

February 26, 2020



# Wastewater System Open House



*THOMPSON'S STATION, TENNESSEE*

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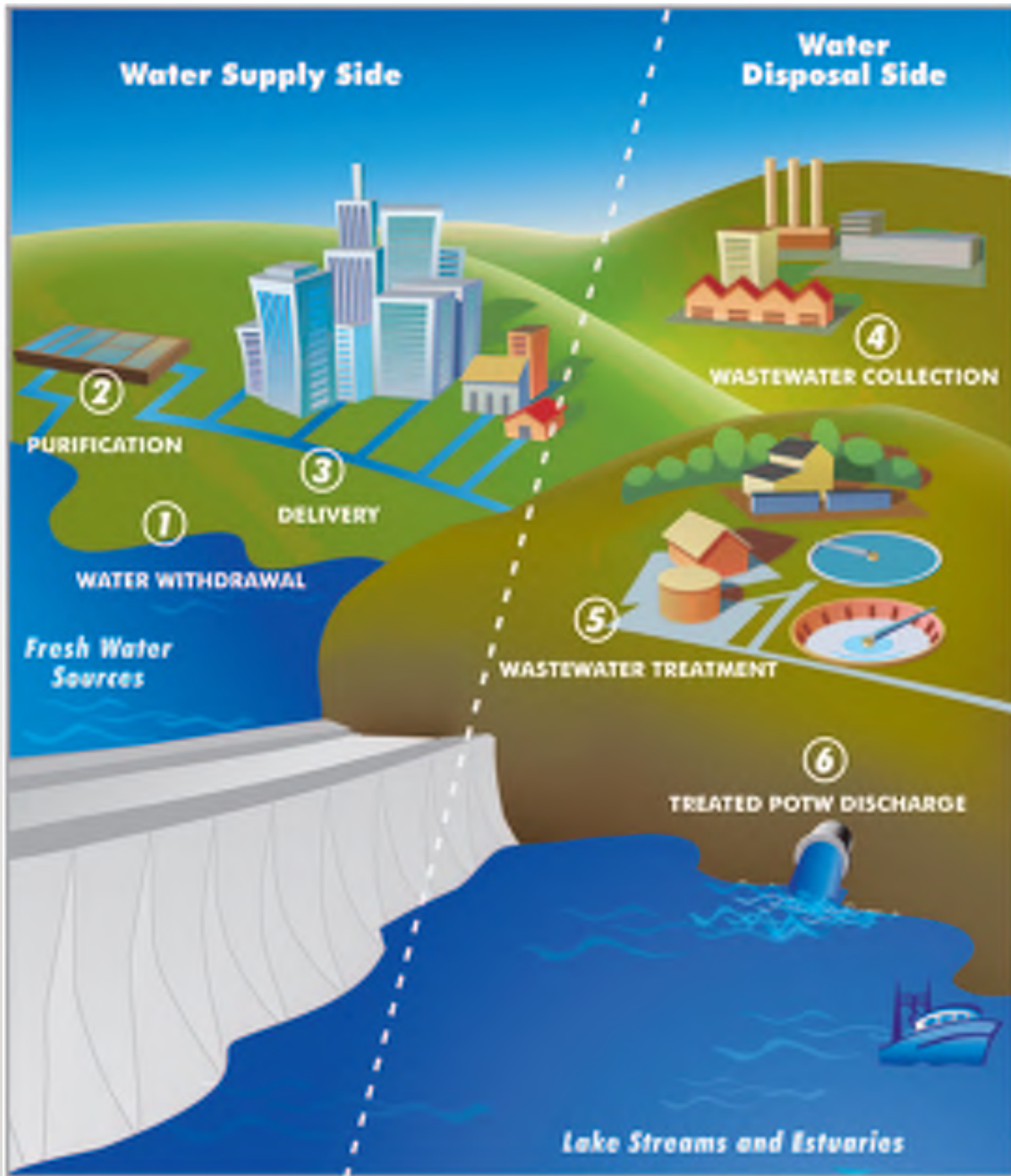
Matthew Johnson, PE

# *WATER 101*

**Waste  
Water**

**Drinking  
Water**

**Storm  
Water**



# WASTEWATER

- Carried by sanitary sewers
- Different from stormwater
- Collected & treated
- Processes vary by system

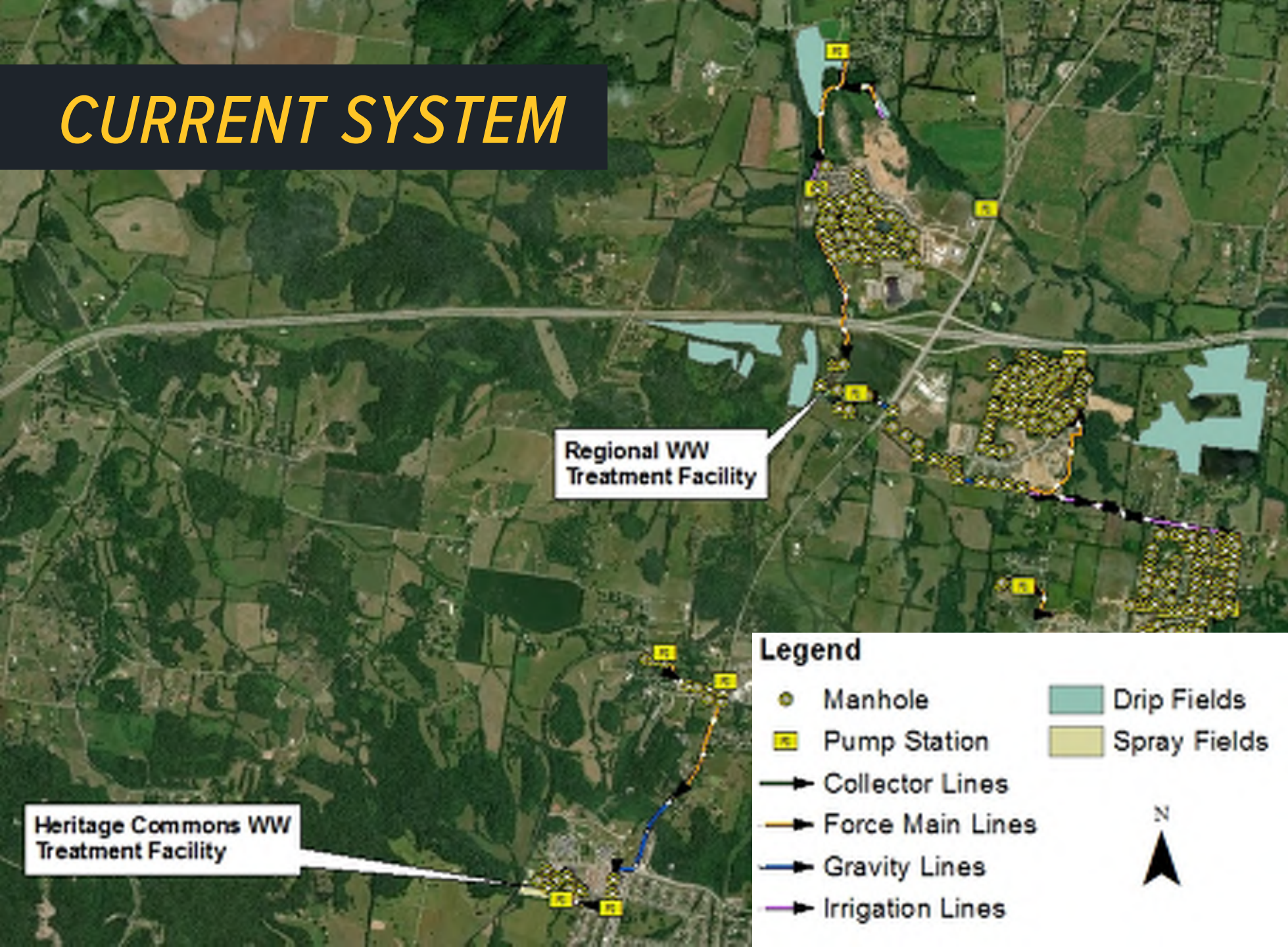
# *WASTEWATER SYSTEMS*

- Biological Treatment
- Effluent Disposal
- Land Application



12.05.2019

# 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

# *MASTER PLAN*

## *What is it?*

A long-term planning document

## *What does it do?*

Provides a conceptual plan to address ageing infrastructure, regulatory requirements, and development

# *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

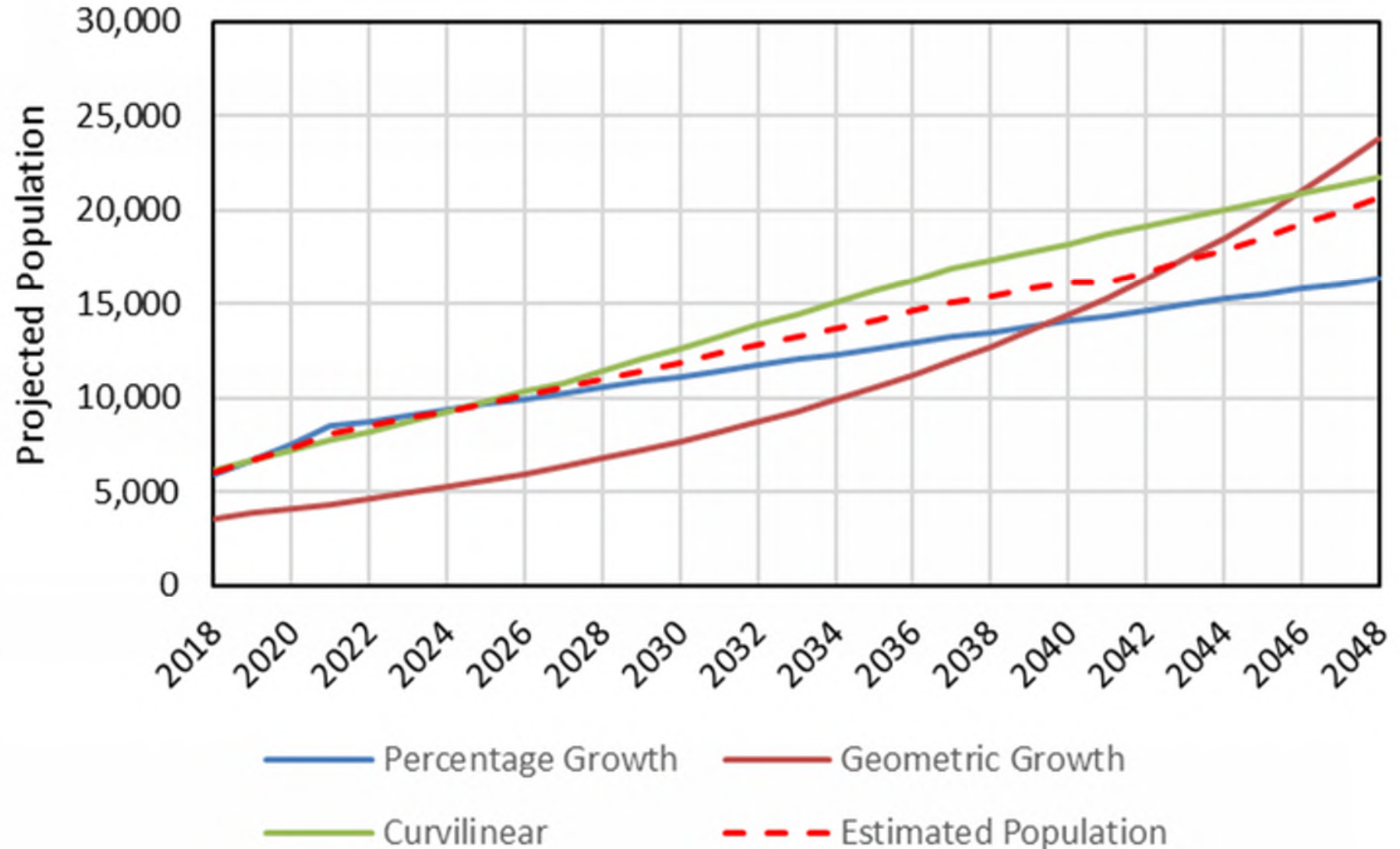
## Projections



Population



System Flows



# WASTEWATER MASTER PLAN

## Projections

→ Populations

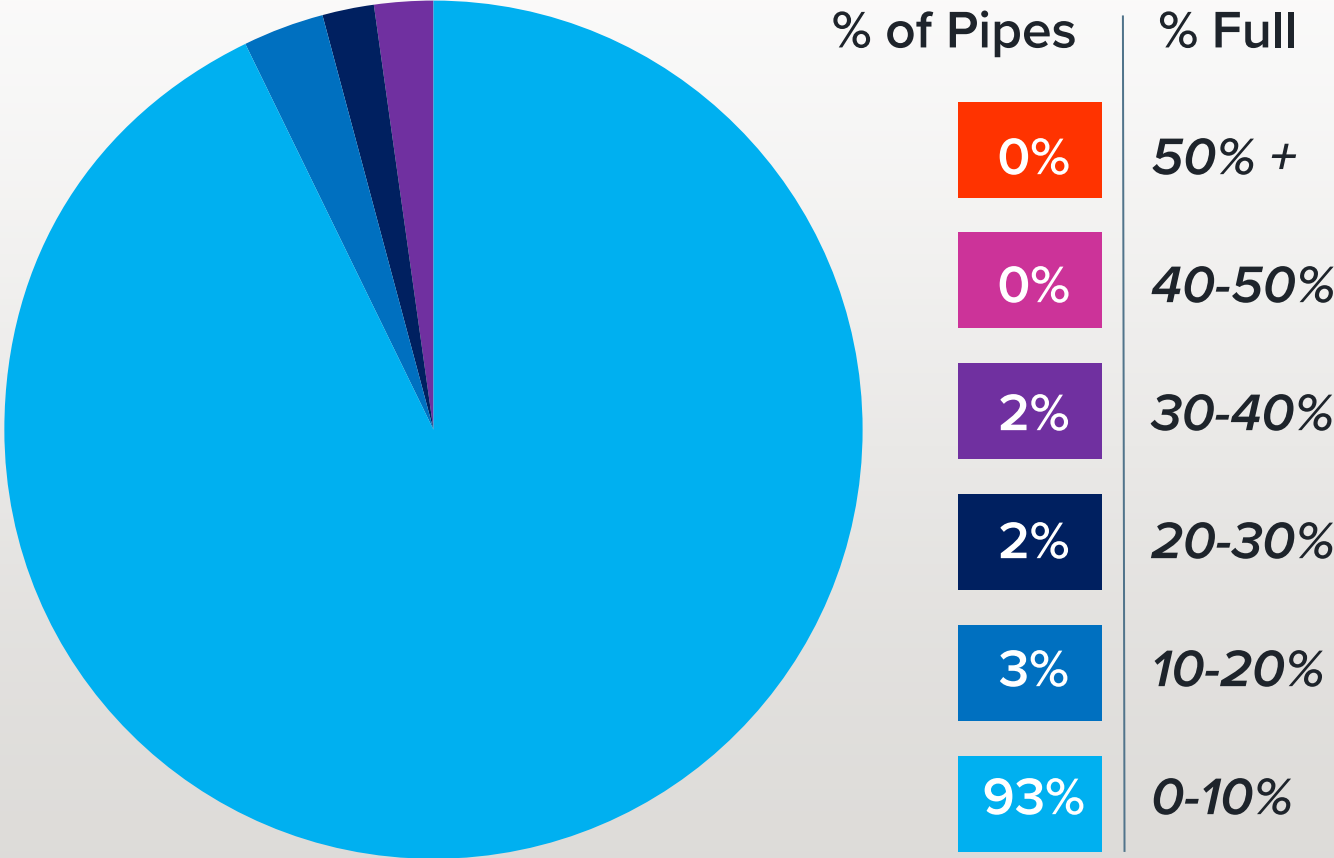
→ Wastewater  
Flows

Year	Population	Average Daily Flow (GPD)	Peak Flow (GPD)
2023	8,926	490,900	834,600
2028	10,997	659,800	1,121,700
2038	15,439	1,003,500	1,706,000
2048	20,673	1,447,100	2,460,100

# 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*
<b>Totals</b>	<b>233</b>	<b>116*</b>	<b>28</b>	<b>1.16*</b>

## Alternatives

→ Wastewater Treatment

→ Effluent Disposal

### Regional Treatment Facility

- Upgrade existing lagoon system – construct third lagoon
- Expand facility 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

# 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
<b>Total</b>	<b>21</b>	<b>21</b>	<b>18</b>	<b>13</b>

1=Lowest Rating, 3=Highest Rating

# SUMMARY

## Alternatives

### Alternatives

➔ Wastewater Treatment

➔ Effluent Disposal

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

## 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*

# WASTEWATER MASTER PLAN

## Effluent Disposal Alternatives

### Alternatives

 Wastewater Treatment

 Effluent Disposal

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



# RECOMMENDATIONS

- Near Term
  - Complete construction of improvements at Hill disposal site
  - Installation of second pump in effluent pump station
  - Repair cell #1 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

# TIMELINE



***Hill Site  
Improvements***

In Progress

***Cell #1  
Repair***

2020

***MBR  
Installation***

2020

***Alexander Site  
Construction***

2023

***Regional Plant  
Expansion***

2038

# 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
<b>Regional Plant – MBR Installation – 1.0 MGD</b>	<b>2020</b>	<b>\$14,196,000</b>
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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