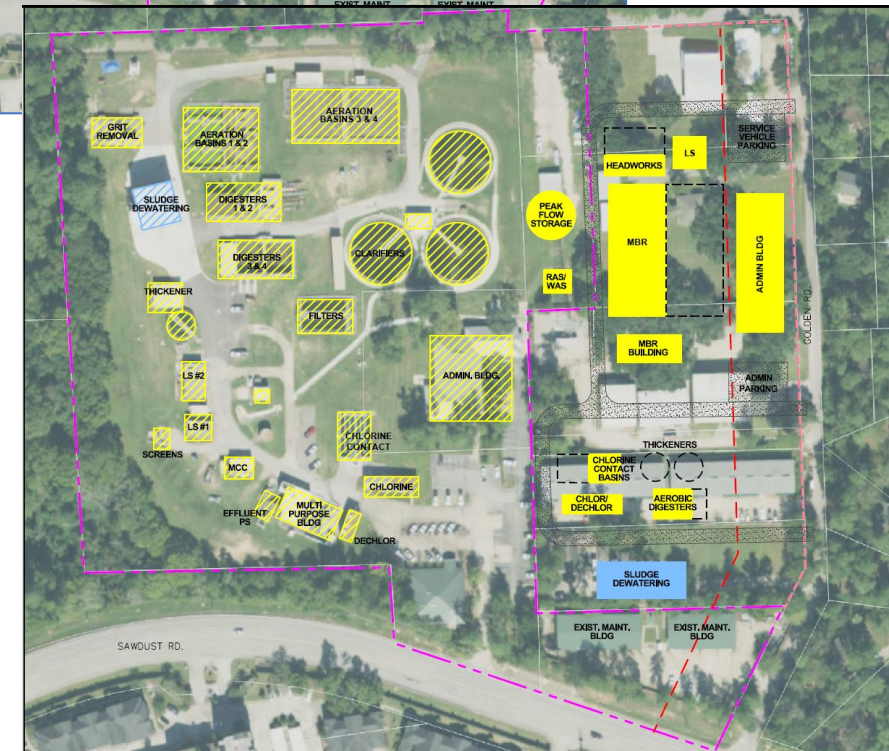
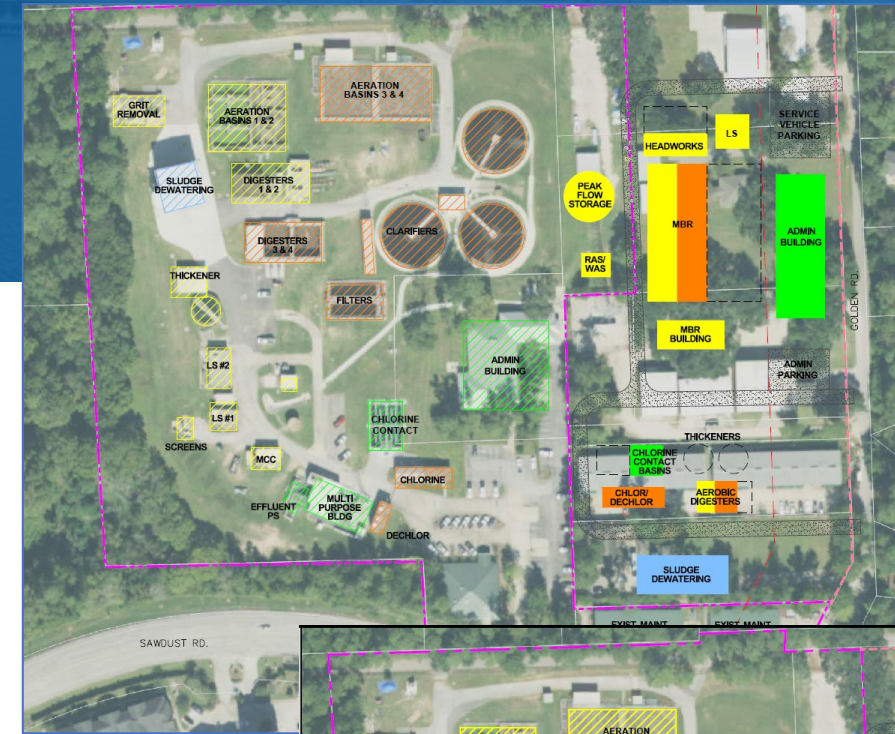
Initial Alternatives Scoring



Final Alternative Selection

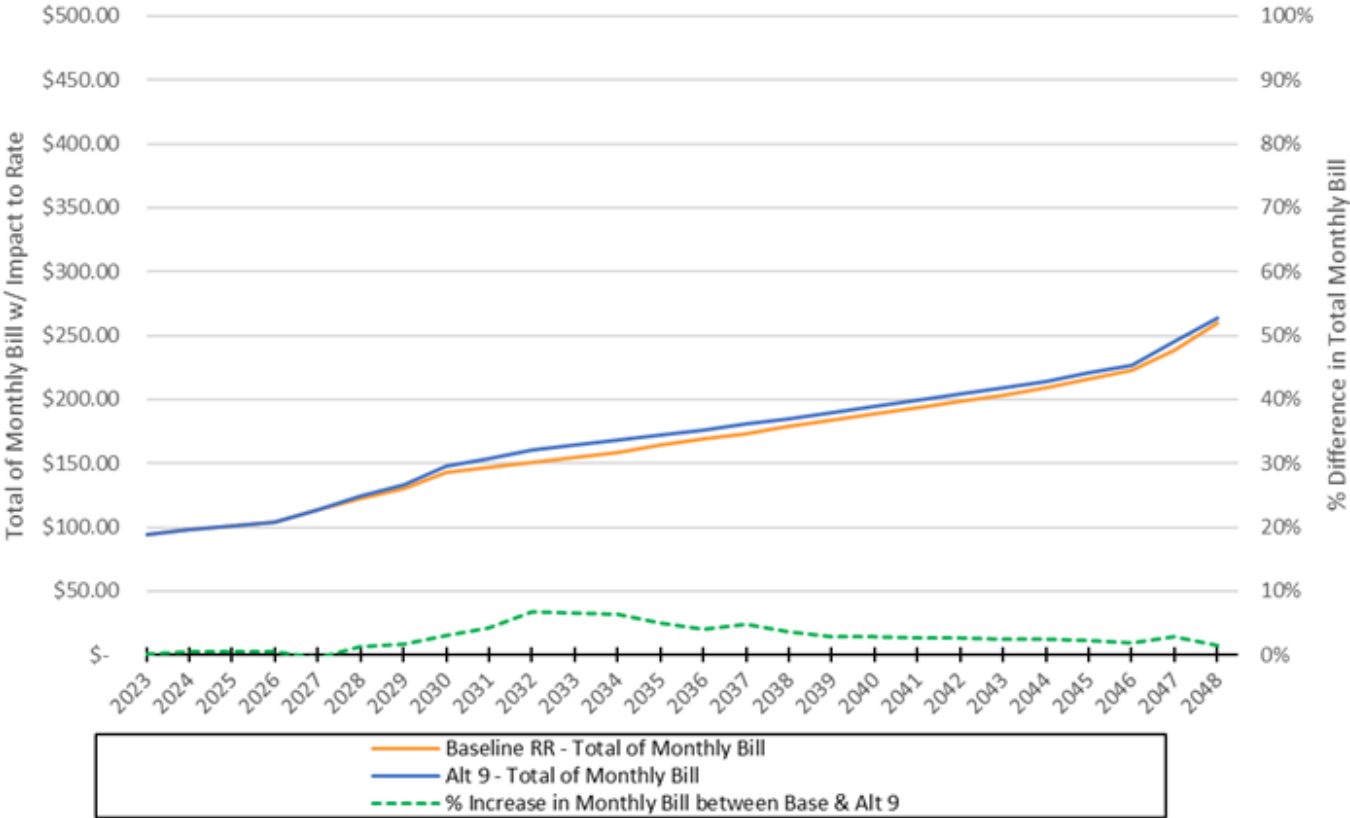
Short-listed Alternatives Identified

- Two alternatives selected:
 - Defer consolidation
 - Replace WWTP No. 1 on adjacent property
 - Utilize membrane bioreactor (MBR) technology
 - Differ in terms of the timing, phasing of improvements
 - Baseline Alternative – phase in improvements over time, as units reach end of useful life
 - Alternative 9 – entirely replace existing plant in first phase of construction



Short-listed Alternatives Have a Similar Rate Impact

Comparison of Total, Average Monthly Bill - 6,000 gal./month



Minimum Level of Service



Evaluation Criteria Weighting



Condition Assessment



Alternatives Shortlist



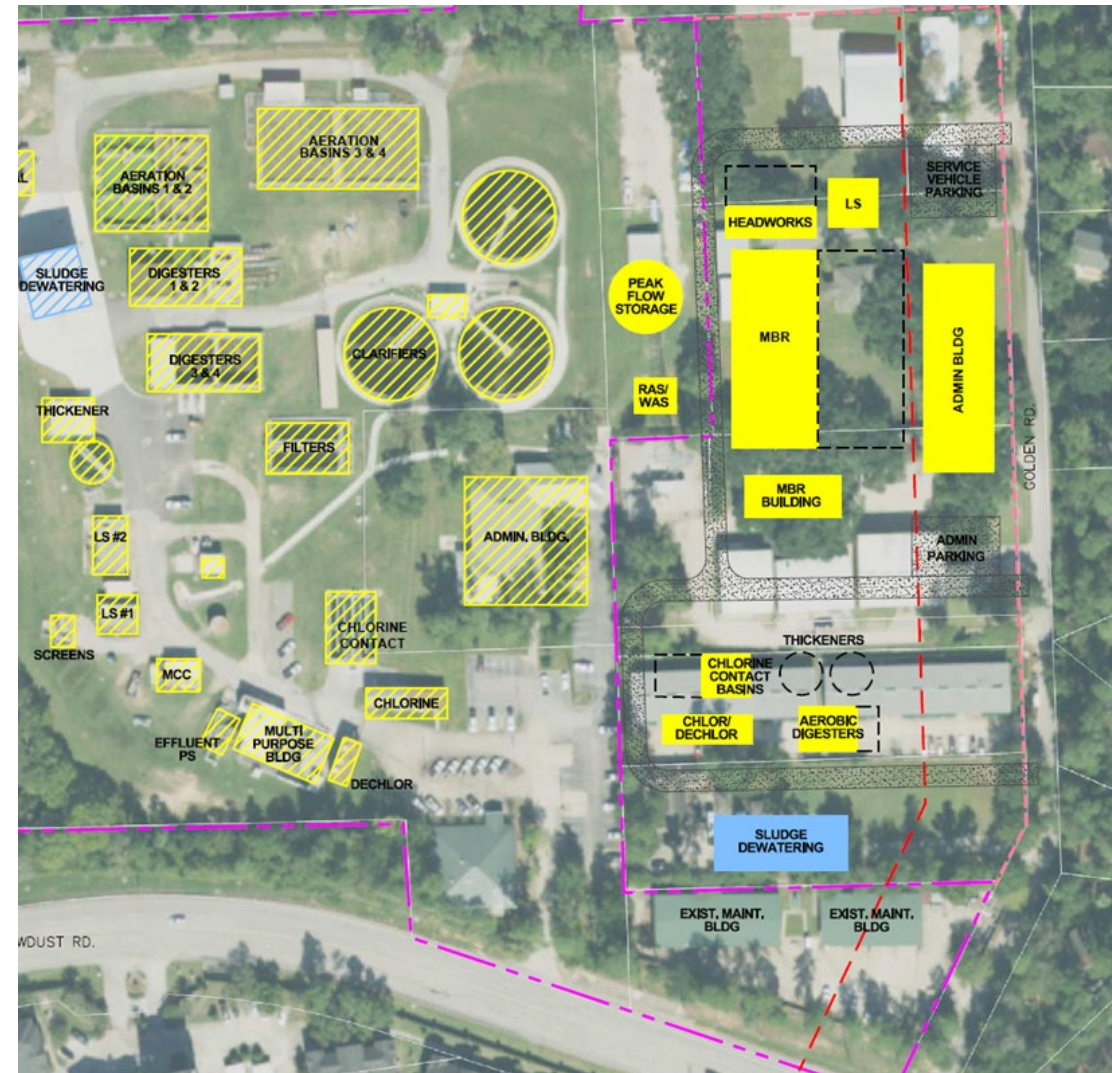
Alternatives Scoring



Final Alternative Selection

Non-Cost Factors Favor New Facility, Alternative 9

- Less on-going construction within plant boundary
 - Operator safety
 - Risk for plant disruptions
- Achieves a higher level of service sooner
 - Consistent high-quality effluent
 - Future regulatory requirements and compliance
 - Odor & noise
- Risk of existing assets reaching estimated remaining useful life
 - Underground piping unknowns, structural concerns
- Optimized facility operations
 - Single treatment technology
 - Improved automation and instrumentation



PHASE II GOALS



- Proceed with Master Plan based on Alternative 9, New WWTP
- Recommend an optimal AADF capacity
- Develop a site layout
- Refine the engineer's opinion of capital cost



WRF No. 1 Average Day
Capacity Optimization Analysis

BACKGROUND

1 Single Family Dwelling
Unit Equivalent
(SFDUE)

=



=



Shopping Center*

**Example shown is for illustrative purposes only. SFDUEs are calculated for each non-single family development based on parameters such as square footage, acreage, etc.*

Projected SFDUEs

X

Planning Criteria
(gallons per day/SFDUE)

=

Projected Wastewater
Flow to Treatment Facility



Existing Planning Criteria
= 217 gpd/SFDUE

A single planning criteria is utilized for all three of the Woodland's Wastewater Treatment Facilities

WRF No. 1 CAPACITY OPTIMIZATION ANALYSIS

1 Planning Criteria Analysis of wastewater flows per Single Family Dwelling Unit Equivalent (SFDUE)

2 SFDUE Projections Assessment of the number of projected SFDUEs for Water Reclamation Facility No. 1

3 Projected Annual Average Flows Planning criteria multiplied by the number of SFDUEs

4 Capacity Recommendation Considerations for sizing Water Reclamation Facility No. 1

WRF No. 1 CAPACITY OPTIMIZATION ANALYSIS

1

Planning Criteria

Analysis of wastewater flows per Single Family Dwelling Unit Equivalent (SFDUE)

2

SFDUE Projections

Assessment of the number of projected SFDUEs for Water Reclamation Facility No. 1

3

Projected Annual Average Flows

Planning criteria multiplied by the number of SFDUEs

4

Capacity Recommendation

Considerations for sizing Water Reclamation Facility No. 1

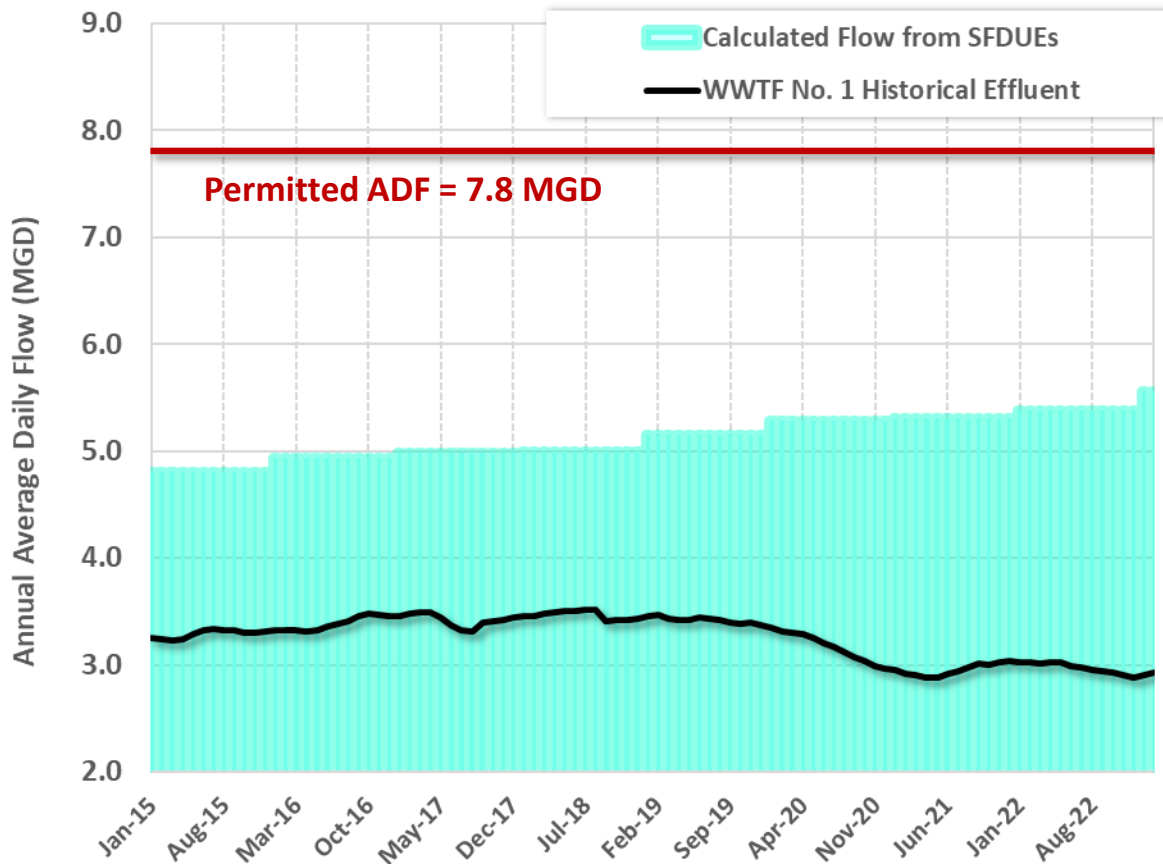
PLANNING CRITERIA ANALYSIS

Purchased SFDUE Capacity | WWTF No. 1

1

Planning
Criteria

SFDUEs from 2022 Land Use Database



Purchased
SFDUEs



Existing
Planning
Criteria
(217 gpd/SFDUE)



Historic Flow
(gpd)

All calculated flows based on 217 gpd/SFDUE

PLANNING CRITERIA ANALYSIS

Utilized SFDUEs

1

Planning
Criteria

- Utilized latest annual SFDUE database from Woodlands Water Agency (WWA)
- Estimated Utilized SFDUEs based on:
 - Historical **commercial** and **multi-family occupancy** data from developers
 - Historical **hotel occupancy** from Visit The Woodlands
 - Constructed** versus **purchased** SFDUEs from WWA
 - Historical **demographics** data from developers in The Woodlands

Example: Utilized 2022 SFDUEs

WWTF	Total SFDUEs from 2022 Land Use Database	Utilized 2022 SFDUEs	Delta
WWTF No. 1	24,787	18,169	6,618
WWTF No. 2	22,244	20,407	1,837
Total	47,031	38,577	8,454

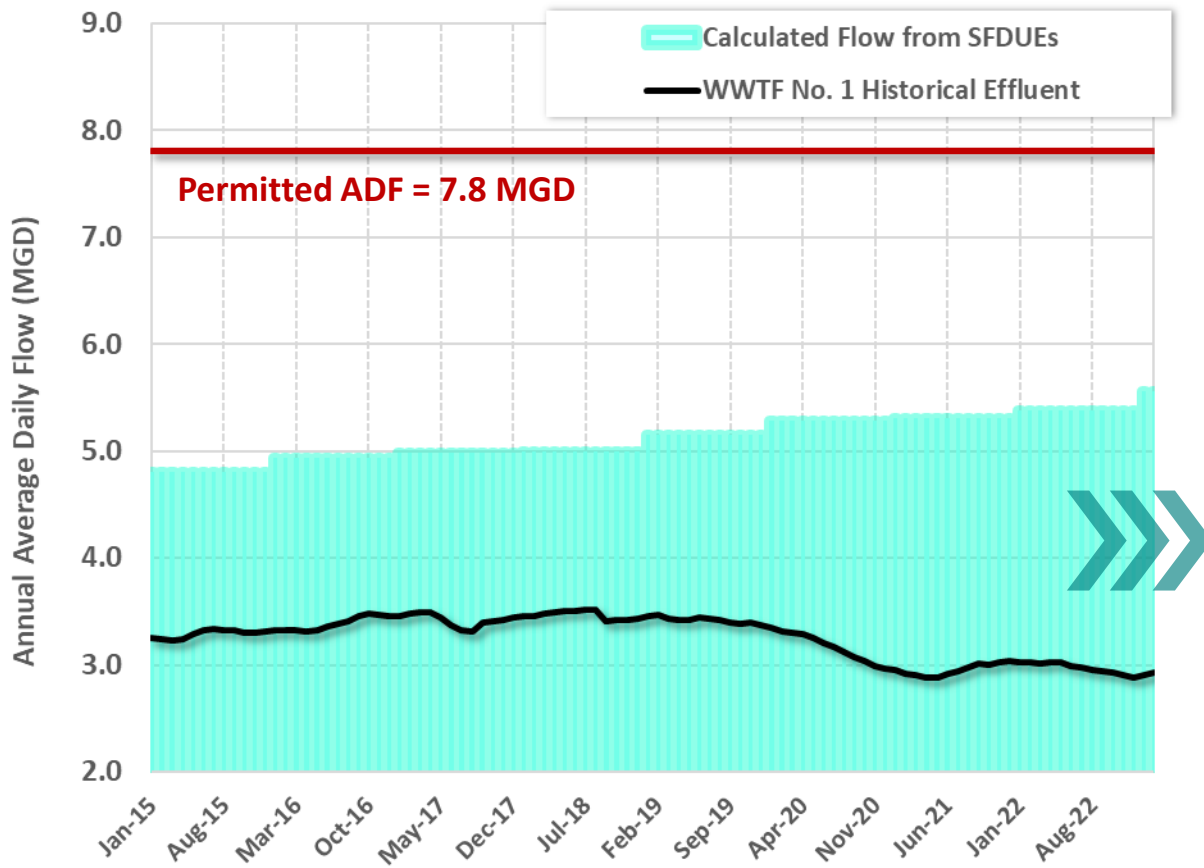
PLANNING CRITERIA ANALYSIS

Utilized SFDUEs | WWTF No. 1

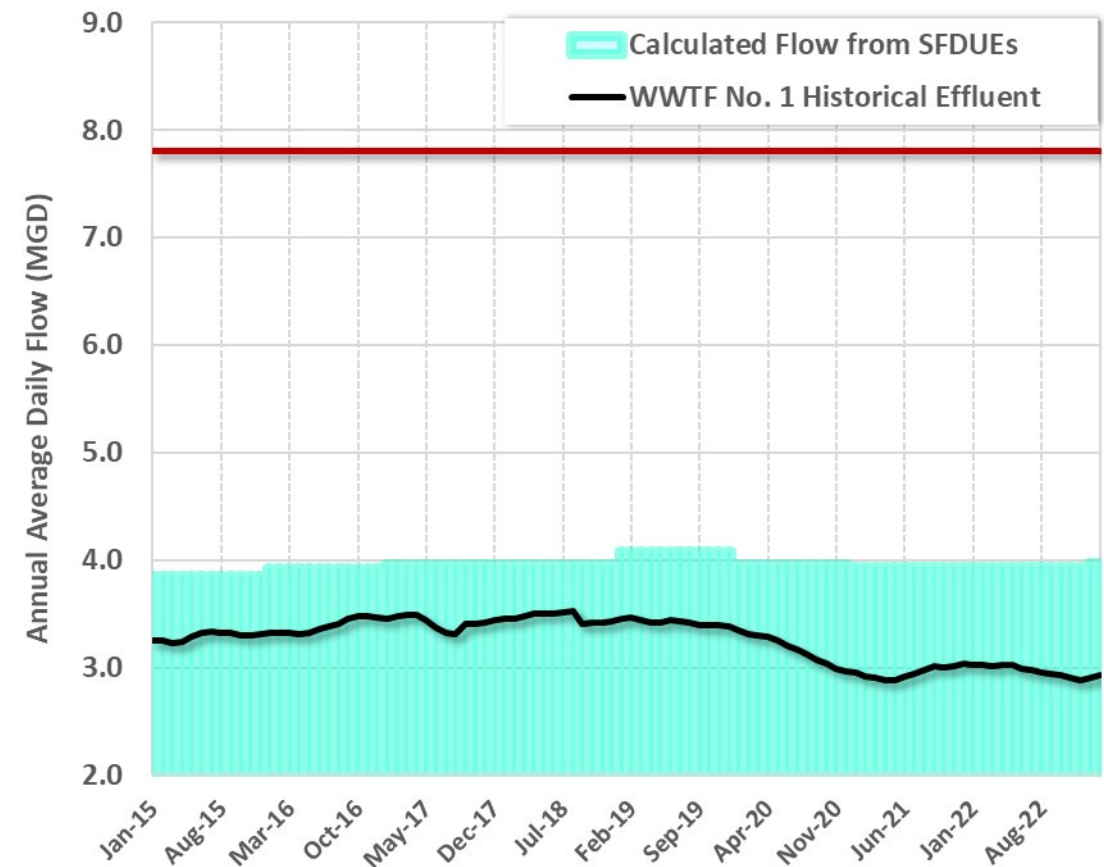
1

Planning
Criteria

SFDUEs from 2022 Land Use Database



Utilized SFDUEs



All calculated flows based on 217 gpd/SFDUE

PLANNING CRITERIA ANALYSIS

Historical gpd/SFDUE Analysis

1

Planning
Criteria

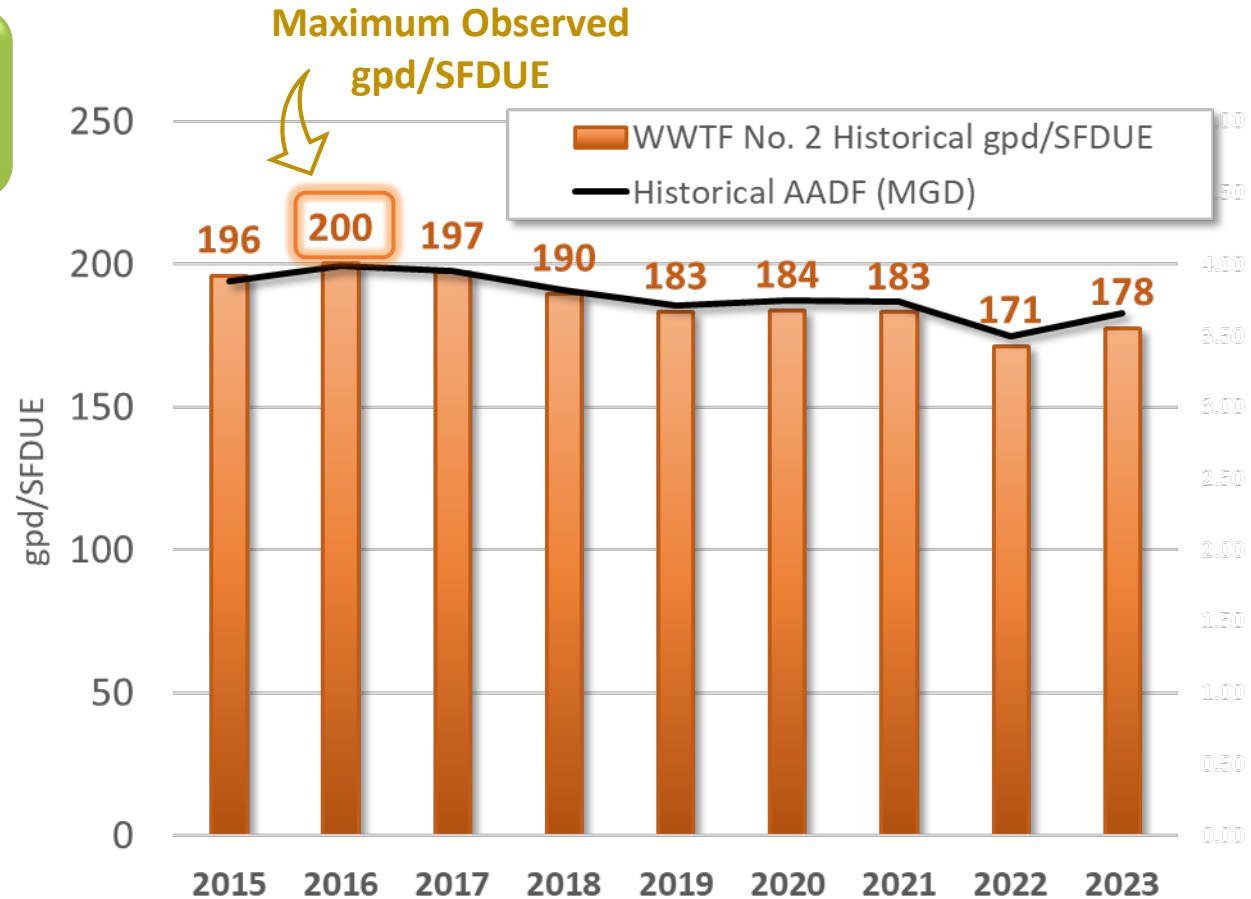
Planning Criteria Equation Rearranged

Historic
Flow



Utilized
SFDUEs

Updated Planning
Criteria
(gal. per day / SFDUE)



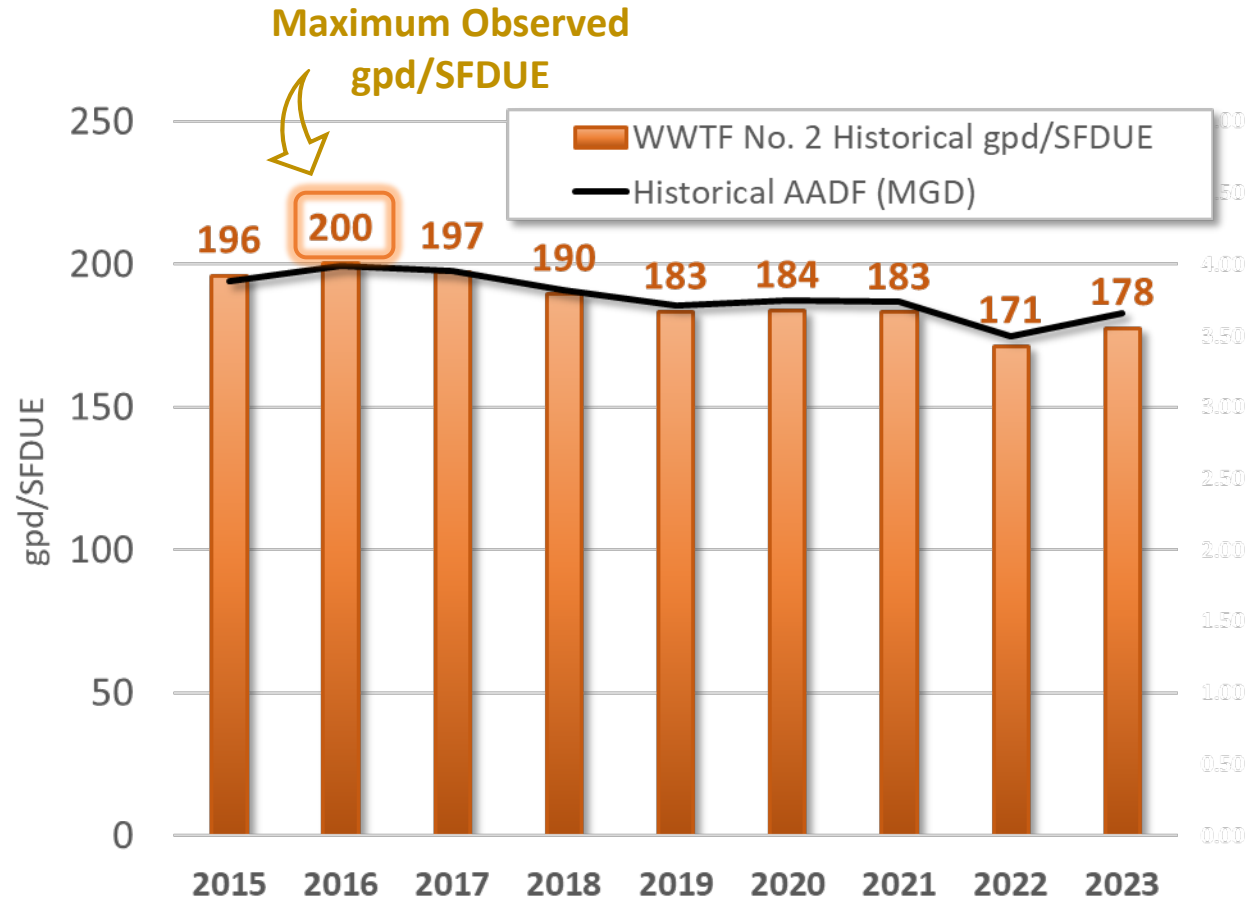
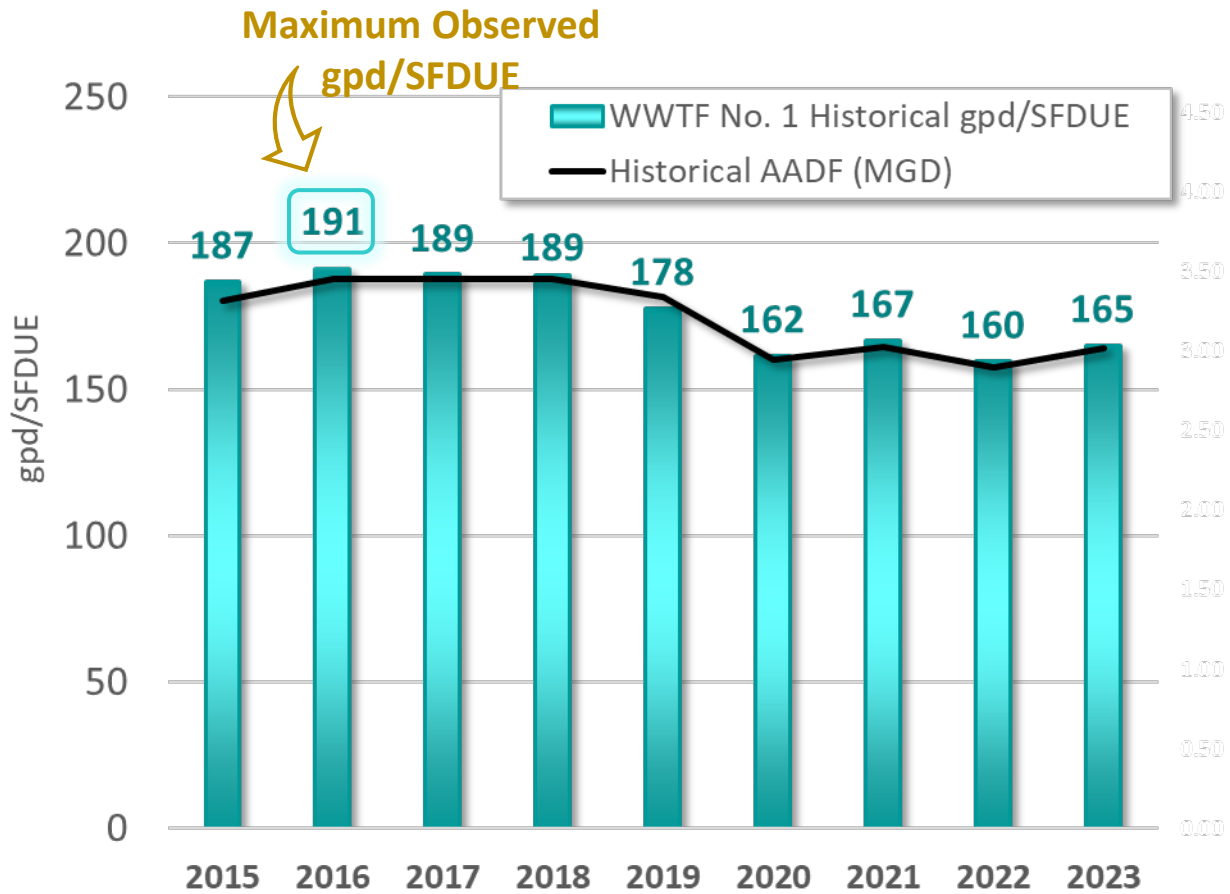
Based on historical effluent flow and Utilized SFDUEs

PLANNING CRITERIA ANALYSIS

Historical gpd/SFDUE Analysis

1

Planning
Criteria



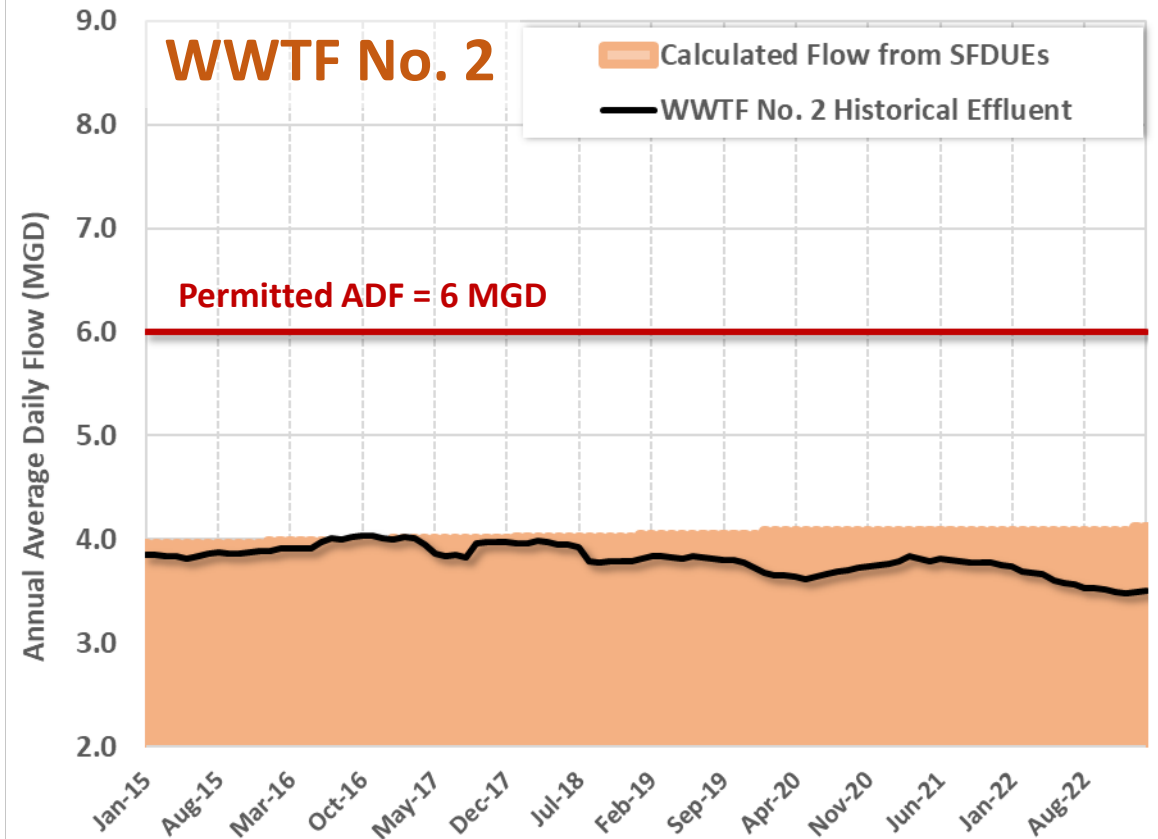
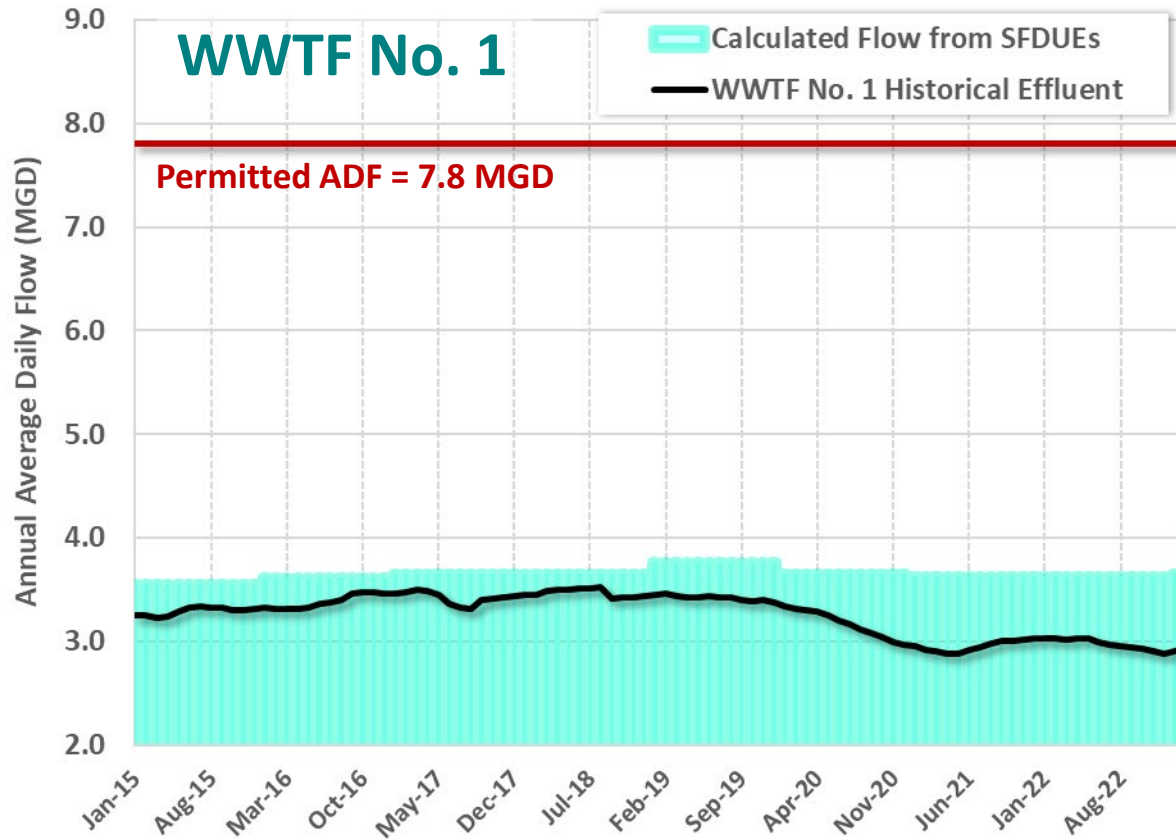
Based on historical effluent flow and Utilized SFDUEs

PLANNING CRITERIA ANALYSIS

Utilized SFDUEs, 200 gpd/SFDUE

1

Planning
Criteria



All calculated flows based on Utilized SFDUEs and 200 gpd/SFDUE

WRF No. 1 CAPACITY OPTIMIZATION ANALYSIS

1

Planning Criteria

Analysis of wastewater flows per Single Family Dwelling Unit Equivalent (SFDUE)

2

SFDUE Projections

Assessment of the number of projected SFDUEs for Water Reclamation Facility No. 1

3

Projected Annual Average Flows

Planning criteria multiplied by the number of SFDUEs

4

Capacity Recommendation

Considerations for sizing Water Reclamation Facility No. 1

SFDUE PROJECTIONS

2

SFDUE Projections



Existing SFDUEs

2022 SFDUEs from WWA Land Use Database; adjusted for occupancy and construction status



Projected SFDUEs

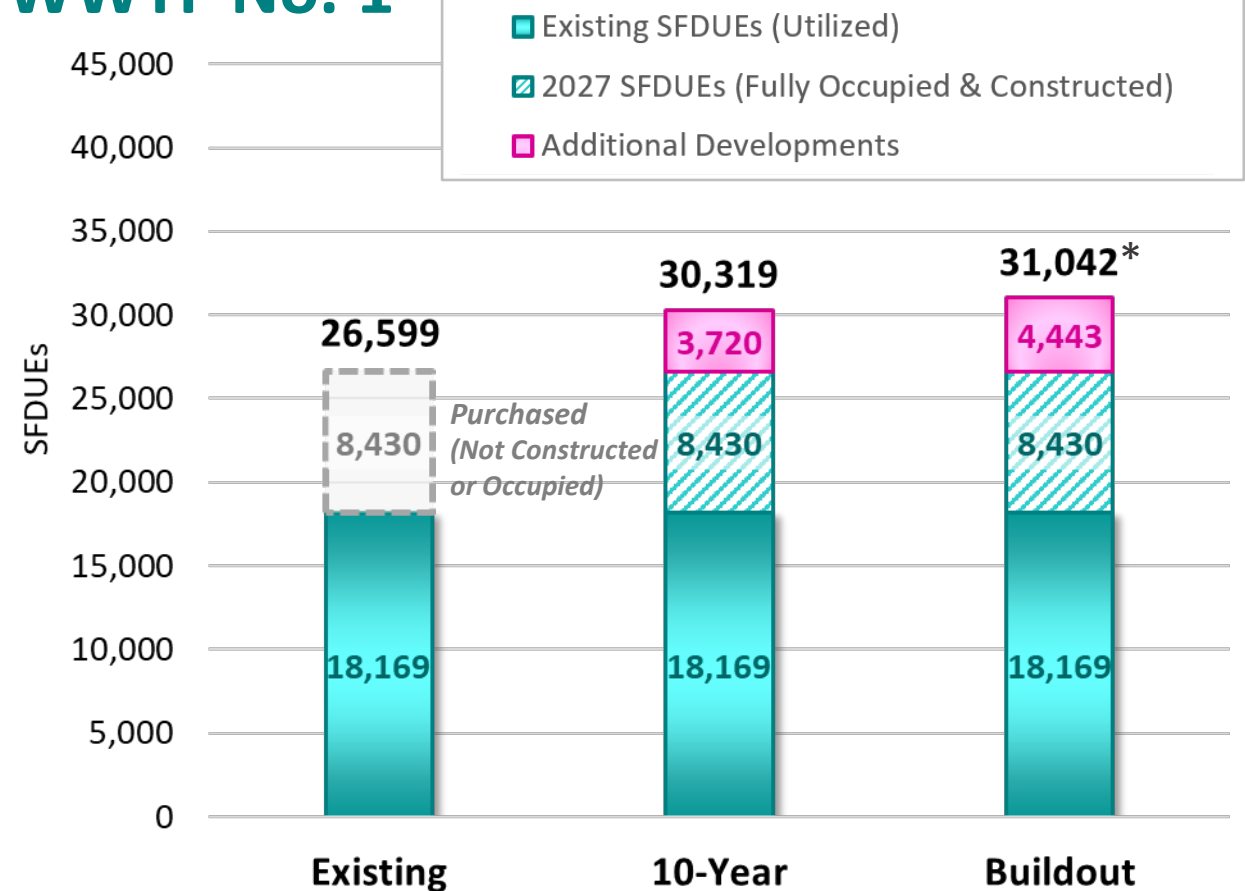
Developed for the 10-Year and Buildout planning periods based on:

Remaining purchased SFDUEs from WWA Land Use Database (Fully Occupied & Constructed)

Additional SFDUE Projections from Developers in The Woodlands (Not included in WWA Land Use Database)

Infill Identified based on Analysis of Vacant Land (Not included in WWA Land Use Database)

WWTF No. 1



*31,042 SFDUEs of 49,408 total SFDUEs within WWTF No. 1 and No. 2 service areas

WRF No. 1 CAPACITY OPTIMIZATION ANALYSIS

1

Planning Criteria

Analysis of wastewater flows per Single Family Dwelling Unit Equivalent (SFDUE)

2

SFDUE Projections

Assessment of the number of projected SFDUEs for Water Reclamation Facility No. 1

3

Projected Annual Average Flows

Planning criteria multiplied by the number of SFDUEs

4

Capacity Recommendation

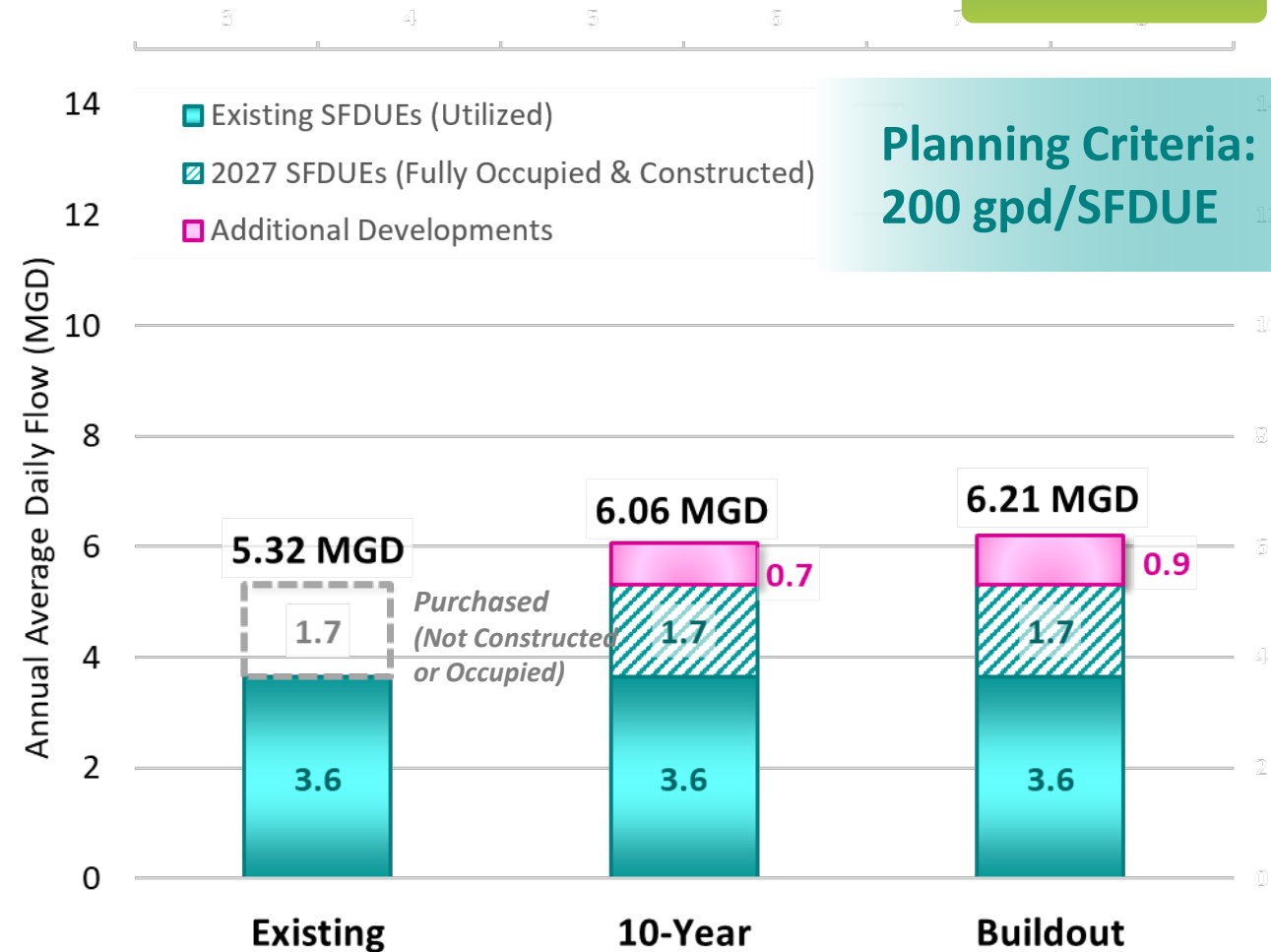
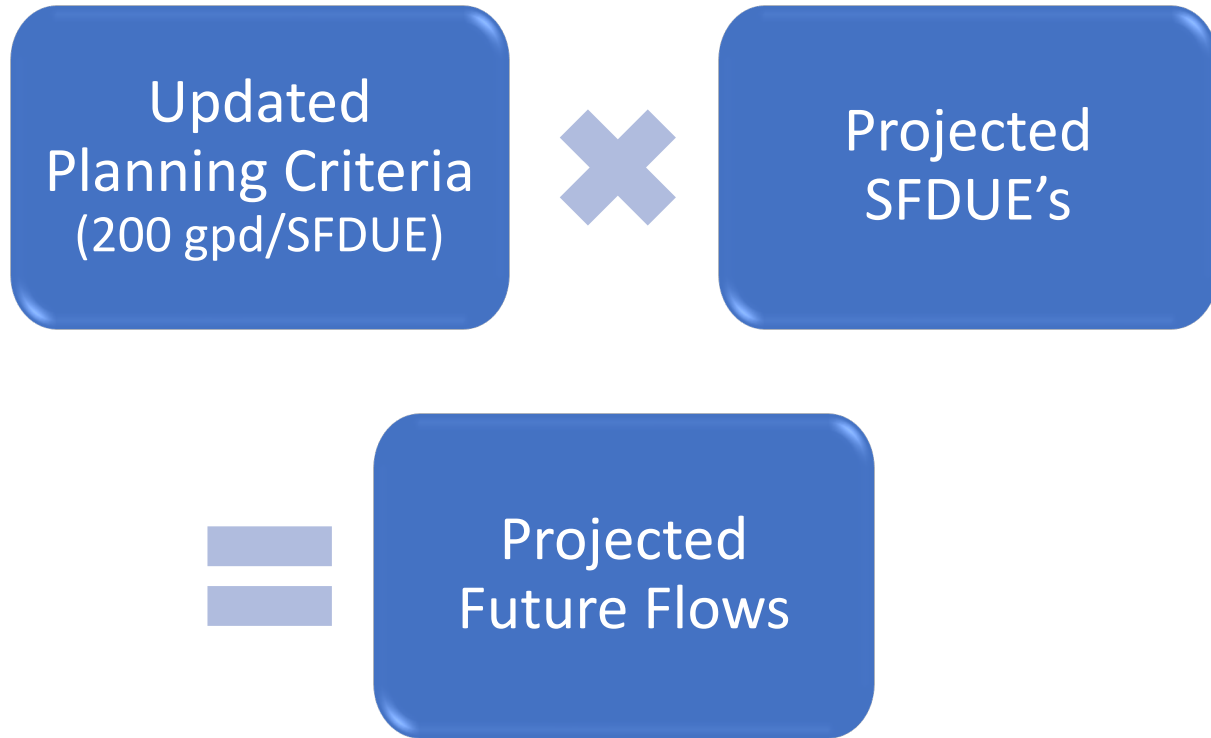
Considerations for sizing Water Reclamation Facility No. 1

PROJECTED ANNUAL AVERAGE DAILY FLOW

WWTF No. 1

3

Projected Annual Average Flows



*Projected flows include a 5% buffer due to planning criteria selection

WRF No. 1 CAPACITY OPTIMIZATION ANALYSIS

1

Planning Criteria

Analysis of wastewater flows per Single Family Dwelling Unit Equivalent (SFDUE)

2

SFDUE Projections

Assessment of the number of projected SFDUEs for Water Reclamation Facility No. 1

3

Projected Annual Average Flows

Planning criteria multiplied by the number of SFDUEs

4

Capacity Recommendation





Considerations for sizing Water Reclamation Facility No. 1

CAPACITY CONSIDERATIONS

4

Capacity
Recommendation

Reasons to Include Additional Capacity Buffer:

-  Increase in I&I and/or Wet Weather
-  Increase in Wastewater Strength
-  Unforeseen Additional Development
-  Operational Buffer

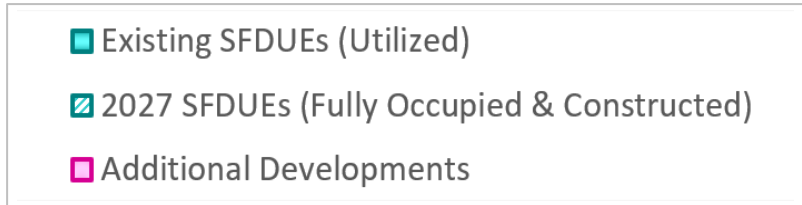
WRF No. 1 CAPACITY

7 MGD Average Day Capacity Includes 16% Total Buffer

4

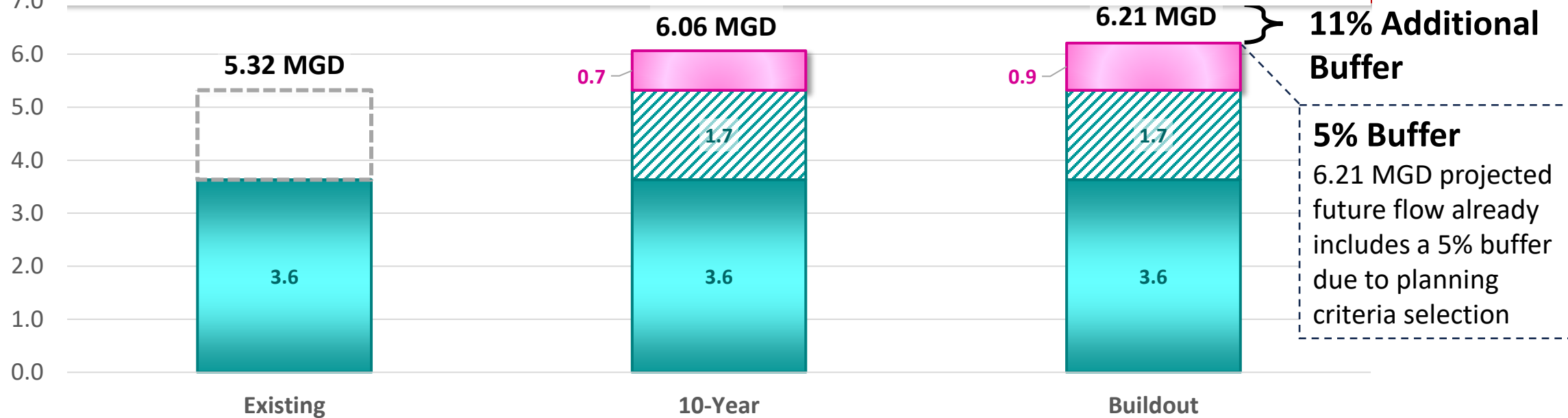
Capacity Recommendation

Annual Average Daily Flow (MGD)



0.8 MGD Reduction In Current Permit

Recommended Annual Average Daily Flow Capacity = 7 MGD





CONCLUSION

- Proceed forward with the WRF No. 1 master planning based on an annual average capacity of 7 MGD
- Continue to look for cost saving opportunities and flexibility in design, such as:
 - Phasing the installation of process mechanical equipment; namely, membranes
 - Optimizing the balance of wet weather treatment vs. storage



Path Forward

Path Forward

1

Capacity Determination ✓

2

**Major Treatment Unit Sizing,
Conceptual Design Drawings** ✓

3

**Cost Estimation,
Site Confirmation**

4

**Continued Stakeholder
Engagement**

CLOSING

Questions and Discussion

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Thank You For Attending

