City of St. Petersburg

Committee of the Whole

Meeting of May 31, 2018 @ 2:30 p.m.

City Hall - Room 100

A. Call to Order – Council Chair Lisa Wheeler-Bowman

B. Discussion Item

a. **Injection Wells – current use, regulatory restrictions, permitting requirements and proposed future use – Jacobs Engineering, Inc. and ASRus, LLC**

b. **Bio-Solids to Energy Project – Contractor and Consultant Summery Update - Claude Tankersley together with:**

1. **The Haskell Company**
2. **Brown and Caldwell**
3. **Black and Veatch Corporation**
4. **AECOM Technical Services, Inc.**
5. **Carollo Engineers**

C. Next Meeting – To be determined

D. Adjournment

CITY COUNCIL AGENDA
NEW BUSINESS ITEM

TO: **Members of City Council**

DATE: **January 17, 2018**

COUNCIL DATE: **February 1, 2018**

RE: ***Referral to Committee of the Whole***

ACTION DESIRED:

Respectfully requesting a referral to the Committee of the Whole to have representatives from FDEP and Jacobs Engineering, Inc., provide a report regarding the current use, regulatory restrictions, permitting requirements and proposed future use of injection wells in St. Petersburg.

Brandi Gabbard, Council Member
District 2

CITY COUNCIL AGENDA
NEW BUSINESS ITEM

TO: Members of City Council

DATE: May 11, 2017

COUNCIL DATE: May 18, 2017

RE: ***Referral to a Committee of the Whole - Bio-Solids to Energy Project Update to include presentations from the Contractor and Consultants***

ACTION DESIRED:

Respectfully requesting a referral to the May 31, 2018 Committee of the Whole for an update of the Bio-Solids to Energy Project with presentations from the following:

- The Haskell Company
- Brown and Caldwell
- Black and Veatch Corporation
- AECOM Technical Services, Inc.
- Carollo Engineers, Inc.

The presentations are to include a summary update on the project together with an update on the major biosolids treatment facilities to be constructed as set forth in the January 7, 2016 City Council agenda backup (shown below):

- Demolition of existing obsolete structures and equipment
- 1560KW combined heat and power gas powered electrical generator
- Tow (2) primary clarifiers
- Flow splitter facility
- Two (2) refurbished gravity belt thickeners
- Two (2) digesters
- Generator waste heat to biosolids digesters heat recovery system
- Fats, oil and grease receiving station that uses primary clarifier odor control system
- Dewatering facility with two screw presses with odor control
- Electrical and boiler building
- Facilities for the cleaning of biogas to pipeline quality natural gas
- Odor control facilities

Ed Montanari, Council Member
District 3

Injection Well Program Overview

City of St. Petersburg, City Council's Committee of the Whole

May 31, 2018

Current Use

Regulatory Restrictions

Permitting Requirements

Proposed Future Use

st.petersburg
www.stpete.org

DRAFT VERSION

Current Use of Injection Wells

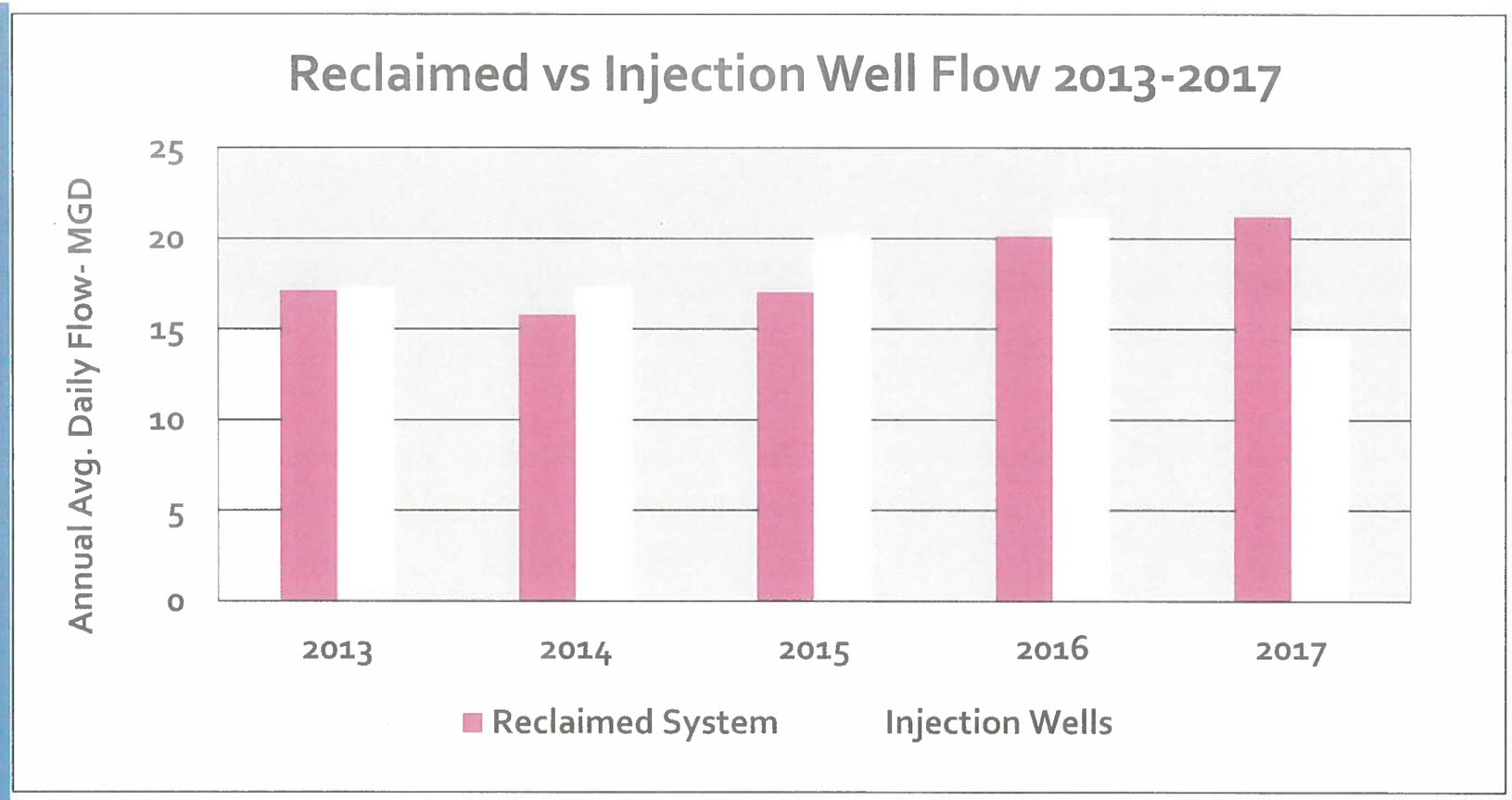
The City is ***the only major utility*** in the Tampa Bay area that has abandoned surface water discharge of treated effluent.

All water directed to the injection wells has undergone secondary treatment and high level disinfection. Raw sewage is not directed to the wells.

CURRENT USE

Provide a backup to the reuse system

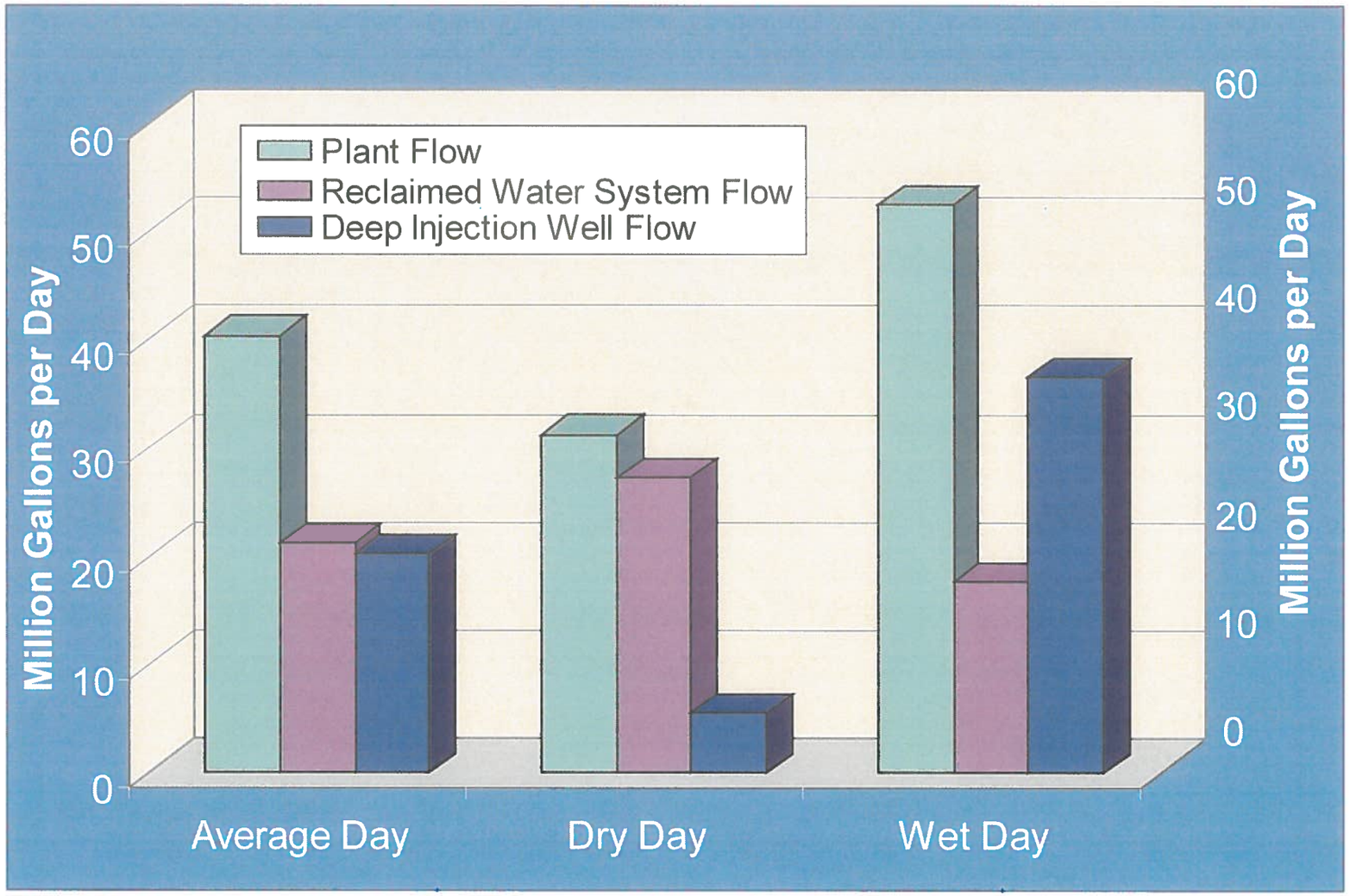
Wet weather events require peak flow disposal



Approximately 50% of flow goes to the wells on an annual average basis

CURRENT USE

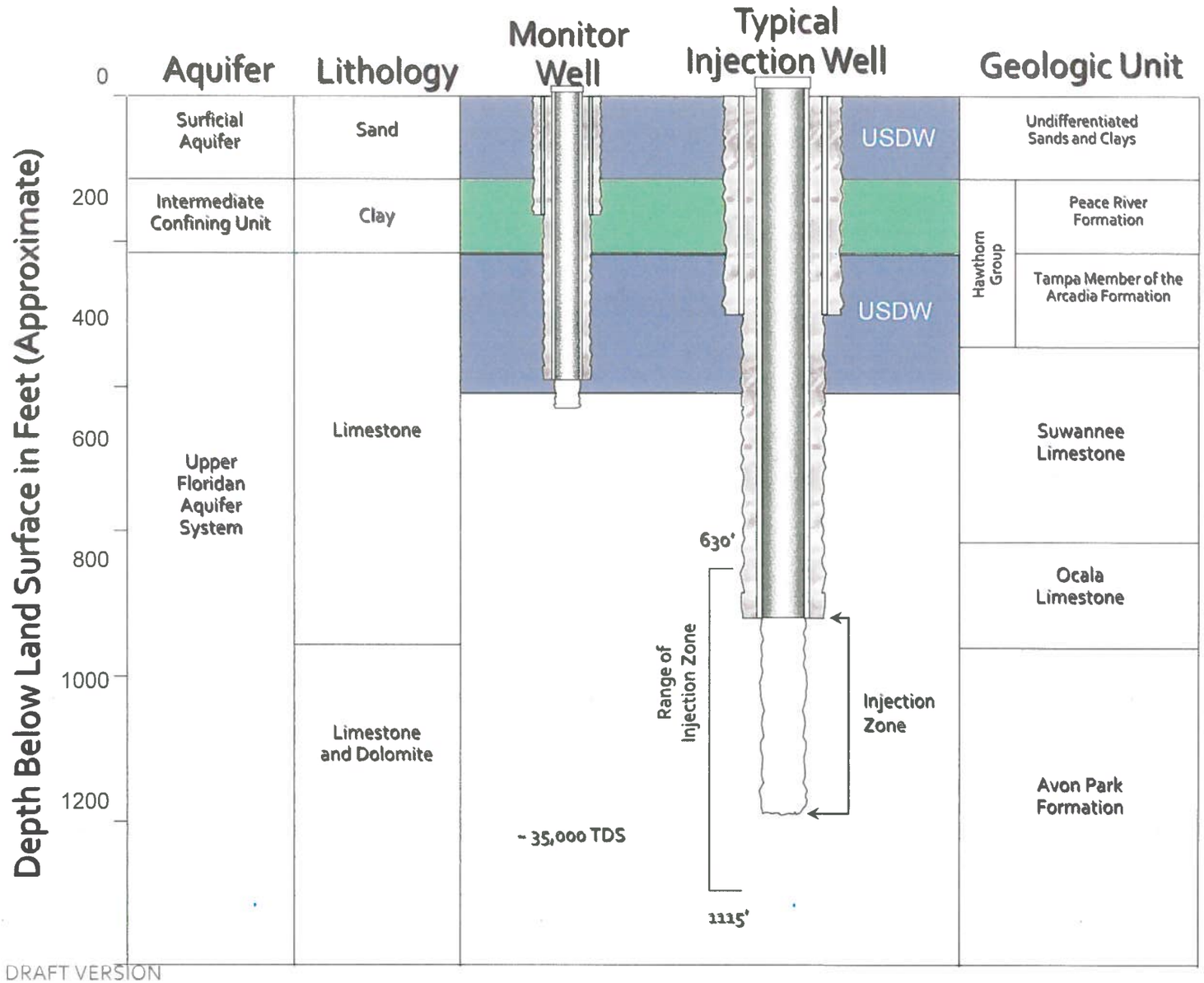
Injection Well Usage Varies by Season



Subsurface Characteristics of Injection Wells

Inject well below USDW

Not Injecting Raw Sewage



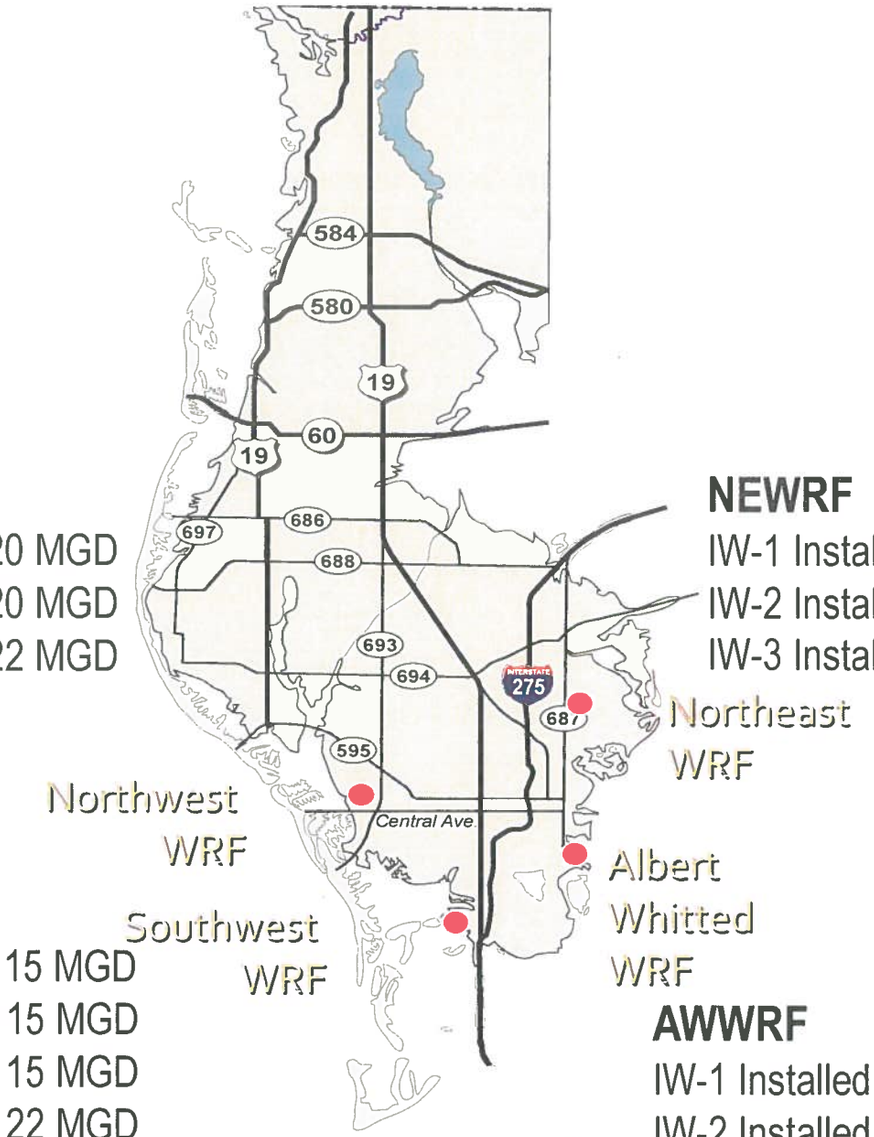
DRAFT VERSION

CURRENT USE

The City has 14 Injection Wells with combined capacity of 260 MGD

NWWRF
IW-1 Installed 1984, 20 MGD
IW-2 Installed 1984, 20 MGD
IW-3 Installed 2017, 22 MGD

SWWRF
IW-1 installed 1976, 15 MGD
IW-2 Installed 1977, 15 MGD
IW-3 Installed 1977, 15 MGD
IW-4 Installed 2017, 22 MGD
IW-5 Installed 2018, 22 MGD
IW-6 Installed 2017, 22 MGD



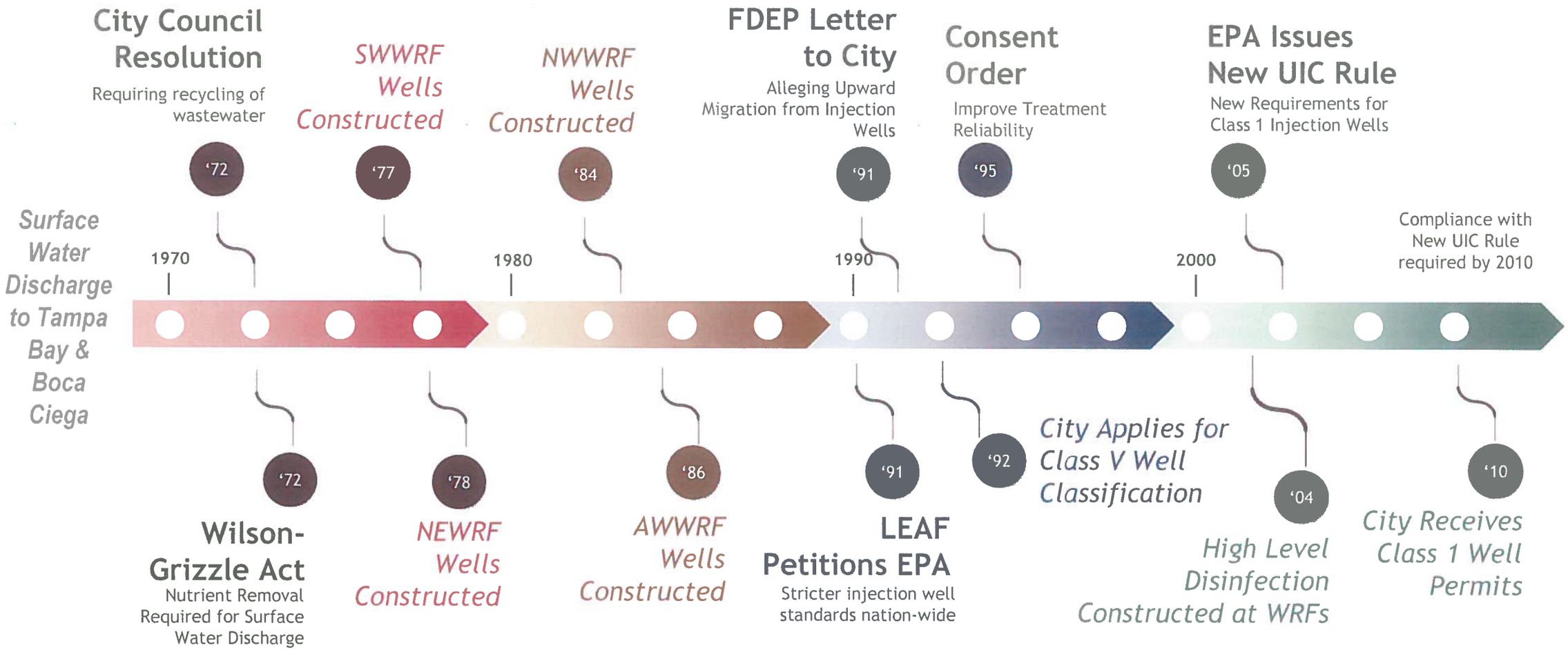
NEWRF
IW-1 Installed 1978, 13 MGD
IW-2 Installed 1977, 13 MGD
IW-3 Installed 1977, 13 MGD

AWWRF
IW-1 Installed 1986, 24 MGD
IW-2 Installed 1985, 24 MGD
Usable by SWWRF, NEWRF, NWWRF

Regulatory Restrictions & Permitting Requirements

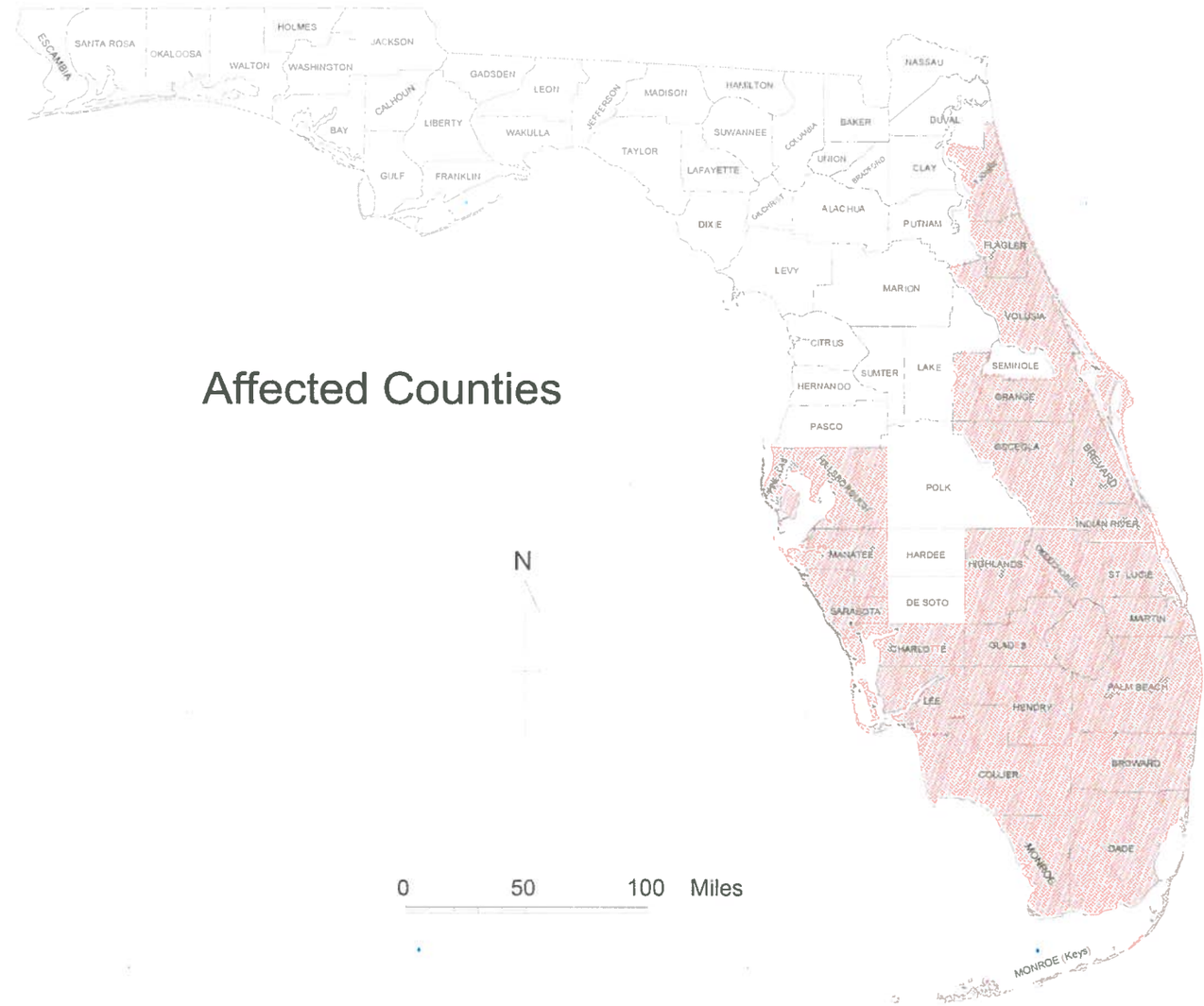
Wells have been in use since 1977

Regulatory History



REGULATORY RESTRICTIONS

24 Counties in Florida affected by 2010 New UIC Rule



REGULATORY RESTRICTIONS

Class I – Wells Used for Disposal of Municipal and Industrial Wastewater (below USDW)

Class II – Oil and Gas Injection Wells
Class III – Solution Mining Injection Wells
Class IV – Hazardous Waste Injection Wells (banned in Florida)
Class V – Other types of injection wells (e.g., ASR)
Class VI – Carbon Sequestration

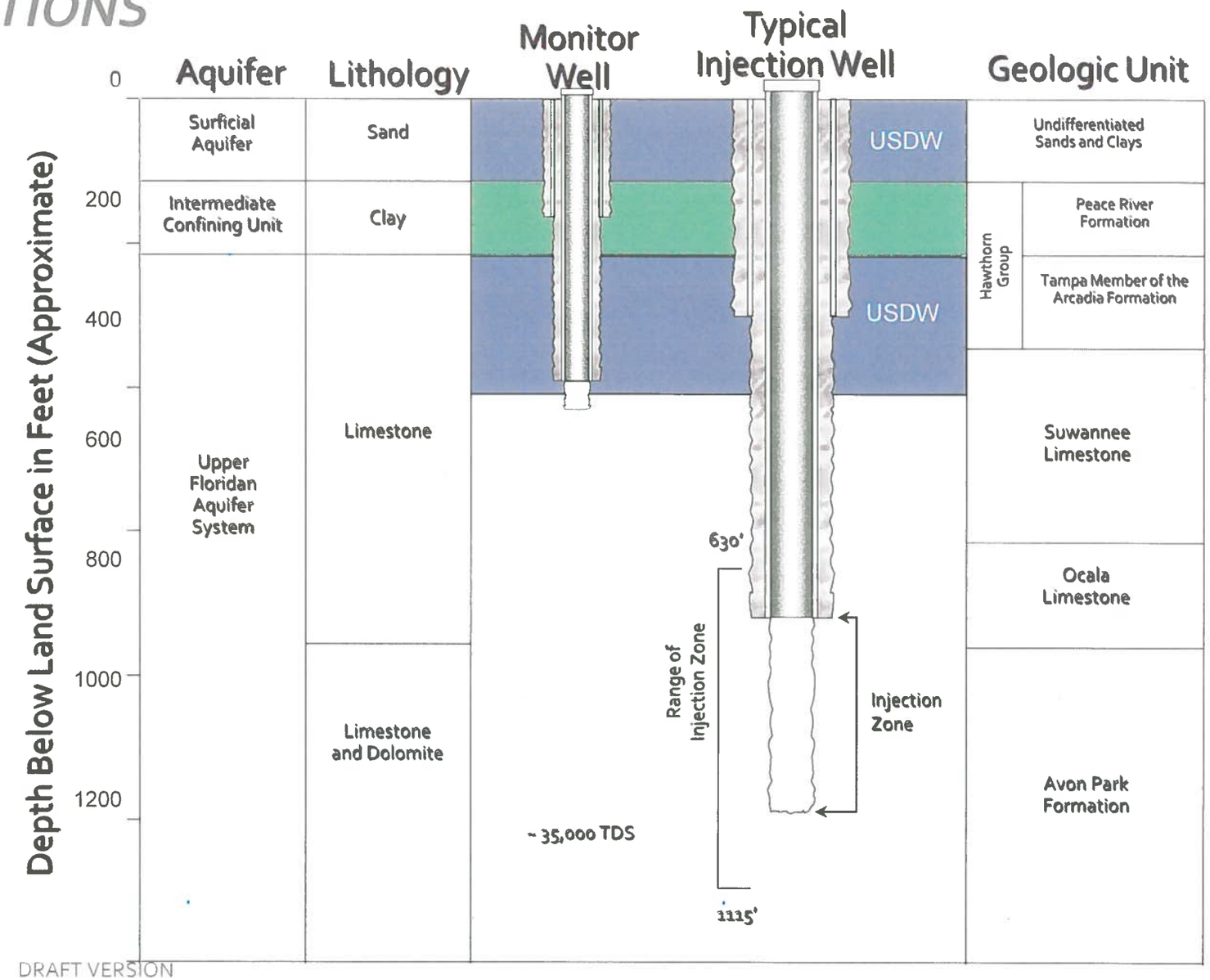
- Completed into a salt water zone beneath any USDW (Total Dissolved Solids >10,000 mg/L)
- Rely on geology to protect the aquifer
- Do not allow upward migration into an USDW
- Have monitor wells to look for changes in water quality

REGULATORY RESTRICTIONS

Subsurface Characteristics of Injection Wells

Inject well below USDW

Monitor Above Injection Zone



DRAFT VERSION

REGULATORY RESTRICTIONS

Class I municipal disposal wells in specific areas of Florida can continue using their wells provided they:

- ✓ Have a pretreatment program
- ✓ Treat to at least secondary treatment standards
- ✓ Provide high-level disinfection (HLD)
- ✓ Must not cause endangerment to an USDW

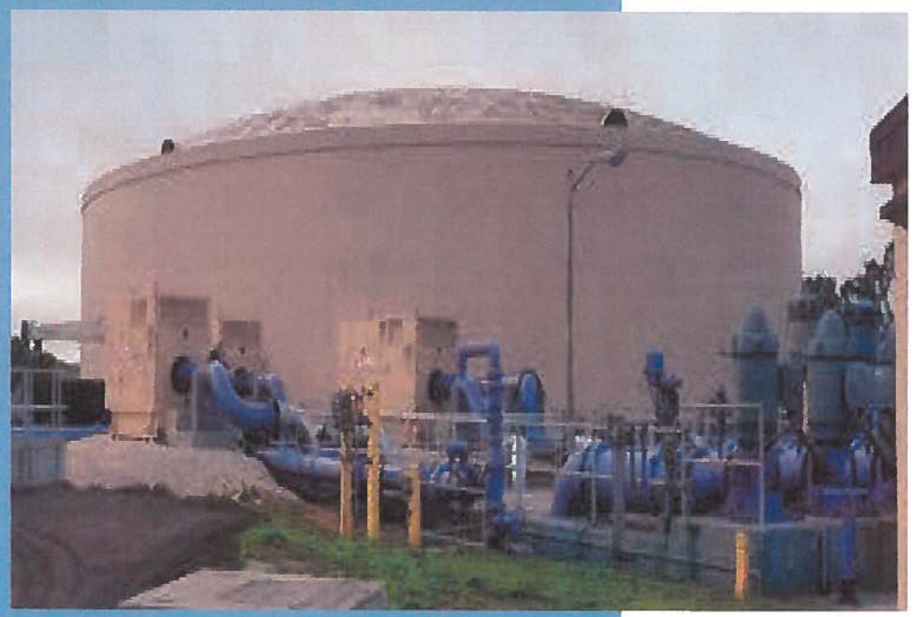
New Federal Rule Revision Allows Continued Injection in Florida

DRAFT VERSION

High Level Disinfection is Required for Public Access Reuse in Florida

- Total Suspended Solids ≤ 5 mg/L
- Chlorine residual ≥ 1.0 mg/L leaving WRF
- Fecal coliform undetected in 75% of samples (max of 25 cfu)
- Florida standards are protective of public health
- Backup storage or disposal is required for "off-spec" water

Back-Up Storage



LOCATION	STORAGE CAPACITY
NEWRF	18.0 MG (two storage tanks 10 MG & 8 MG)
NWWRF	10.0 MG (two storage tanks 5 MG & 5 MG)
SWWRF	15.0 MG (two storage tanks 10 MG & 5 MG)
TOTAL	43 Million Gallons

Off spec storage/retreatment is practical for short periods of time & low flow scenarios

Need a BMP for unavoidable off-spec events

Proposed Future Use of Injection Wells

- Continue to utilize injection wells for disposal of excess reclaimed water
- Maintain firm capacity for injection wells at each WRF
- Typically 40 years useful life – original wells may require replacement

In Summary

- Surface water discharge is detrimental, regardless of level of treatment
- Unique geology, with no potable water supplies underlying the City
- Injected water is of very high quality, meeting most drinking water standards
- Among largest urban reuse systems worldwide; Injection Wells provide the necessary wet weather backup

Questions

Biosolids Program Update

City of St. Petersburg, City Council's Committee of the Whole

May 31, 2018

Biosolids Projects Status

Updated Economic Analysis

Next Steps for Biosolids Program

DRAFT VERSION

Biosolids Projects Status

Southwest Water Reclamation Facility

March 2016

Preconstruction Photo

Solids Processing Area

DRAFT VERSION

Southwest Water Reclamation Facility

March 2016

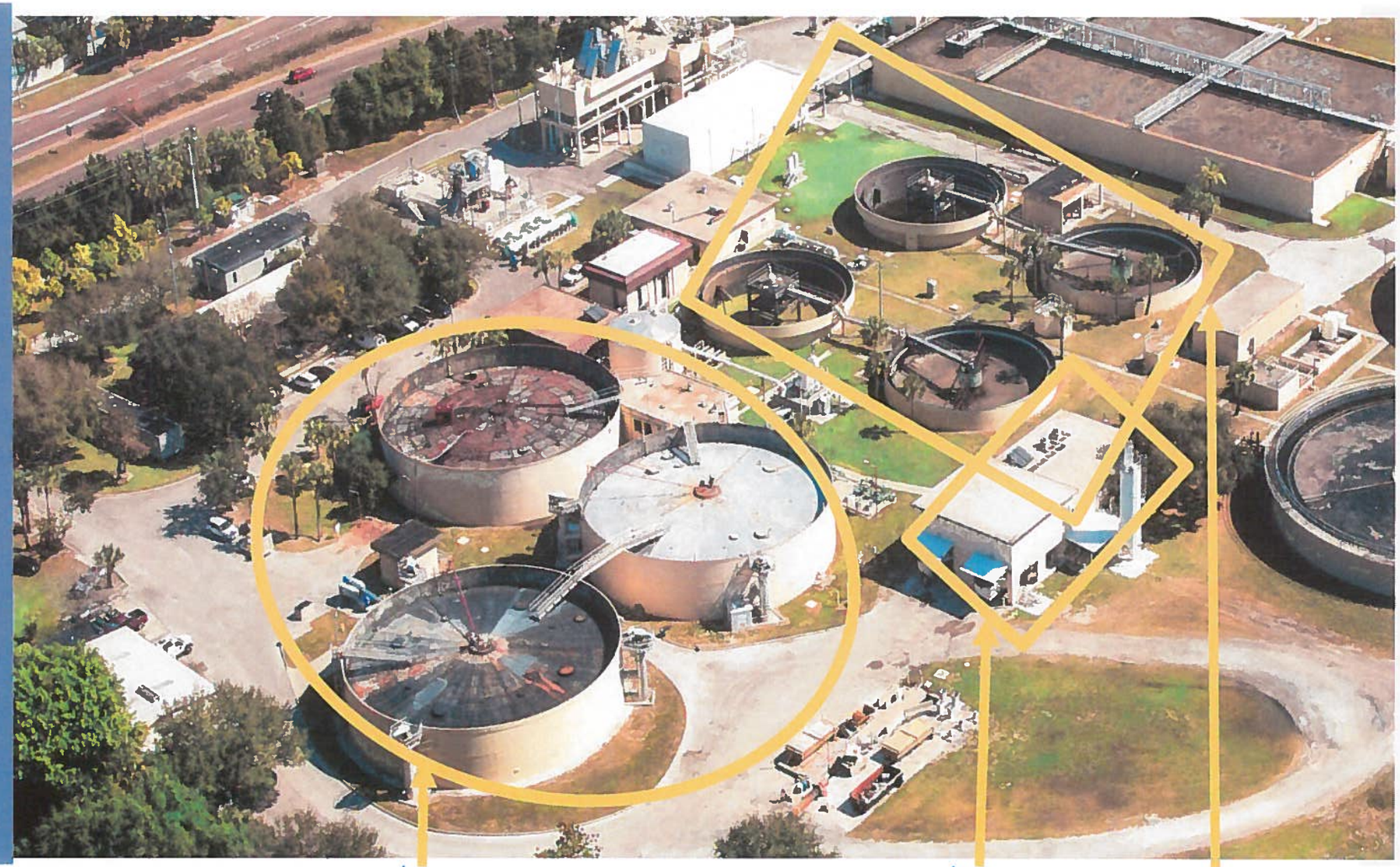
Southwest Water Reclamation Facility

March 2016

Preconstruction Photo

"Old" 1955 Plant to be demolished

Existing Solids Units to be Replaced



Southwest Water Reclamation Facility

November 2016

Site ready for new biosolids facilities

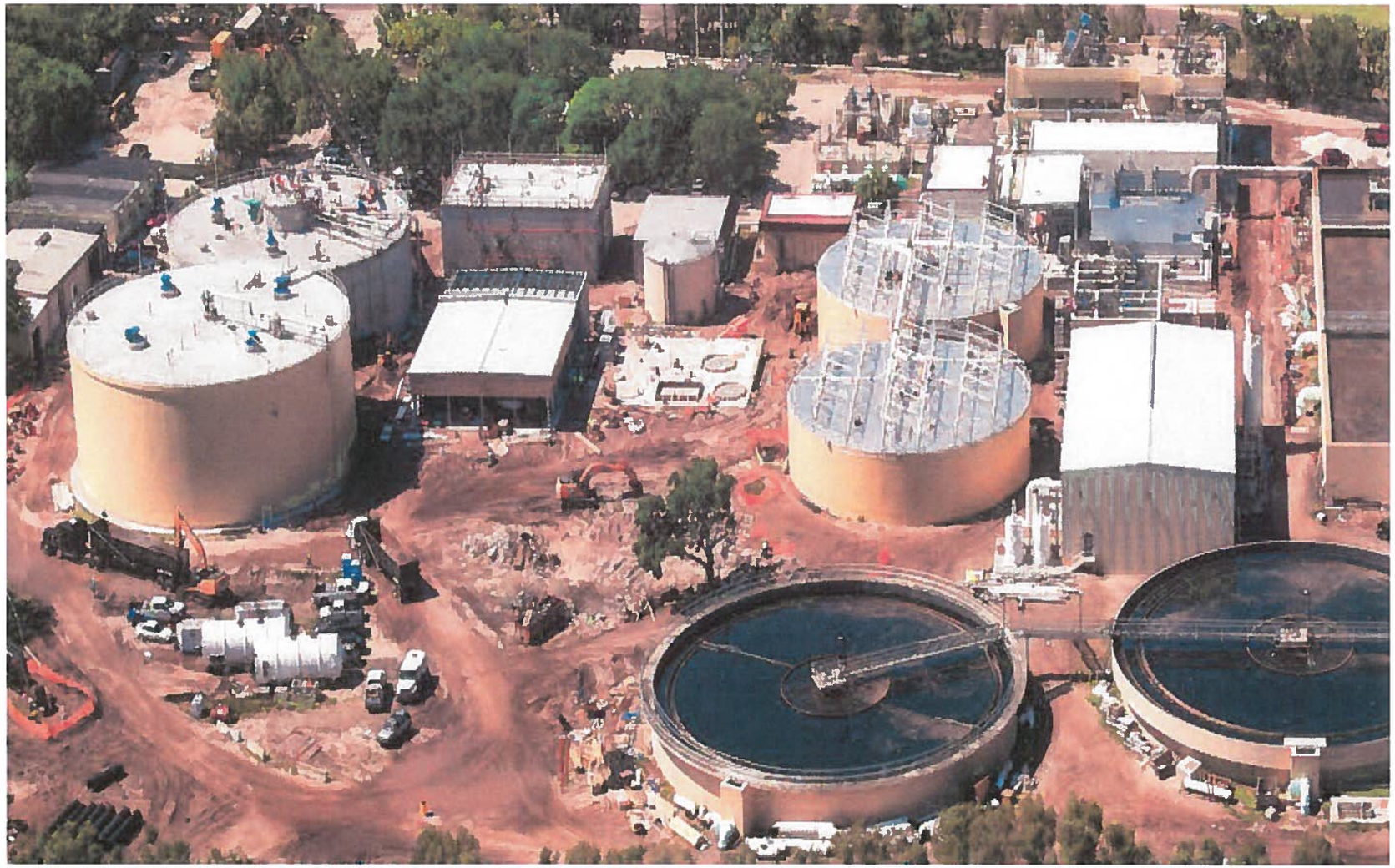
Generator Enclosure

New Dewatering Building

Southwest Water Reclamation Facility

May 2018

Current Biosolids Program Progress



SWWRF May 2018

Two Digesters

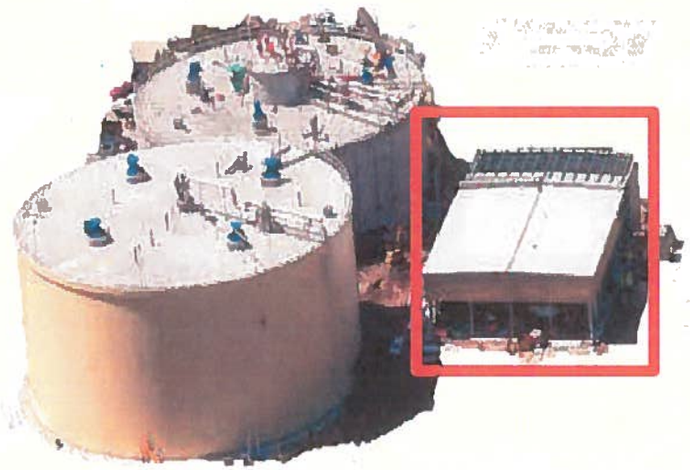
- *Structures complete*
- *Equipment installed*
- *Work on-going to complete – mechanical piping, electrical, painting, instrumentation, handrail and stairs*
- *Completion scheduled for November 2018*

Engineer = Brown & Caldwell

SWWRF May 2018

Digester Control Enclosure

- *Foundations complete*
- *Electrical room masonry complete*
- *Process equipment installation nearing completion*
- *Work on-going to complete – mechanical piping, Motor Control Center, electrical, instrumentation, painting, and doors*
- *Heat exchangers installed*
- *Yard piping of hot water supply and return underway*
- *Completion scheduled for December 2018*



Engineer = Brown & Caldwell

SWWRF May 2018

Batch Tanks

Concrete structure complete

Equipment platform structure nearing completion

Work on-going to complete – equipment installation, mechanical piping, roof system, exterior insulation, protective coatings, electrical and instrumentation

Completion scheduled for November 2018

Engineer = Brown & Caldwell

SWWRF May 2018

Two Refurbished Gravity Belt Thickeners

- *Refurbished GBT is installed*
- *Relocation of NWWRF GBT is currently scheduled for August 2018*
- *Work on-going to complete – mechanical, electrical, instrumentation, painting, and building mansard changes*
- *Completion scheduled for October 2018*

Engineer = Carollo

SWWRF May 2018

Odor Control Facilities

- *Concrete structure complete*
- *Odor Control Equipment to be installed June 2018*
- *Work on-going to complete – mechanical piping & equipment, electrical and instrumentation*
- *Completion scheduled for November 2018*

Engineer = Brown & Caldwell

SWWRF May 2018

Biogas Upgrade System

Construction of BUS system underground infrastructure and concrete foundations scheduled to begin in June 2018

20. & 21. BUS equipment submittal process underway – anticipated completion by December 2018

12. Gas Storage Tank (steel tank) scheduled to start in June, with anticipated completion by December 2018

6. Flare system scheduled to start in June, with completion anticipated by November 2018

Engineer = Brown & Caldwell

SWWRF May 2018

Two Primary Clarifiers

Primary Clarifiers and Covers - construction complete and mechanism tested

Work on-going to complete – stairs, handrails, odor control piping, and final electrical

Completion scheduled for September 2018

Engineer = Brown & Caldwell

SWWRF May 2018

Dewatering Facility with Two Screw Presses & Odor Control

- *Dewatering facility is complete*
- *Commissioned and placed into service in March 2018*
- *Temporary relocation of Lime Stabilization system (to maintain Class A Biosolids) was completed in April 2018*

Engineer = AECOM

SWWRF May 2018

Flow Splitter Facility

Primary Clarifier Splitter Box and Headworks by-pass constructed and turned over to City on August 15, 2017 prior to wet season

Work on-going to complete – protective coatings, odor control cover, instrumentation, handrail, walk platform and electrical

Completion scheduled for September 2018

Engineer = Brown & Caldwell

SWWRF May 2018

1560KW Combined Heat and Power (CHP) Gas Powered Electrical Generator

- *Gas generator and enclosure installed*
- *Refurbished Albert Whited generator and enclosure installed*
- *CHP equipment and piping installation ongoing*
- *Completion scheduled for September 2018*

Engineer = Black & Veatch

SWWRF May 2018

Electrical & Boiler Building

Electrical Building is nearing completion

HVAC system and ductwork installation complete

Work on-going to complete – electrical and instrumentation

Boiler install scheduled for June

Completion scheduled for September 2018

Engineer = Black & Veatch

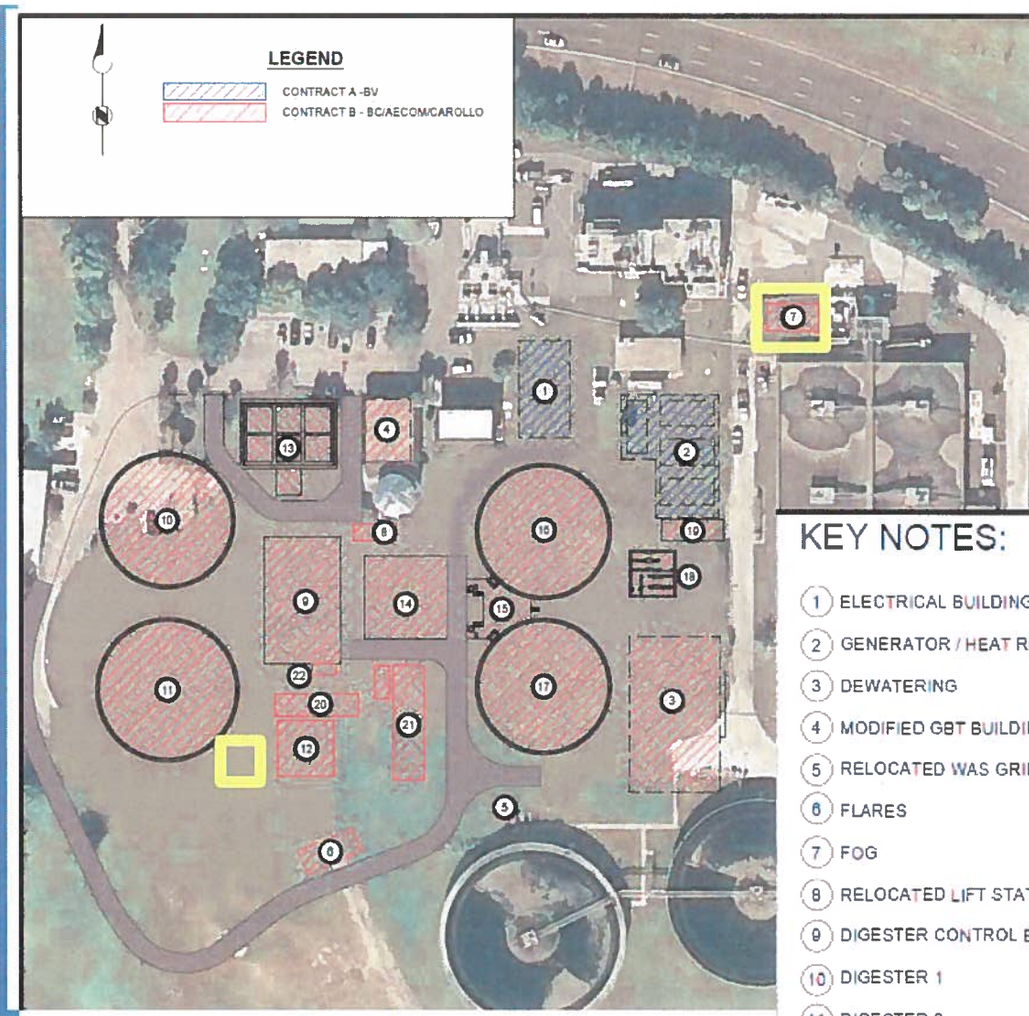
SWWRF May 2018

FOG Receiving Station

City directed Haskell in May 2018 to construct FOG station in new location to minimize operational problems

Construction of the FOG station has not started

Schedule for completion – TBD



KEY NOTES:

1. ELECTRICAL BUILDING
2. GENERATOR / HEAT RECOVERY SYSTEM
3. DEWATERING
4. MODIFIED GBT BUILDING
5. RELOCATED WAS GRINDER
6. FLARES
7. FOG
8. RELOCATED LIFT STATION #2
9. DIGESTER CONTROL ENCLOSURE
10. DIGESTER 1
11. DIGESTER 2
12. GAS STORAGE
13. BATCH TANKS
14. NEW ODOR CONTROL SYSTEM
15. PRIMARY SLUDGE PUMP STATION
16. PRIMARY CLARIFIER 1
17. PRIMARY CLARIFIER 2
18. SPLITTER BOX
19. FERRIC CHLORIDE FACILITY
20. BIOGAS COOLING SYSTEM
21. BIOGAS UPGRADE SYSTEM
22. COOLING TOWER

Engineer = Brown & Caldwell

How do these processes work together?

Updated Economic Analysis

Present Worth Savings forecasted over 20 years

January 2016
Present Worth
Assumptions

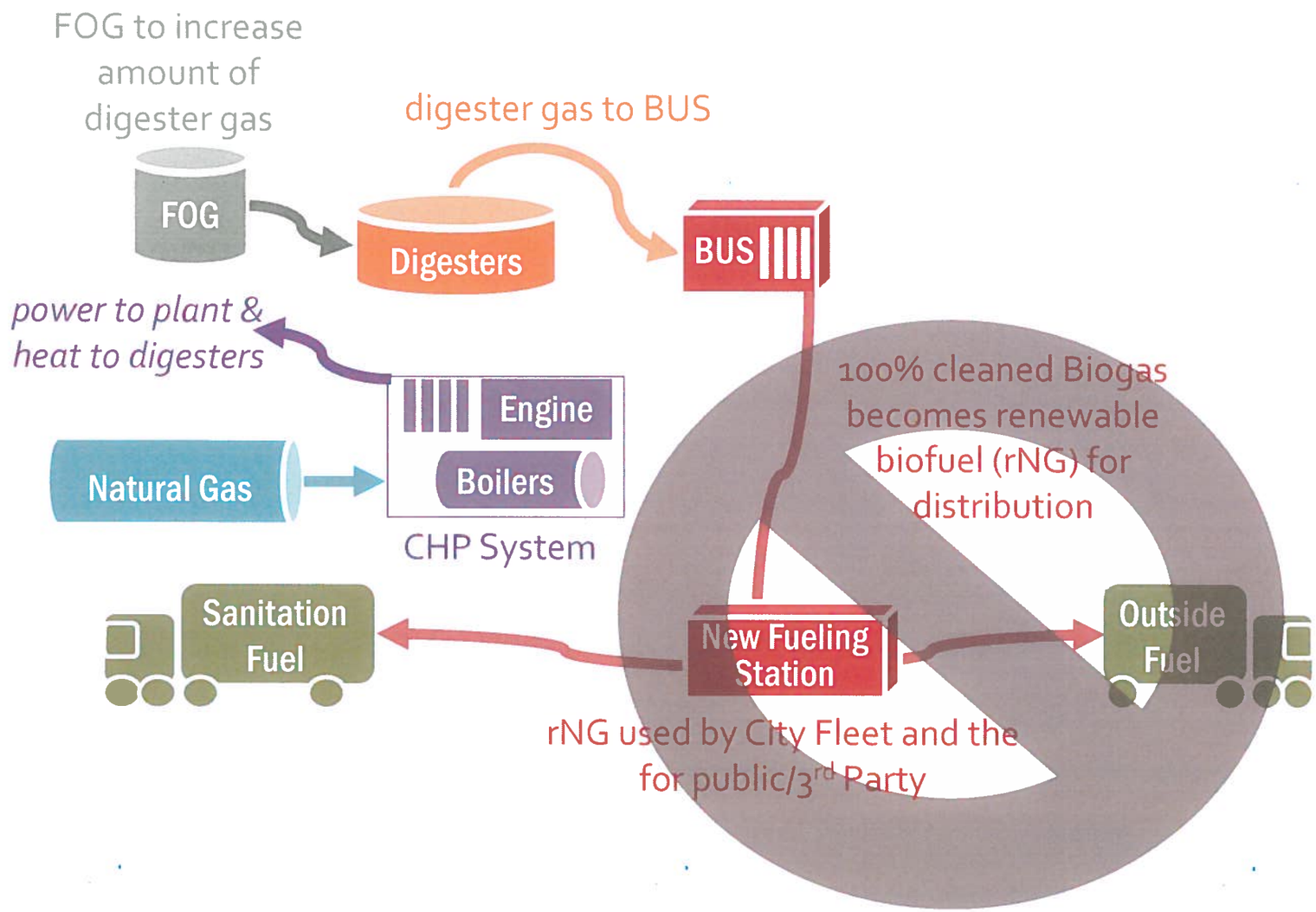
$31M savings over 20 years

1. **Consolidate Biosolids to SWWRF**
   - from NEWRF, NWWRF, and SWWRF
2. **Purchase NG to run the new CHP engine**
   - to create power and heat for the SWWRF
3. **Receive Fats, Oils & Grease (FOG)**
   - to increase biogas production by 11-12%
   - to generate "tipping fee" revenue
4. **Create a Renewable Product**
   - City to build public fueling station & distribution line
   - rNG created and transported to City Fleet Fueling Station
   - Excess rNG to be sold to the public through a public rapid-fill station
   - Create Renewable Energy Credits (RINs) as a result of using rNG in vehicles

2016 Biosolids Program Schematic

The GMP was based upon the following assumed uses for the biogas.

Selling 100% rNG resulted with $31M PW savings from selling RINs



Refinement of January 2016 Program Assumptions

Options reviewed for delivering rNG

- Construct City Fueling Station at SWWRF
  - *Concerns with City becoming a gas distributor*
- Use Tube Trailers to transport compressed gas to Fleet
  - *Deemed too risky – option not pursued*
- Send rNG to TECO pipeline for Fleet to draw off
  - *Discussions remain on-going with TECO*

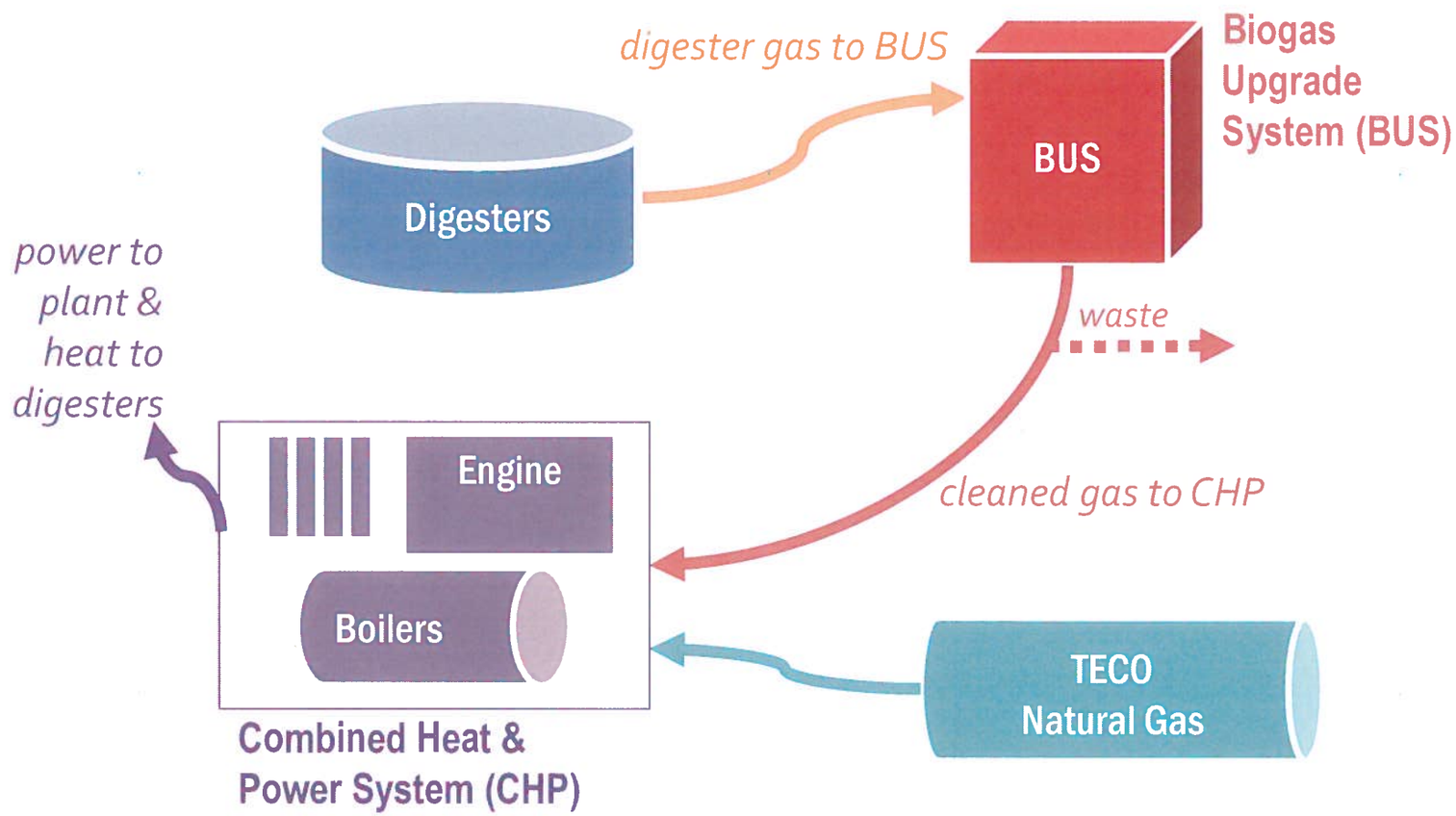
Logistics reviewed for using FOG

- Individual haulers to bring FOG to SWWRF
- Off-site FOG collection/processing facility
- Commercial contractor to haul FOG to SWWRF
- FOG is a different RINs qualified material

Core Biosolids Program

without RINs without FOG

Using all the treated digester gas on-site to power the CHP could provide an estimated $XX million in 20-year Present Worth savings.



Benefits of the Core Biosolids Program

use digester gas on-site for CHP

1. **Replaced Aging Infrastructure**
   - Majority of the biosolids equipment at NEWRF, NWWRF, and SWWRF had exceeded their useful life
2. **Complied with Biosolids Regulations**
   - Class B biosolids were no longer viable with new regulations
   - Class AA biosolids reduce disposal costs by improving flexibility and reducing compliance requirements at agricultural sites
3. **Improved Digestion Process**
   - Improved quality and reduced the total volume of biosolids requiring disposal
4. **Reduced Annual O&M Costs**
   - Annual Savings is between $1.5M and $2M (not including FOG, RIN, or rNG revenue)
5. **Reduces City's Carbon Footprint**
   - Converting from electricity to natural gas power will reduce greenhouse gas emissions

Even without producing a renewable energy product, the Biosolids Program could save $xx million of present worth costs over 20 years

DRAFT VERSION

Additional Benefits and Potential Savings

Using rNG

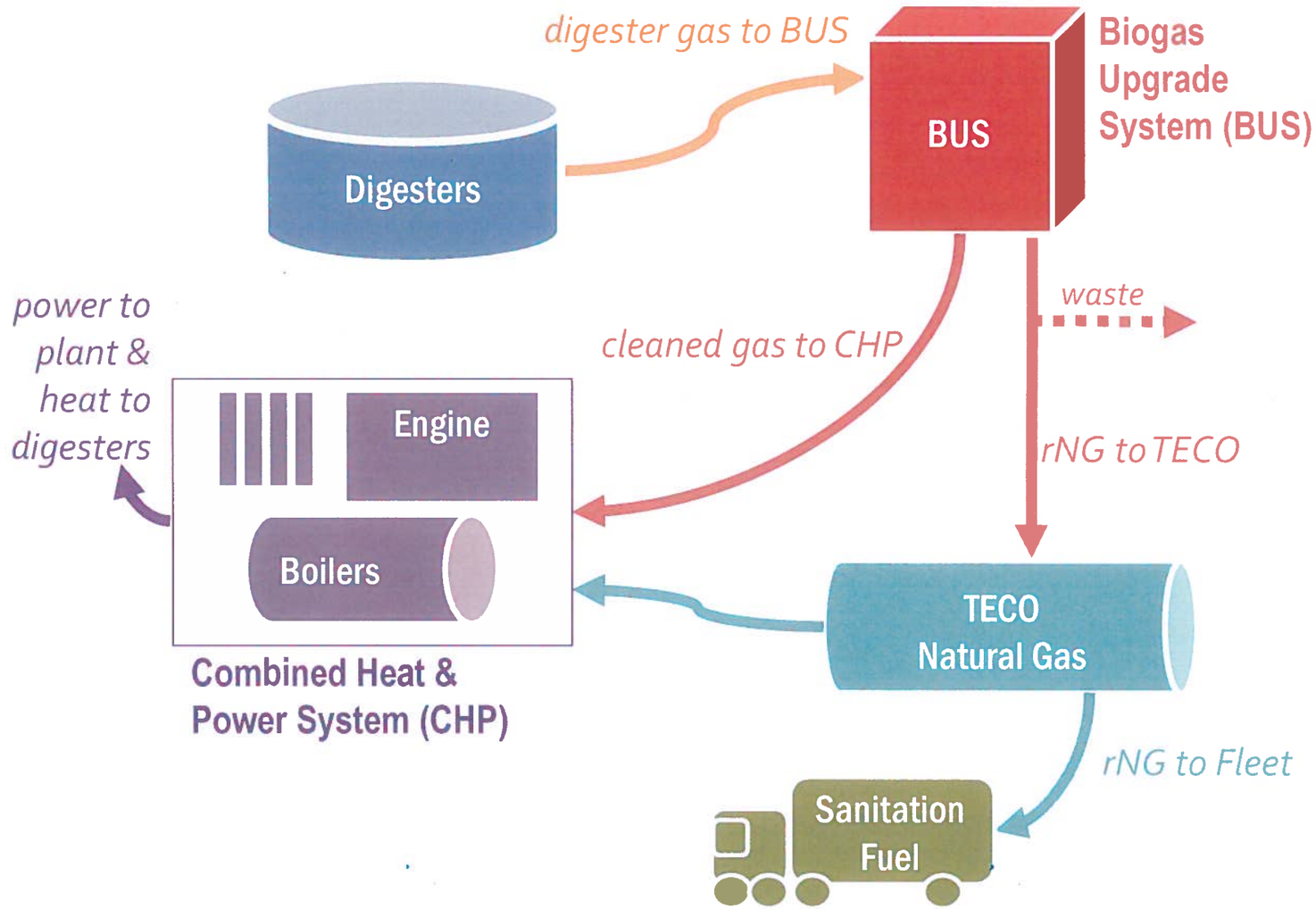
6. **Beneficial Use of the Biogas Renewable Fuel**
   - City Sanitation is in the process of converting fleet to run on CNG (or on the City's rNG) and further reduces the City's carbon footprint.
7. **Creation of Renewable Energy Commodity**
   - This credit further reduces operation costs.

By producing a renewable energy product, the Biosolids Program could save the City $xx million of present worth costs over 20 years

Enhanced Biosolids Program

using RINs no FOG

Using a portion of the treated digester gas to produce renewable energy could provide $xx million in 20-year Present Worth savings.



Additional Benefits and Potential Savings

Using FOG

8. Beneficial Use of the FOG

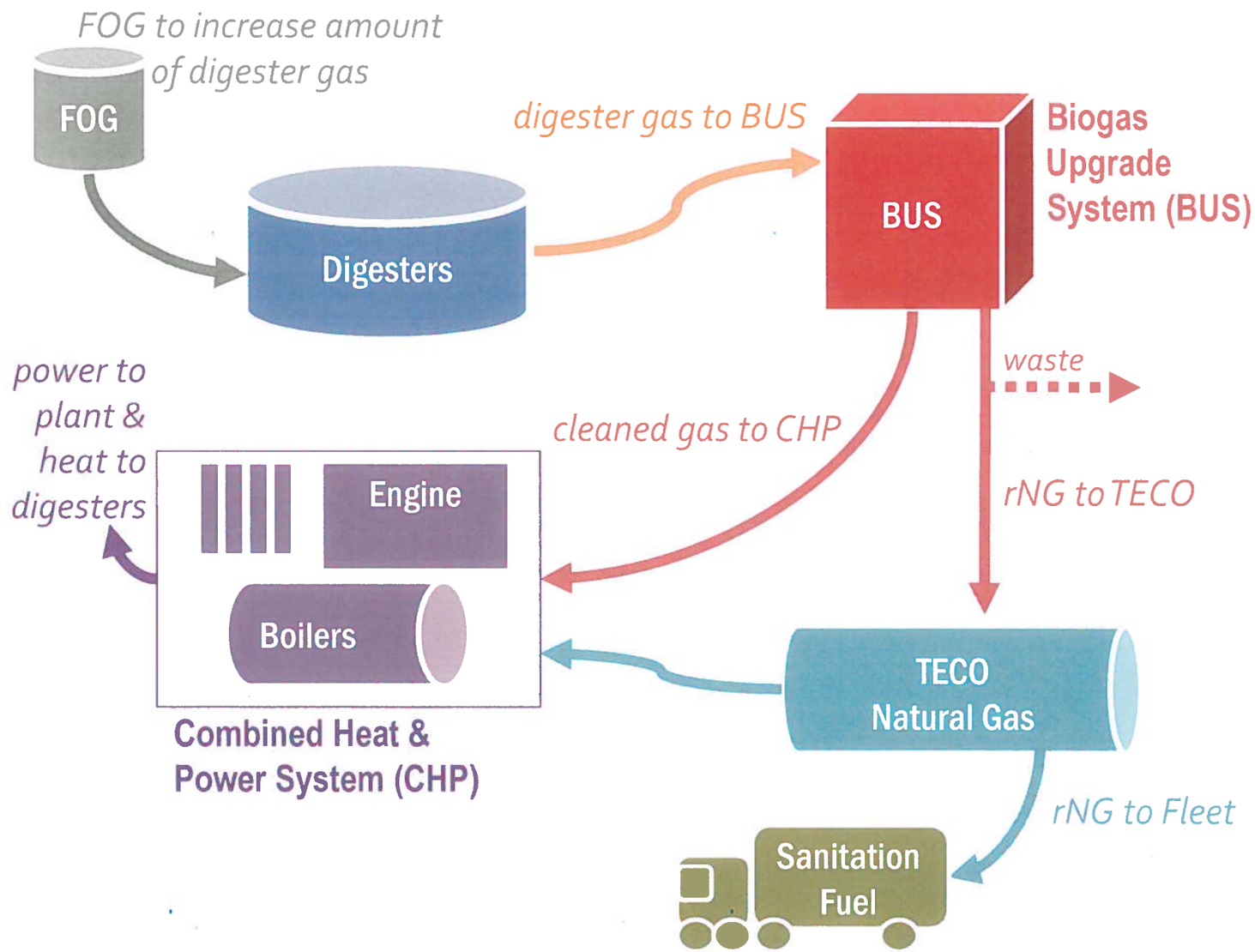
- FOG could be collected by commercial hauler(s) and transported to the SWWRF FOG Receiving Station.
- Would increase biogas produced from 9.9 MMBTUs to 11.2 MMBTUs
- FOG portion of rNG is considered a D5 commodity valued much lower than traditional biogas rNG (D3 commodity)

By producing a renewable energy product and incorporating FOG, the Biosolids Program could save the City $xx million of present worth costs over 20 years

Enhanced Biosolids Program

using RINs using FOG

Using a portion of the treated digester gas to produce renewable energy could provide $xx million in 20-year Present Worth savings.



Next Steps

Decision Regarding Present Worth Assumptions

EXCEL TOOL FOR DISCUSSION PURPOSES

Biosolids Program

City's Next Steps

- **Contract Solicitation for 3rd Party Operation and Maintenance**
  - for CHP and BUS systems
- **Continue TECO Discussions**
- **Direction Whether to Pursue RINs Program**
  - Establish RIN sale process
  - Complete EPA Registration as a RIN provider
  - Solicitation of RIN Verification Contract
- **Commissioning of the Biosolids to Energy Project**
  - approximately June 2019

Questions