

March 10, 2020



Wastewater System Update

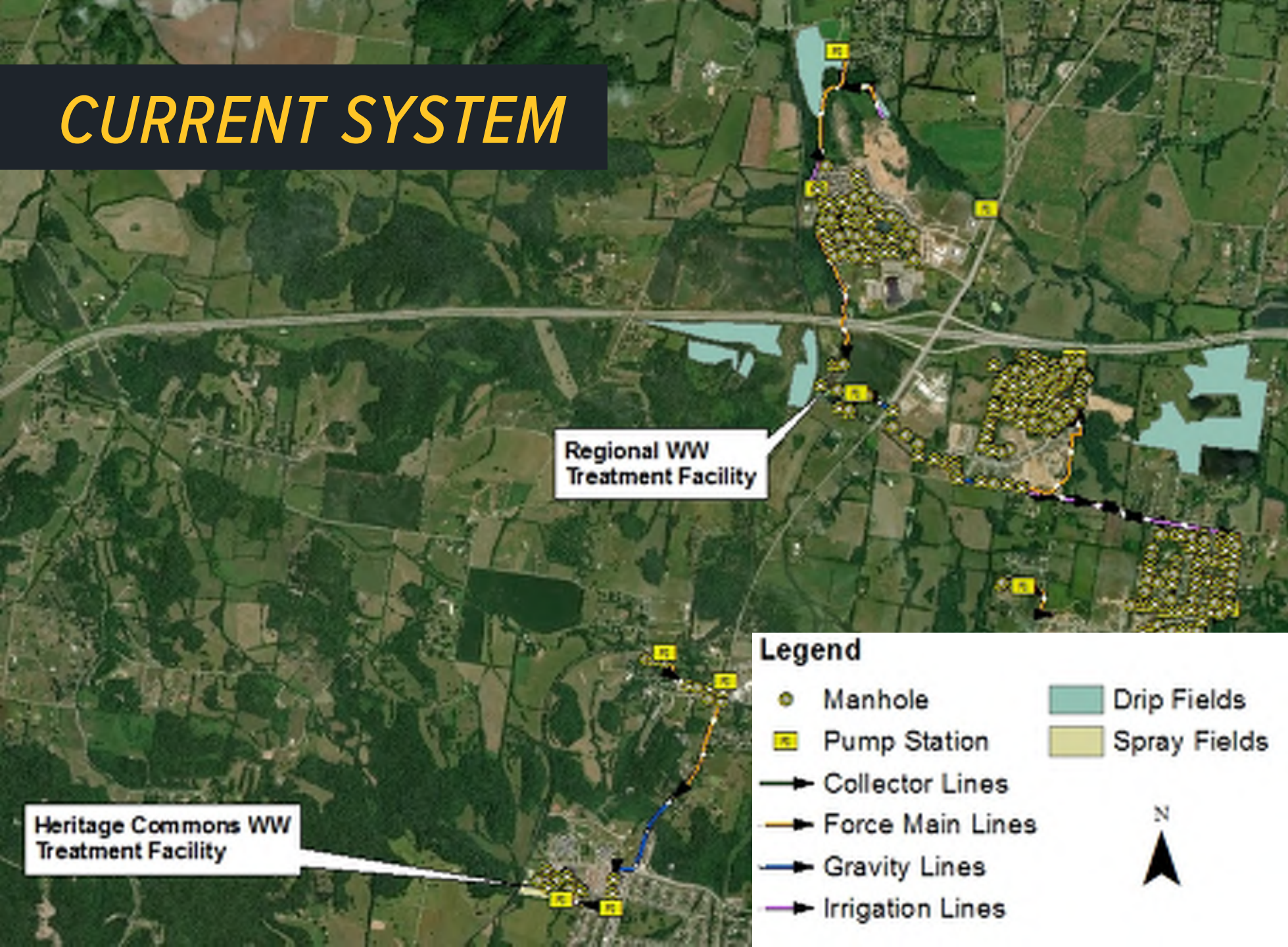


THOMPSON'S STATION, TENNESSEE

Paul Bizier, PE

Matthew Johnson, PE

CURRENT SYSTEM



2

**Treatment
Facilities**

11

**Lift
Stations**

134,000

**Feet
of Pipe**

28

**Acres of
Effluent Disposal**

CURRENT SYSTEM

Thompson's Station	Gallons Per Day
Average Flow at Regional Facility	410,000
Available Wastewater Disposal Capacity	280,000
Permitted Regional Facility Wastewater Treatment Capacity	470,000
Total Committed Sewer Capacity (Built or Approved to Build)	523,000
Total Committed Sewer Capacity (Built, Approved to Build, or Reserved)	950,000

WASTEWATER MASTER PLAN

Projections

Population

Wastewater
Flows

Capacity Analysis

Existing
Collection System
Conditions

Future Collection
System
Conditions

Condition Assessments

Collection
System

Treatment
Plant

Effluent
Disposal

Alternatives Evaluation

Wastewater
Treatment

Effluent
Disposal

WASTEWATER MASTER PLAN

30 Year Planning Horizon - 2048

- **Master Plan Objective**
 - Determine required capacity
 - Recommend most cost-effective treatment and effluent disposal solution

WASTEWATER MASTER PLAN

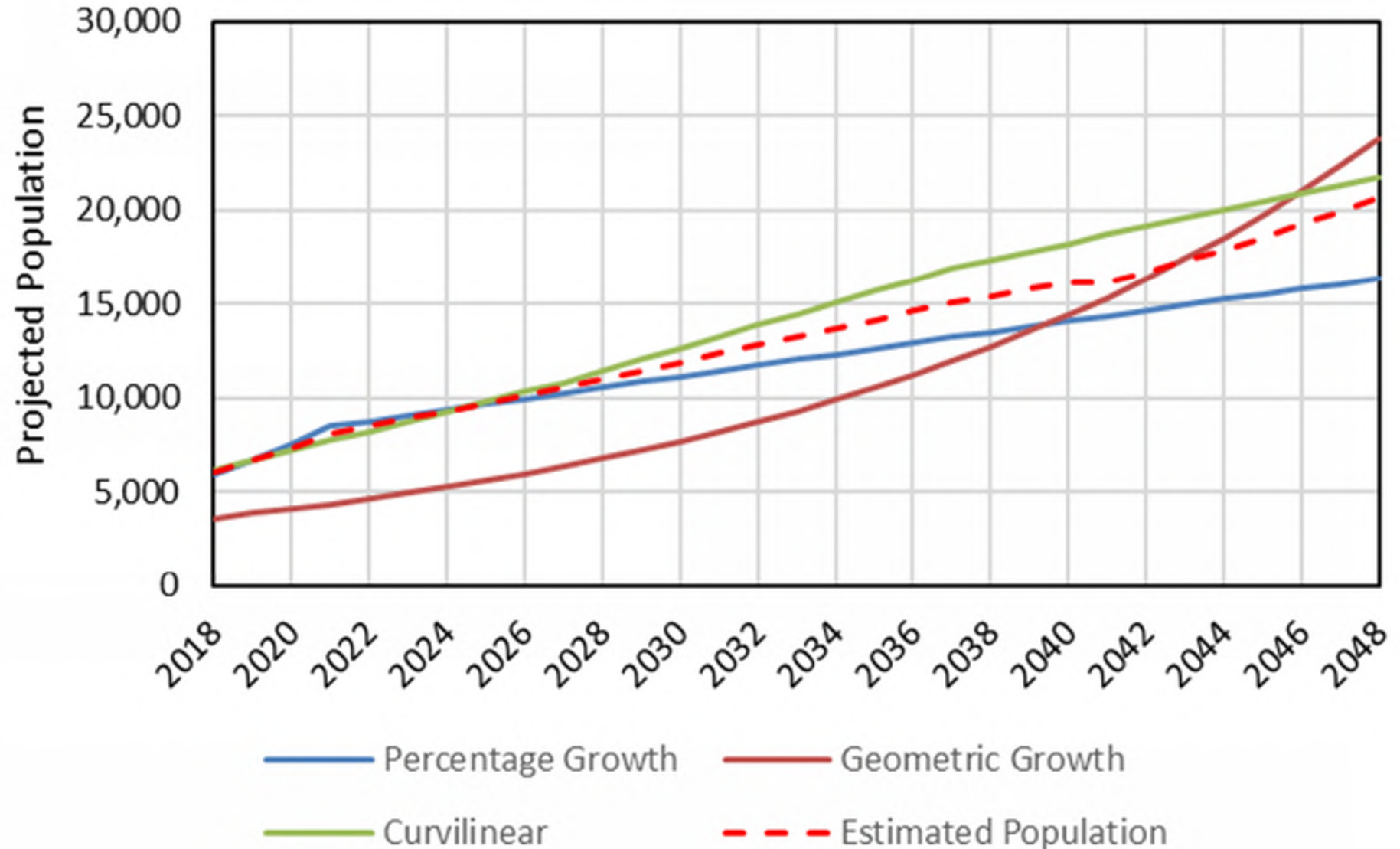
Projections



Population



System Flows



WASTEWATER MASTER PLAN

Projections

 Populations

 Wastewater
Flows

Year	Population	Average Daily Flow (GPD)	Peak Flow (GPD)
2023	8,926	490,900	834,600
2048	20,673	1,447,100	2,460,100

WASTEWATER MASTER PLAN

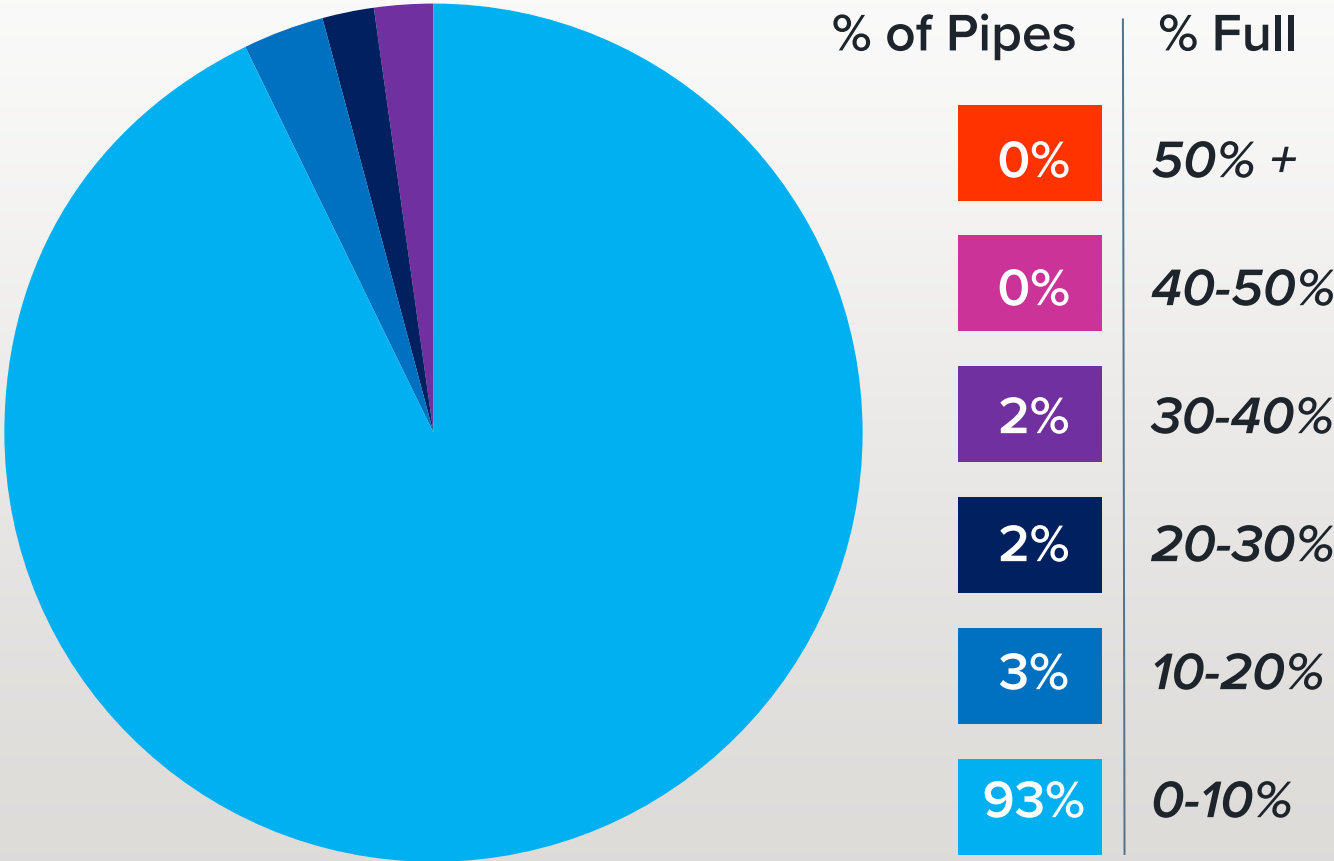
30 Year Planning Horizon - 2048

- **Master Plan Objective**
 - Determine required capacity
 - Recommend most cost-effective treatment and effluent disposal solution
- **Projected population of 20,500**
- **Required capacity of 1.5 MGD**

WASTEWATER MASTER PLAN

Capacity Analysis

➔ Collection System



WASTEWATER MASTER PLAN

Existing Condition Assessments

→ Collection
System

→ Treatment
Plant

→ Effluent
Disposal

- All pipes are roughly 10 years or less in age and generally in good condition
- No capacity limitations identified in gravity sewer pipes during average or peak flow conditions
- Majority of gravity sewer pipes did not experience flows greater than 10% of capacity

WASTEWATER MASTER PLAN

Existing Condition Assessments

→ Collection System

→ Treatment Plant

→ Effluent Disposal

Heritage Commons Treatment Facility

30,000 GPD Capacity Rating, Avg Daily Flow: 19,000 GPD



WASTEWATER MASTER PLAN

Existing Condition Assessments

→ Collection System

→ Treatment Plant

→ Effluent Disposal

Heritage Commons Treatment Facility

- Two Scheaffer System ponds
- Ponds, blowers, and air piping in good condition
- Frequent maintenance of pump for lagoon effluent
- Filter and UV systems in good condition

WASTEWATER MASTER PLAN

Existing Condition Assessments

→ Collection System

→ Treatment Plant

→ Effluent Disposal

Regional Treatment Facility

470,000 GPD Permitted Capacity, Avg Daily Flow: 410,000 GPD



Existing Condition Assessments

→ Collection System

→ Treatment Plant

→ Effluent Disposal

Regional Treatment Facility

- Two Scheaffer System ponds
- Original liner in Cell #1
- Blowers and air piping in good condition but undersized for future demands
- Filter and UV systems in good condition
- Potential future reliability concerns

WASTEWATER MASTER PLAN

Wastewater Disposal Sites

Existing Condition Assessments

→ Collection System

→ Treatment Plant

→ Effluent Disposal



**Further investigation/analysis necessary to confirm*

Site Name	Total Acres	Suitable Area (ac)	Utilized Area (ac)	WW Disposal Capacity (mgd)
Ozzad Property	33	20	20	0.20
Tollgate	30	8	8	0.08
Hill Property	63	21	0	0.21
Alexander Property	107	67*	0	0.67*
Totals	233	116*	28	1.16*

WASTEWATER MASTER PLAN

30 Year Planning Horizon - 2048

- **Master Plan Objective**
 - Determine required capacity
 - Recommend most cost-effective treatment and effluent disposal solution
- **Projected population of 20,500**
- **Required capacity of 1.5 MGD**
- **Existing collection system condition and capacity sufficient**
- **Review 1.5 MGD treatment and effluent disposal alternatives**

WASTEWATER MASTER PLAN

Alternatives

 Wastewater Treatment

 Effluent Disposal

Regional Treatment Facility

- Upgrade existing lagoon system to 1.5 MGD – construct third lagoon
- Expand facility to 1.5 MGD with alternative technology
- Construct Second Regional Plant (0.6 MGD), upgrade existing Regional Plant (1.0 MGD)

Heritage Commons Treatment Facility

- No recommended capital improvements

REGIONAL PLANT ALTERNATIVES

Project	1.0 MGD Plant	1.5 MGD Plant Expansion	Total
MBR	\$14.2M	\$7.2M	\$21.4M
Lagoon Expansion	\$24.9M	\$0.2M	\$25.1M

TECHNOLOGIES EVALUATED

Alternatives

 Wastewater
Treatment

 Effluent
Disposal

- Membrane Bioreactors
- Sequencing Batch Reactors
- Oxidation Ditch
- Conventional Activated Sludge

EVALUATION SUMMARY

Criteria	Membrane Bioreactor	Sequencing Batch Bioreactor	Oxidation Ditch	Conv. Act. Sludge
Footprint/Land Requirements	3	2	1	1
Suitability for Reuse	3	2	2	2
Suitability for Surface Water Discharge	3	3	2	2
Operational Complexity	1	2	3	1
Odor	2	3	2	1
Expandability	2	2	2	2
Construction Timeframe	3	2	1	1
Cost (Capital/O&M)	3/1	2/3	2/3	1/2
Total	21	21	18	13

1=Lowest Rating, 3=Highest Rating

SUMMARY

Alternatives

Alternatives

→ Wastewater Treatment

→ Effluent Disposal

Technology Alternative	Capital Costs	Lifecycle Costs
Membrane Bioreactor	\$ 14.2 M	\$ 19.6 M
Sequencing Batch Reactor	\$ 22.8 M	\$ 24.0 M
Oxidation Ditch	\$ 21.5 M	\$ 23.6 M
Conventional Activated Sludge	\$ 29.6 M	\$ 31.2 M

**Treatment technology cost comparison was based on 1.0 MGD capacity.*

Recommended alternative: MBR

Alternatives

→ Wastewater Treatment

→ Effluent Disposal

- Lifecycle cost: \$ 19.6 million
- Only alternative that can fit within existing site
- Provides greatest flexibility and environmental sustainability
- Shortest implementation period

TECHNOLOGIES EVALUATED



Membrane Bioreactor


- Highest Level of Treatment
- Compact
- Cost Competitive

1.0 MGD MBR Trains (2), Marco Island, FL

Effluent Disposal Alternatives

Alternatives

 Wastewater Treatment

 Effluent Disposal

- One treatment plant
 - Three alternatives identified
- Two treatment plants
 - Two alternatives identified

WASTEWATER MASTER PLAN

30 Year Planning Horizon - 2048

- **Master Plan Objective**
 - Determine required capacity
 - Recommend most cost-effective treatment and effluent disposal solution
- **Projected population of 20,500**
- **Required capacity of 1.5 MGD**
- **Existing collection system condition and capacity sufficient**
- **Review 1.5 MGD treatment and effluent disposal alternatives**
- **MBR is most cost-effective alternative**

RECOMMENDATIONS

- Near Term
 - Complete construction of improvements at Hill disposal site
 - Installation of second pump in effluent pump station
 - Repair cell #1 boot at Regional Plant
- Long Term
 - MBR Installation at Regional WWTP with capacity of 1.0 MGD
 - Construction of disposal system at Alexander Site
 - Regional Plant Expansion to 1.5 MGD

MASTER PLAN PROJECT STATUS

Project	Anticipated Project Start	Cost Opinion
Regional Plant Cell #1 Repair	May 2020	\$300,000
Hill Property Drip Fields	Ongoing	\$2,900,000
Regional Plant – MBR Installation – 1.0 MGD	2020	\$14,196,000
Alexander Site Drip Fields	2023	\$9,769,000
Regional Plant – MBR Expansion – 1.5 MGD	2038	\$7,190,000

Thank you.

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