Manatee County SCADA Master Plan

Manatee County // JULY 2020

// Contents

Manatee County FLORIDA

Introduction

// Assessments

- System Visioning
- Organizational and Governance Assessment
- PLC and Hardware Assessment
- SCADA Software Assessment
- Network and Communication Assessment
- Enterprise Data Integration Assessment
- Cyber and Physical Security Assessment

// SCADA System Projects

Projects were developed to address the recommendations of the assessments. These projects are meant to define a SCADA system CIP for upgrades and new infrastructure in order to adjudicate system gaps, replace outdated components, and follow industry best practices and standards. Recommendations and projects were developed to address the core principles developed with the County that include:

- Standardized solutions and implementations.
- Replacement of outdated equipment.
- Increased system reliability.
- Increased system security.
- Access to data.

Core SCADA System Project

// Core SCADA System Project

Manatee County Government
Capital Improvement Program

FY 2020 – 2024
Category: Wastewater **Subcategory:** Wastewater Treatment
Project Title: Core SCADA System Project
Department: Public Works Projects
Project Manager:
Infra. Sales Tax:
Project # **Status:** Requested

Comprehensive Plan Information

CIE Project: **N** Plan Reference:
LOS/Concurrency: **N** Project Need:

Project Location

Countywide

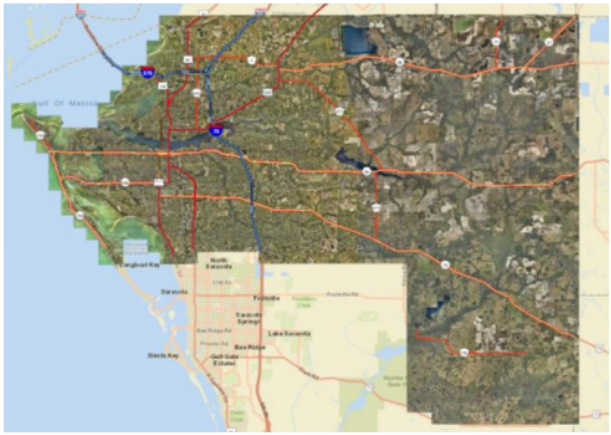
Description and Scope

Development of a centralized SCADA platform and SCADA related networking and security services. Project will include design and construction of the core SCADA system infrastructure to support central application management and access.

Rationale

To provide centralized management of SCADA system applications to reduce application maintenance and increase security and standardization.

Project Map



Schedule of Activities

Activity	Start	End	Amount
Design:	10/20	4/21	343,750
Land:			
Construction:	7/21	7/22	1,087,000
Equipment:			
Project Mgt:			
Total Budgetary Cost Estimate:			1,431,250

Operating Budget Impacts

Category	Fiscal Year	Amount
Personal:		
Non-Personal:		
Operating Capital:		
Operating Total:		

Funding Strategy

Utility Rates

Means of Financing

Funding Source	Amount
Rates	1,431,250
Total Funding:	1,431,250

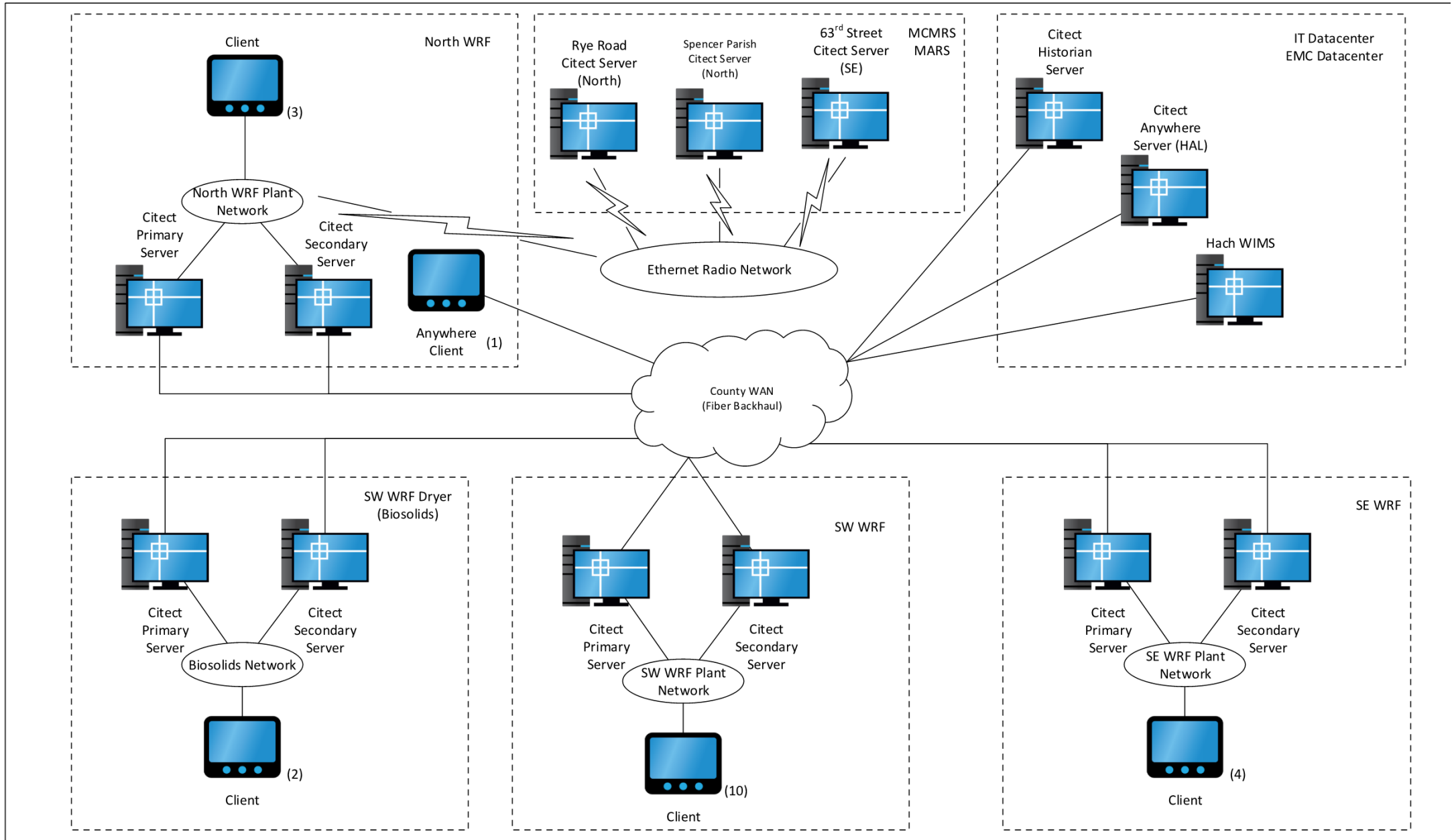
Programmed Funding

Expended to Date	Appropriated to Date	FY2021	FY2022	FY2023	FY2024	FY2025	Future
0	0	400,000	1,031,250	0	0	0	0

// Core SCADA System Project

a. Implement centralized AVEVA CitectSCADA (Plant SCADA) server at IT Datacenter with following functions:
   i. Hosts global application to allow access to all sites.
   ii. Provides backup server services to all facilities.
   iii. Single point for graphical changes to specific sites and global objects.
   iv. Master Alarm server for remote notification of alarms.
b. CitectSCADA Web Server for remote client deployment.
c. Rockwell ThinManager for thin client management.
d. Master Wonderware Historian.
e. Centralized Hach WIMS implementation.
f. Centralized remote alarm notification.
g. Application Change Management Administration (Rockwell Asset Center).
h. Applications Programming through Studio 5000.
i. Test Environment.
j. (Optional) Integration with DFS system.
k. Implementation of server management functions:
   i. Active Directory.
   ii. DNS, DHCP.
   iii. WSUS and Patch Management.
   iv. Network Time.
   v. Server and Virtualization Management.
   vi. Localized system storage.
l. Implementation of Network Security:
   i. Anti-Virus Management.
   ii. System logfile storage and management.
   iii. VPN tunnels to each site.
   iv. Update routing and ACL rules.
m. Network Time Server.
n. Implement SCADA system governance (Could be separate project):
   i. Policies and procedures.
   ii. Security Plans.

// Core SCADA System Project



// Core SCADA System Project

Outcomes:

- System Standardization.
- Enhance system governance through change management, centralized group policies and authentication, and ease maintenance.
- Migration to the latest version of CitectSCADA (Plant SCADA) for all applications within a single County wide application architecture using clustering for reliability and application organization.
- Implement more thin clients and develop a mobile client solution.
- Migrate Historian to the central datacenter and integrate with Hach WIMs for reporting and generating key performance indicators.
- Implement Active Directory security along with other server services such as pathing and anti-virus for security.
- Develop a core SCADA server and network architecture to develop a segmented infrastructure and implement security.
- Virtualize server systems and implement a virtual machine backup and recovery system.
- Add network management including configuration backup and recovery systems.

// Core SCADA System Project

Activities	Cost
Design	
Specifications	10,000
Drawings	155,000
Meetings	10,000
Project Management	25,000
Commissioning	75,000
Design Total	**275,000**
Construction	
Server Rack and Components	25,000
Servers	40,000
Network Storage	20,000
Network Components	50,000
Rockwell Asset Center	50,000
Alarm Software and Implementation	10,000
Software OS and General	50,000
Software Implementation	25,000
Hach WIMS Modifications	15,000
Thin Client System	50,000
Test System (Sandbox)	25,000
Drawings	20,000
Testing	50,000
HMI Application Dev	300,000
Submittals	15,000
O&M	15,000
Training	10,000
Electrical	100,000
Construction Total	**870,000**
Subtotal	1,145,000
Contingency 25%	286,250
Total	**1,431,250**

SE WRF Upgrades

// SE WRF Upgrades

Manatee County Government
Capital Improvement Program

FY 2020 – 2024
Category: Wastewater **Subcategory:** Wastewater Treatment
Project Title: SE WRF SCADA Upgrades
Department: Public Works Projects
Project Manager:
Infra. Sales Tax:
Project # **Status:** Requested

Comprehensive Plan Information

CIE Project: **N** Plan Reference:
LOS/Concurrency: **N** Project Need:

Project Location

SE WRF

Description and Scope

This project includes the replacement of existing Legacy PLC systems and associated network hardware, OITs, and the addition of fiber optic cabling for modernization and standardization of equipment and added system resiliency at the SE WRF and includes upgrades for the MARS and Dryer

Rationale

Upgrade outdated equipment and standardize PLC systems at the SE WRF. Add resiliency to the Fiber Optic Network. Standardize PLC programming platform and applications.

Schedule of Activities

Activity	Start	End	Amount
Design:	5/21	5/22	443,750
Land:			
Construction:	6/22	5/24	2,018,750
Equipment:			
Project Mgt:			
Total Budgetary Cost Estimate:			2,462,500

Operating Budget Impacts

Category	Fiscal Year	Amount
Personal:		
Non-Personal:		
Operating Capital:		
Operating Total:		

Programmed Funding

Expended to Date	Appropriated to Date	FY2020	FY2021	FY2022	FY2023	FY2024	Future
0	0	185,000	595,210	1,009,380	672,910	0	0

Project Map

Funding Strategy

Utility Rates

Means of Financing

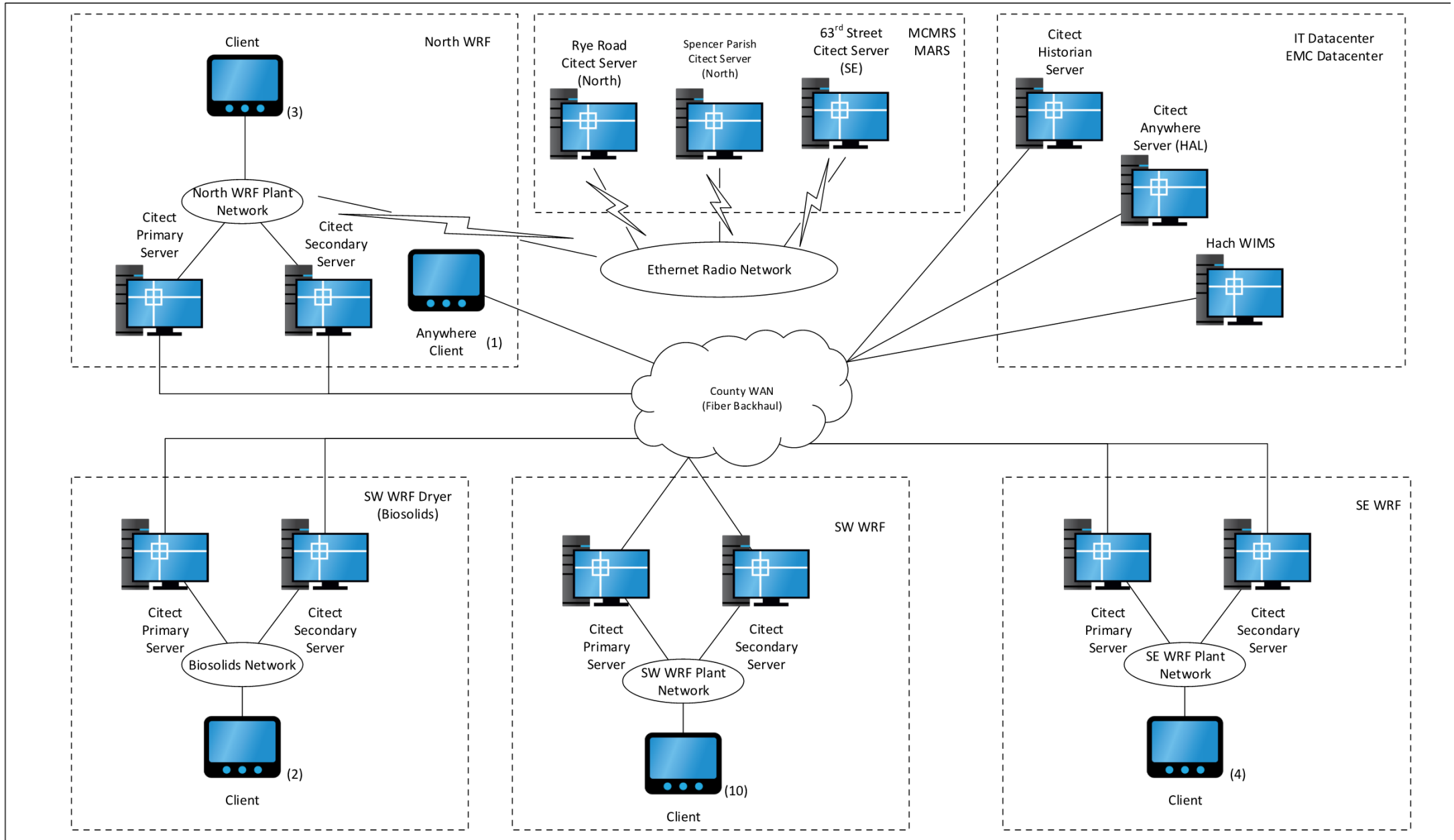
Funding Source	Amount
Rates	2,462,500
Total Funding:	2,462,500

// SE WRF Upgrades

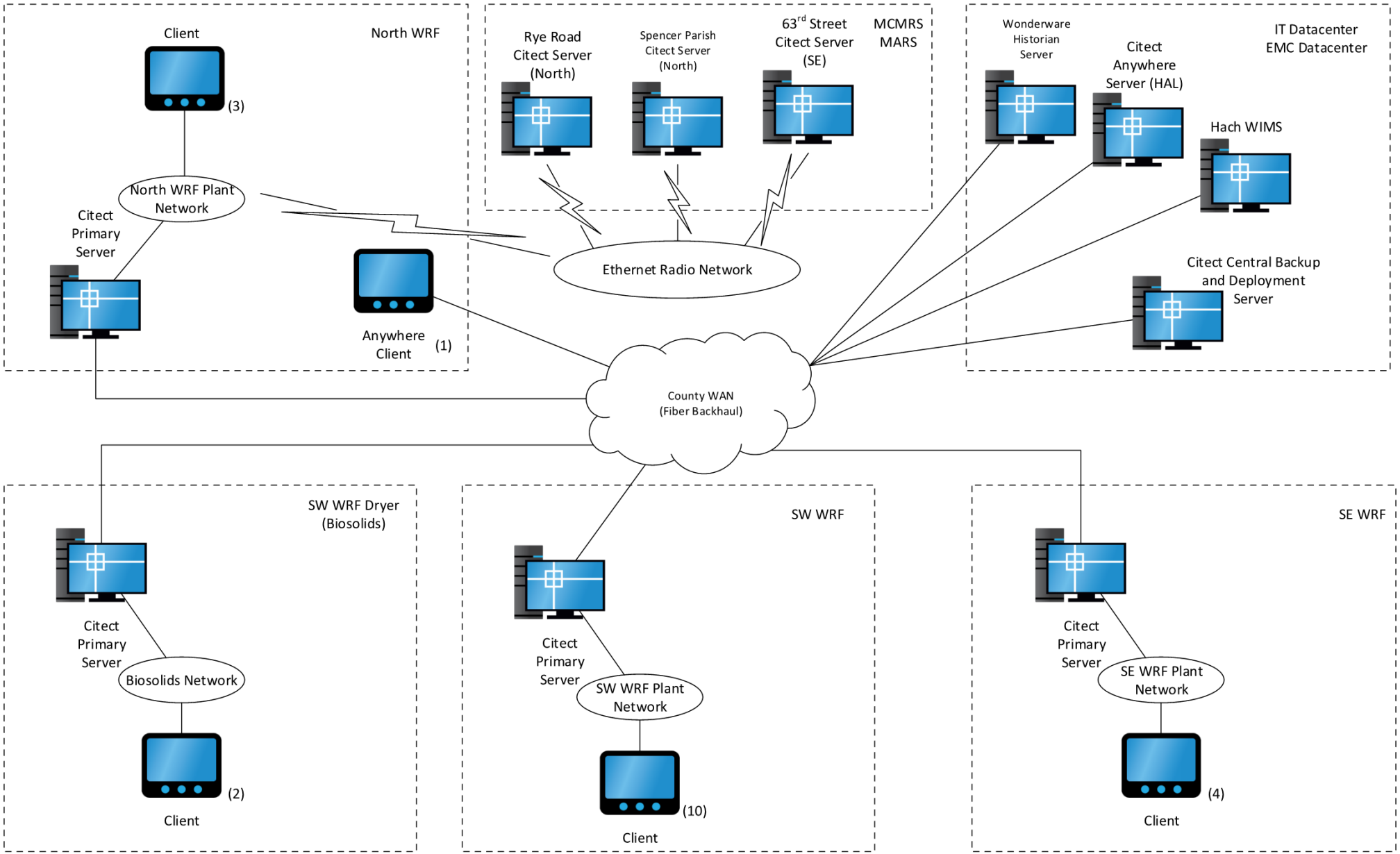
- Replace Existing Legacy PLCs – Distributed using CompactLogix
- Replace Legacy OITs – Thin Clients
- Upgrade network components – Stratix Switches
- New CitectSCADA (PlantSCADA) Application – Local redundancy centralized clustering
- Local WIN-911
- Master Historian with local buffering
- Deployment of local and centralized thin clients
- Upgraded Control Room
- Move server equipment to dedicated locked room

- Value Options
  - Use central Citect server for redundancy – single local server
  - Install WIN-911 at central server only

// SE WRF Upgrades



// SE WRF Upgrades – Single Local Server VE



// SE WRF Upgrades

Table 3.2 Existing PLC Platforms

Controller	QTY	Lifecycle Status	Percentage
SLC	39	End of Life	50.6%
CompactLogix	7	Active	9.1%
MicroLogix (1000/1100)	28	Mature	36.4%
Other	3		3.9%
Total	**77**		

Existing PLCs to be replaced include legacy Rockwell Automation Allen-Bradley SLC PLCs. New PLCs will be based on the County's standard Rockwell Automation Allen-Bradley CompactLogix L33 Series. PLCs can be replaced using either of the two options presented in the report based on constraints and preferences during the design. The first option is to maintain exists SLC I/O and migrate the I/O to new CompactLogix controllers using the 1747-AENTR adaptor module. This option would minimize any re-wiring and re-termination of I/O and provide a fast and lower cost replacement. I/O could then be transferred at a later date depending on need and continued availability of SLC I/O cards. The second option would be to completely replace SLC controllers and I/O. This would upgrade the entire system including I/O to more modern components but would increase time and cost of the transition. Specialized wiring arms could be utilized in this option that mate directly to the existing SLC terminals in order to speed wiring. Unless significant I/O changes are planned, or replacement of entire PLC cabinets is desired, it is recommended to transition using the first option in order to reduce the time and cost of the transition. This upgrade will provide a consistent level of programming environment, equipment support, and a higher level of standardization on control hardware.

// SE WRF Upgrades

PHASE 1

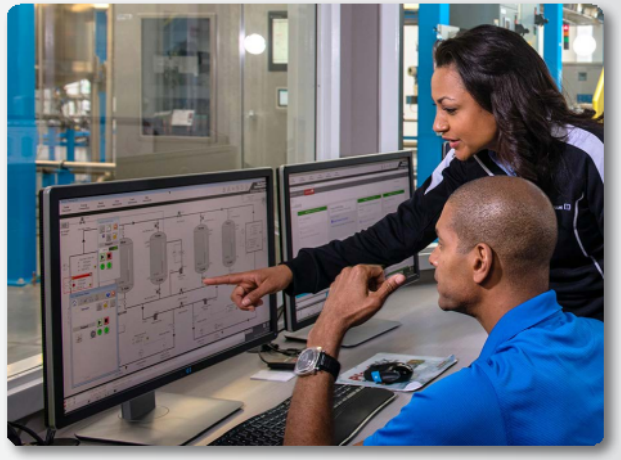
Application Code Conversion

Save time and engineering resources when converting your SLC 500 application code by using the embedded conversion utilities in either RSLogix 5000 or Studio 5000 software. And, converting your PanelView Standard project to PanelView Plus is as simple as importing the existing project into FactoryTalk View Studio.

Tools: RSLogix 5000 and Studio 5000 software, FactoryTalk View Studio Software

Benefits (application code):
- Convert 80-100% of code using automated code conversion
- Take advantage of powerful constructs and features that you can leverage to improve the application

Benefits (HMI application):
- 80% of the time no further modification is required for HMI application
- Utility generates conversion log identifying features not supported by new hardware selected
- Option to take advantage of enhanced features and graphics
- Better integration with controllers



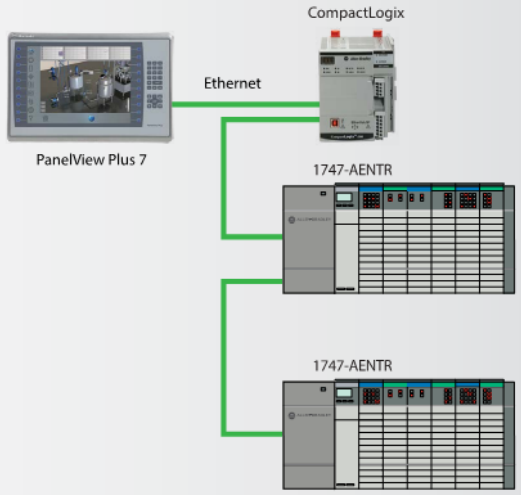
PHASE 2

Replace the SLC Processor and/or Adaptor Modules

Mount and wire the CompactLogix™ system and replace the SLC first slot modules (SLC processor or communication adaptor module) with the SLC Ethernet adaptor (1747-AENTR). Utilizing this module allows you to retain your existing SLC I/O and preserve existing field wiring, while allowing your SLC I/O chassis to be controlled from your new CompactLogix controller. This approach simplifies the migrations process, reduces risks associated with rewiring the I/O, and saves valuable time allowing you to quickly get your application into production.

Tools: 1747-AENTR Ethernet adaptor, CompactLogix User Manual

Benefits:
- Maintain existing field wiring
- Minimize commissioning time and effort
- Ability to return to SLC control, if needed



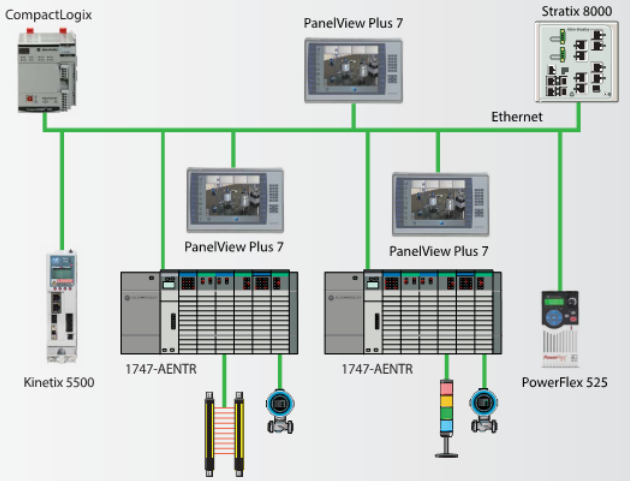
// SE WRF Upgrades

PHASE 3

Replace other System Components

Because Rockwell Automation is a comprehensive supplier, we can help with other products and services. If your control system has legacy or competitive variable speed drives, motion control, sensors or motor control centers we can discuss how we can help migrate those products as well. But it doesn't stop there. We have a worldwide service group that can do the migration work, assist and train operators or provide the maintenance services once it's complete. We can also review your network needs and review asset management for your entire facility.

Tools: Popular Configuration Drawings for CompactLogix 5380

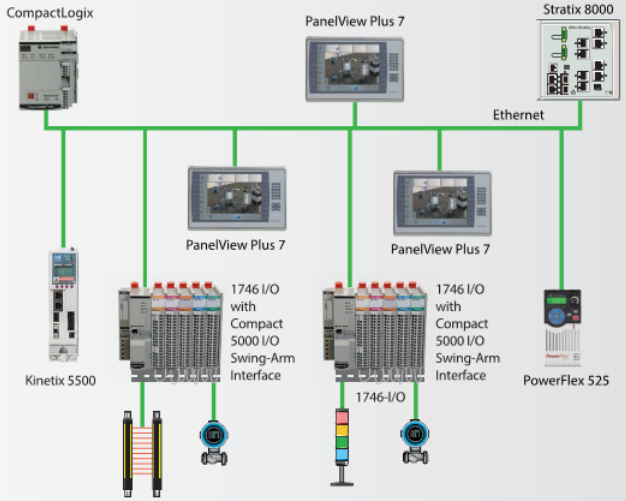


PHASE 4

I/O Replacement (FUTURE STATE)

In the final phase of the migration process, the I/O Wiring Conversion System is used to replace the 1746 I/O with the CompactLogix I/O. Because I/O replacement represents a large investment, we provide an approach that's right for your schedule and budget. The I/O Wiring Conversion System provides a method to connect the existing 1746 I/O wiring to the 5069 I/O modules without disturbing the field wiring connections, dramatically reducing labor time and eliminating the potential for downtime that could result from wiring mistakes during the migration. Planning your migration is more manageable as I/O can be swapped one rack at a time or all at once based on your schedule and budget. In either case, you can run both new and old I/O networks simultaneously. Additionally, I/O cross reference documentation assures correctness and provides historical back-up for future troubleshooting or diagnostics.

Tools: I/O Wiring Conversion System (Coming in 2019), ProposalWorks Selection Software



// SE WRF Upgrades

Table 3.3 Major Ethernet Switch Types

Manufacturer	QTY	Percentage
Phoenix Contact	27	69%
Other	12	31%
Total	**39**	

Currently, many of the Ethernet switches are unmanaged. These are plug-and-play devices that do not provide any control of where the information is being sent. Therefore, they can greatly slow down the speed of the data being sent and possibly create broadcast storms that negatively impact the response of the network. It is recommended to replace all unmanaged switches with managed Rockwell Stratix switches. Utilizing managed switches allows for IGMP Snooping to be enabled which allows data to be sent only to the intended destination therefore optimizing the network bandwidth. Managed switches also optimize the performance of full-duplex mode which allows for messages to be both sent and received concurrently. The Plant Floor Switches should be replaced with the Rockwell Stratix 5700 series. These switches support the spanning tree protocol that provides the County desired resiliency and these switches are industrial rated and suitable for control panel mounting. Stratix switches also have higher level integration with CompactLogix controllers providing direct monitoring of the switches through pre-built add on instructions. Additionally, as Rockwell continues to embed security into their hardware, these devices will allow for direct implementation of these security features.

// SE WRF Upgrades

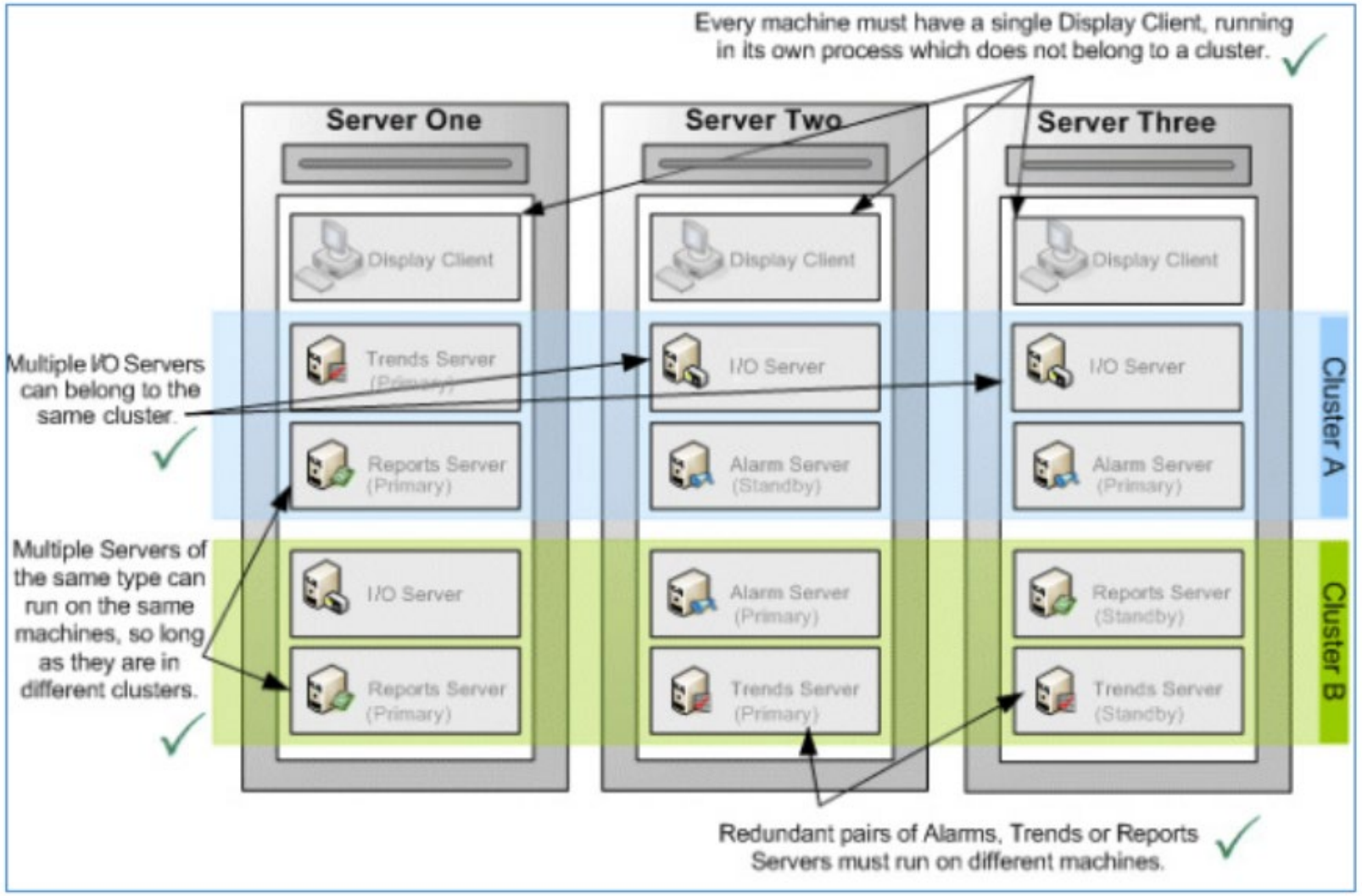


Figure 4.2 Two Clusters Split across Three Machines

// SE WRF Upgrades

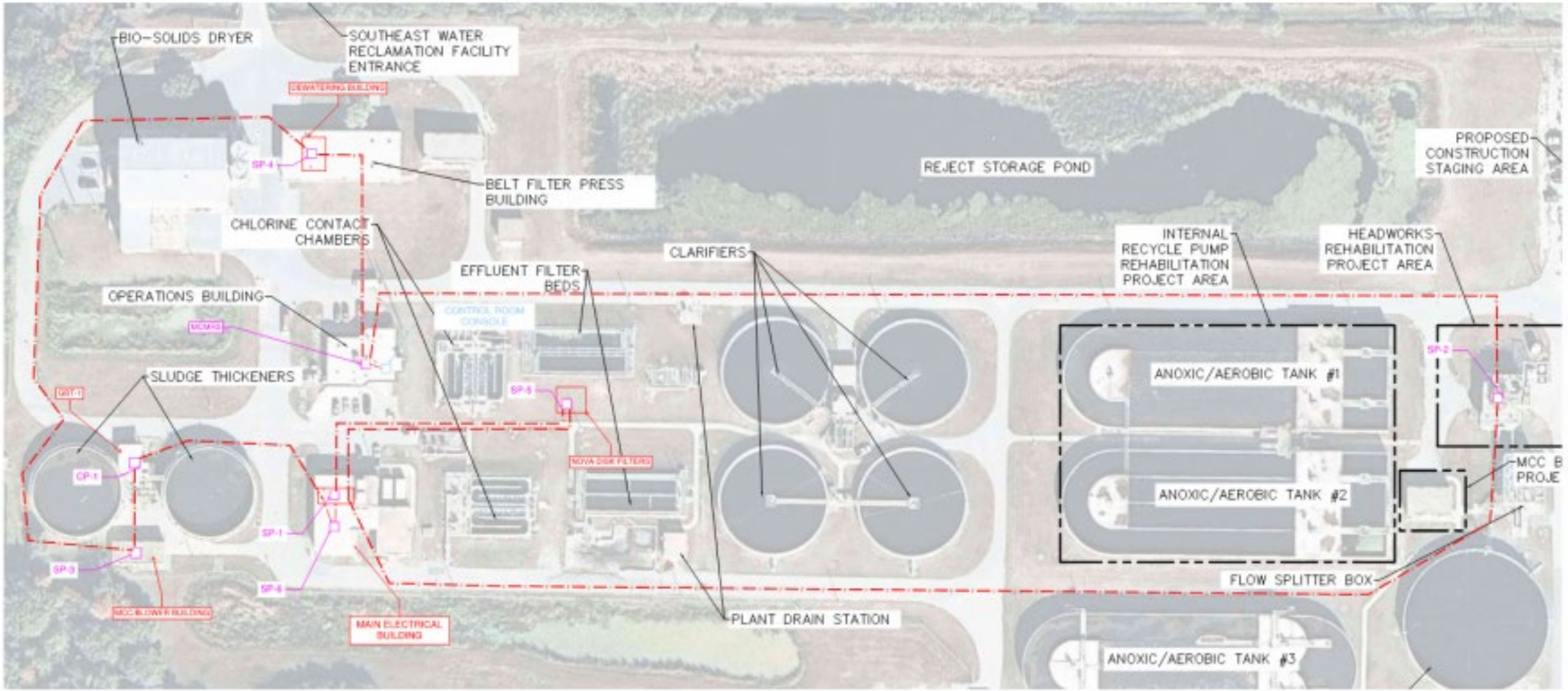


Figure 5.5 SE WRF Existing Fiber Route

// SE WRF Upgrades

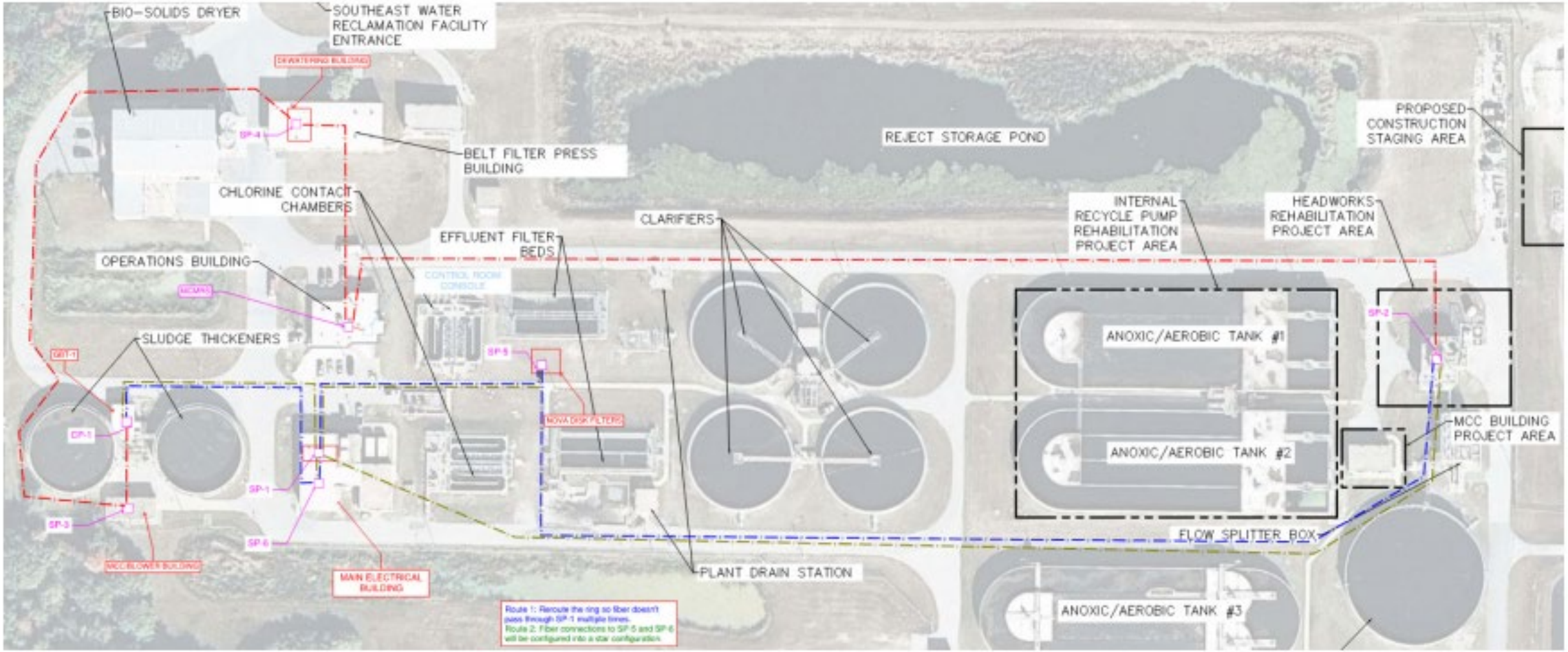


Figure 5.6 SE WRF Fiber Route Options

// SE WRF Upgrades

Table 8.2 SE WRF SCADA System Project Cost Estimate

Activities	Cost
Design	
Specifications	25,000
Drawings	200,000
Meetings	15,000
Project Management	25,000
Construction Services	90,000
Design Total	**355,000**
Construction	
PLC Upgrades	770,000
Drawings	50,000
Testing	50,000
HMI Application Updates	250,000
Server Hardware and software	80,000
Control Room Upgrades	100,000
Fiber Optic Cable	160,000
Pull Boxes	75,000
Ethernet Switches	20,000
Fiber Patch Panels	10,000
Submittals	25,000
O&M	25,000
Construction Total	**1,615,000**
Subtotal	1,970,000

SW WRF Upgrades

// SW WRF Upgrades

Manatee County Government
Capital Improvement Program

FY 2020 – 2024
Category: Wastewater **Subcategory:** Wastewater Treatment
Project Title: SW WRF SCADA Upgrades
Department: Public Works Projects
Project Manager:
Infra. Sales Tax:
Project # **Status:** Requested

Comprehensive Plan Information

CIE Project: **N** Plan Reference:
LOS/Concurrency: **N** Project Need:

Project Location

SW WRF

Description and Scope

This project includes the replacement of existing Legacy PLC systems and associated network hardware, OITs, and the addition of fiber optic cabling for modernization and standardization of equipment and added system resiliency at the SW WRF

Rationale

Upgrade outdated equipment and standardize PLC systems at the SW WRF. Add resiliency to the Fiber Optic Network. Correct existing logic errors and increase automation.

Project Map

Schedule of Activities

Activity	Start	End	Amount
Design:	8/21	8/22	468,750
Land:			
Construction:	9/22	12/24	2,062,500
Equipment:			
Project Mgt:			
Total Budgetary Cost Estimate:			2,531,250

Operating Budget Impacts

Category	Fiscal Year	Amount
Personal:		
Non-Personal:		
Operating Capital:		
Operating Total:		

Funding Strategy

Utility Rates

Means of Financing

Funding Source	Amount
Rates	2,531,250
Total Funding:	2,531,250

Programmed Funding

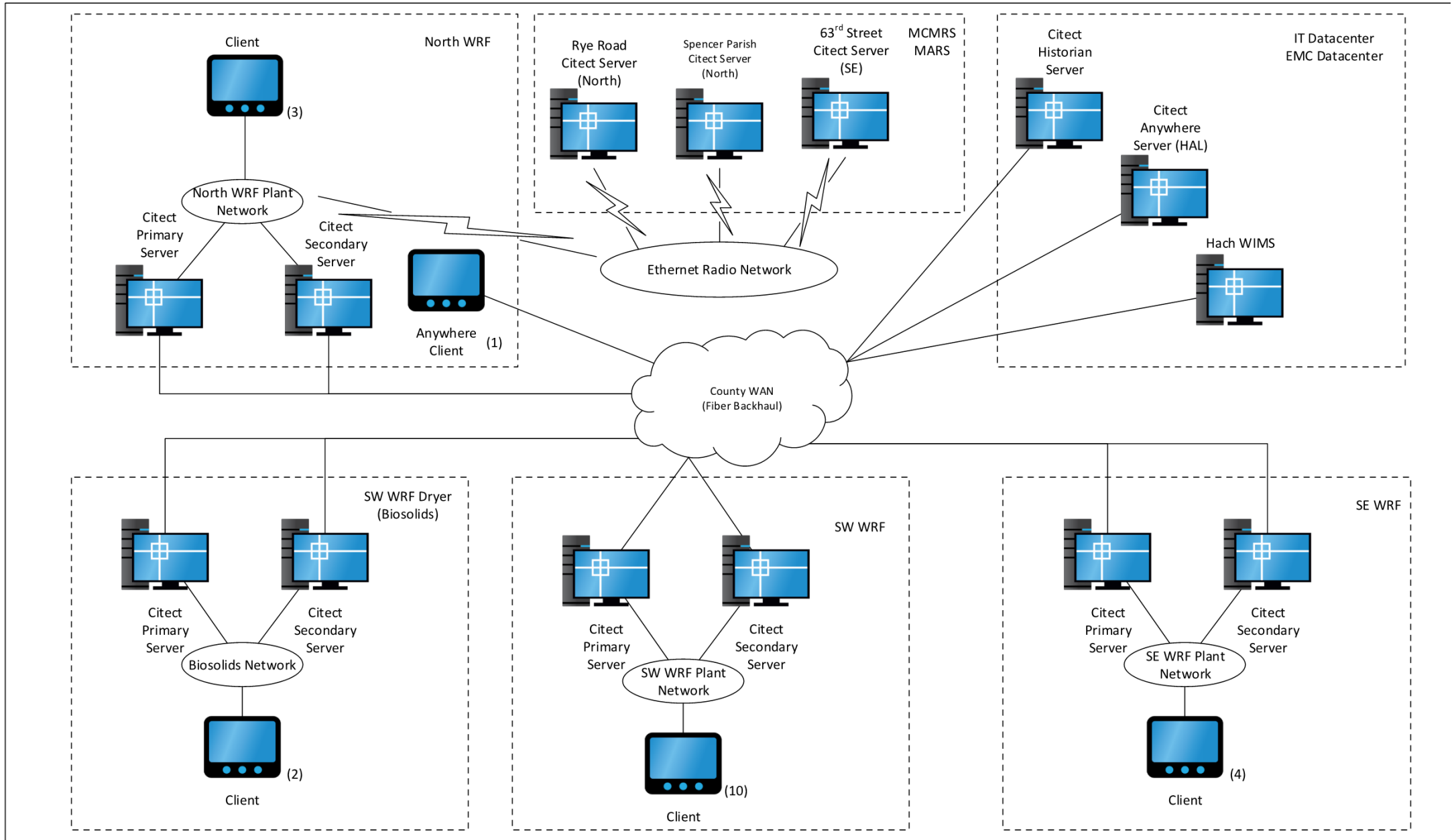
Expended to Date	Appropriated to Date	FY2020	FY2021	FY2022	FY2023	FY2024	Future
0	0	78,125	550,000	960,000	943,125	0	0

// SW WRF Upgrades

- Replace Existing Legacy PLCs – Distributed using CompactLogix
- Replace Legacy OITs – Thin Clients
- Upgrade network components – Stratix Switches
- New CitectSCADA (PlantSCADA) Application – Local redundancy centralized clustering
- Local WIN-911
- Master Historian with local buffering
- Deployment of local and centralized thin clients
- Upgraded Control Room
- Move server equipment to dedicated locked room

- Value Options
  - Use central Citect server for redundancy – single local server
  - Install WIN-911 at central server only

// SW WRF Upgrades



// SW WRF Upgrades

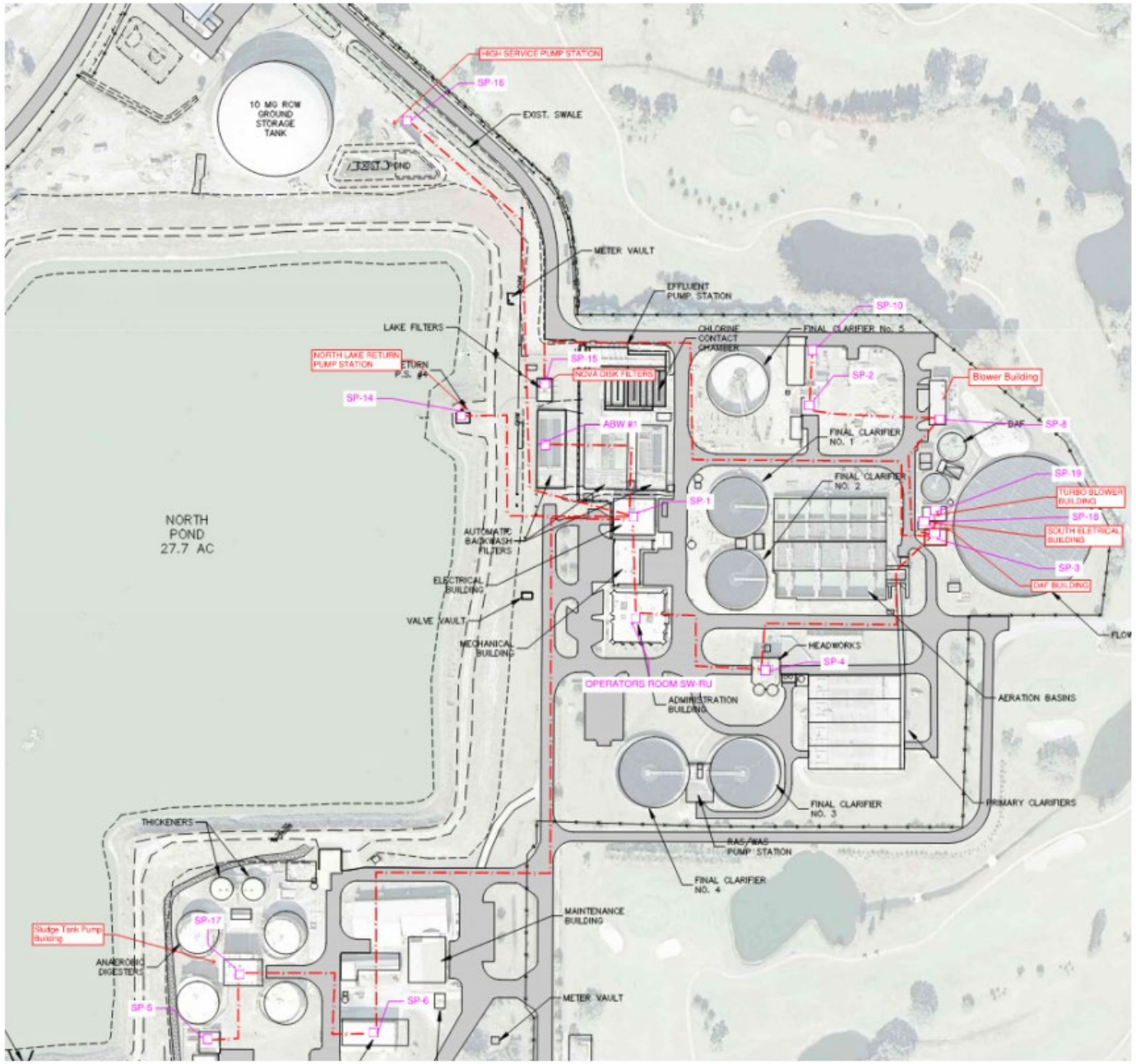
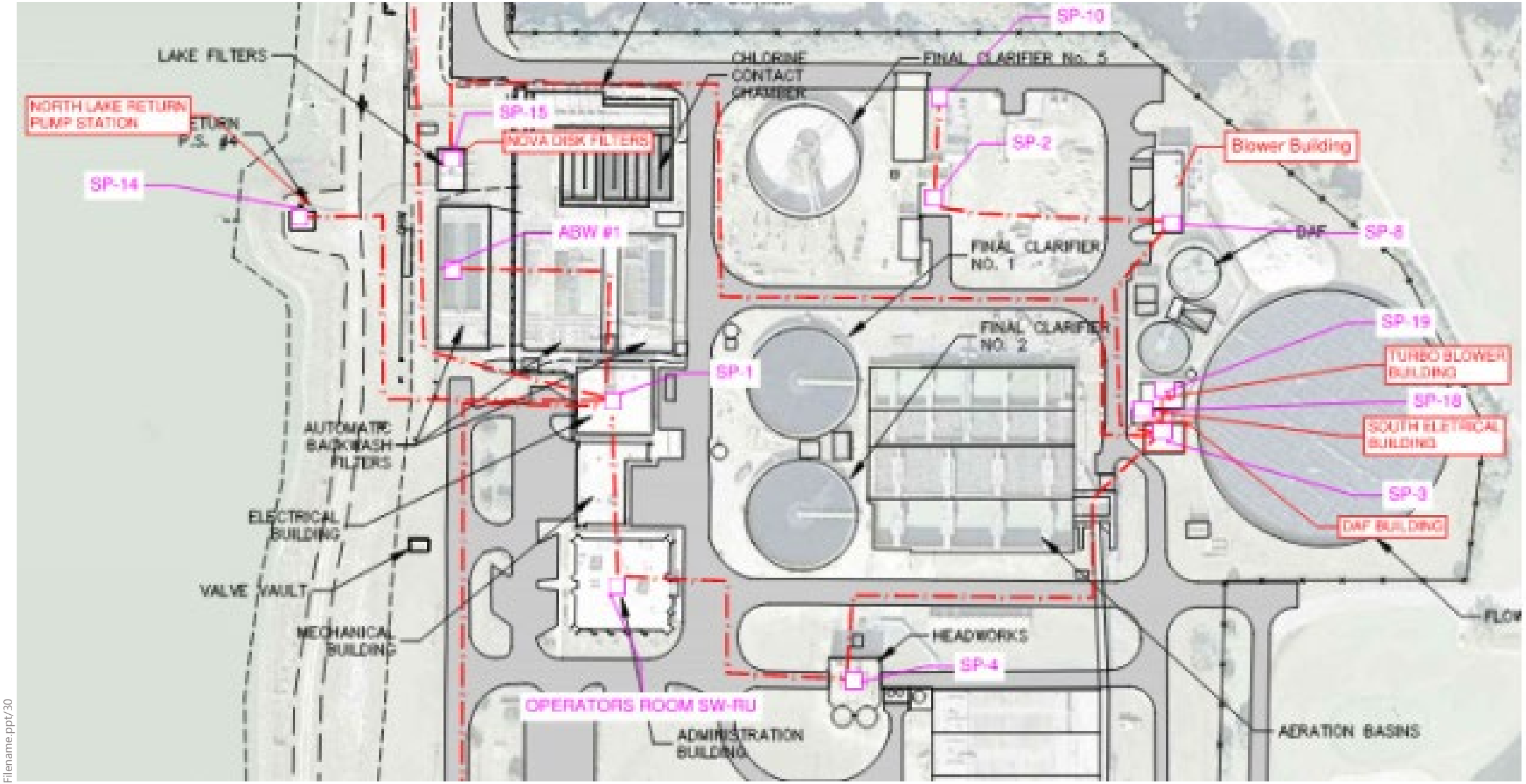


Figure 5.3 SW WRF Existing Fiber Route

// SW WRF Upgrades



// SW WRF Upgrades

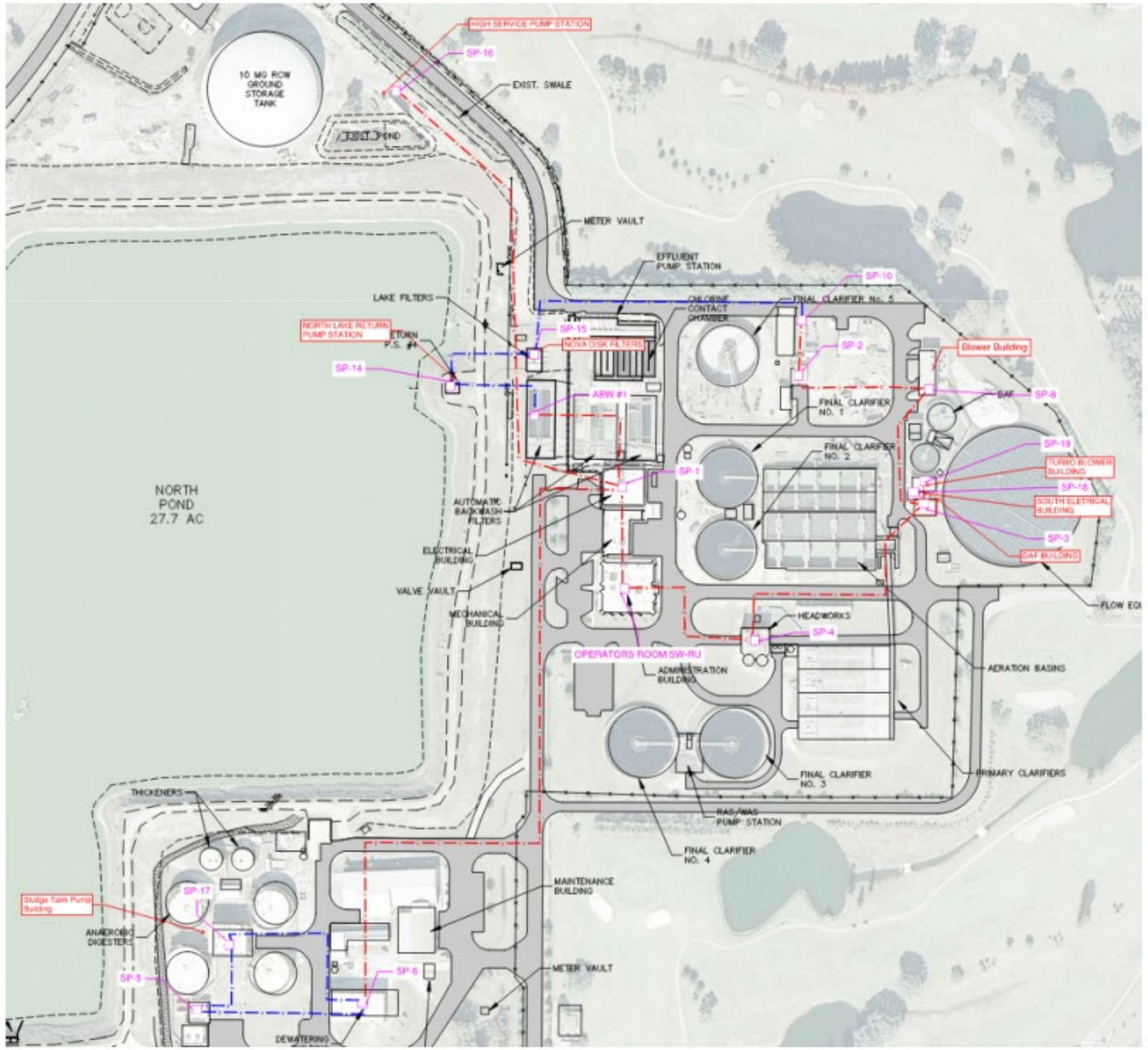
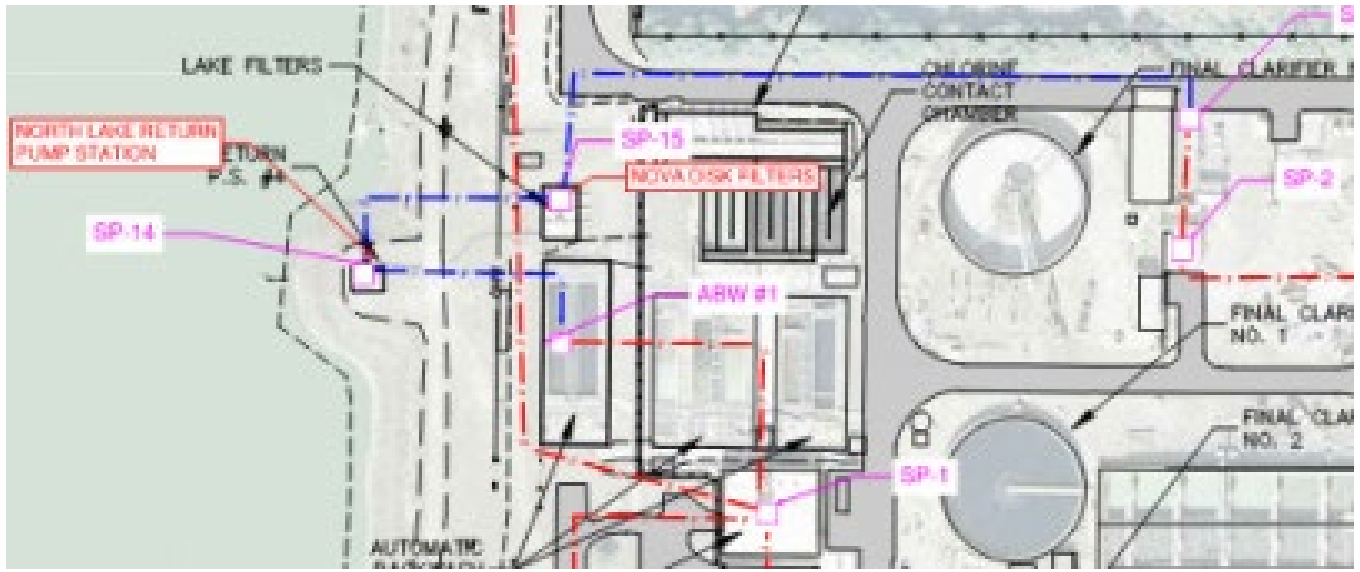
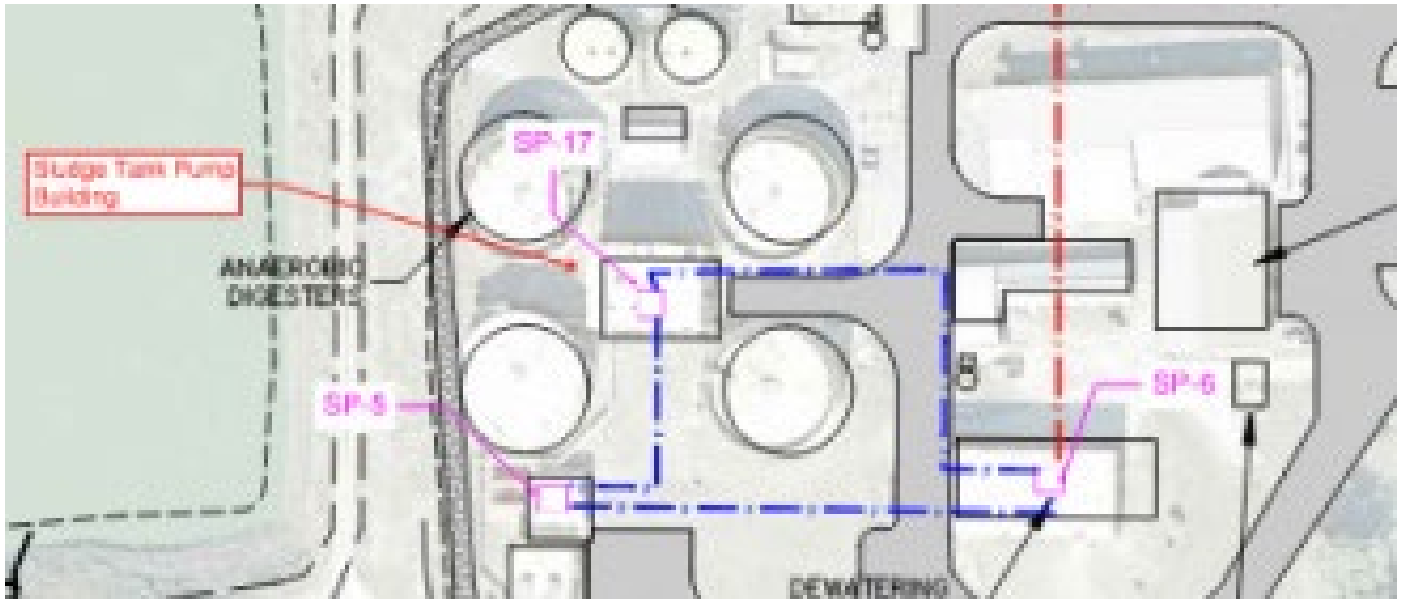


Figure 5.4 SW WRF Route Proposes Two Fiber Rings Around the Entire Plant Site

// SW WRF Upgrades





// SW WRF Upgrades

Table 8.3 SW WRF SCADA System Project Cost Estimate

Activities	Cost
Design	
Specifications	25,000
Drawings	220,000
Meetings	15,000
Project Management	25,000
Construction Services	90,000
Design Total	**375,000**
Construction	
PLC Upgrades	800,000
Drawings	50,000
Testing	50,000
HMI Application Updates	250,000
Server Hardware and software	80,000
Control Room Upgrades	100,000
Fiber Optic Cable	110,000
Pull Boxes	100,000
Ethernet Switches	40,000
Fiber Patch Panels	20,000
Submittals	25,000
O&M	25,000
Construction Total	**1,650,000**
Subtotal	2,025,000
25% Contingency	506,250
Total	**2,531,250**

N WRF Upgrades

// N WRF Upgrades

Manatee County Government
Capital Improvement Program

FY 2020 – 2024
Category: Wastewater **Subcategory:** Wastewater Treatment
Project Title: North WRF SCADA Upgrades
Department: Public Works Projects
Project Manager:
Infra. Sales Tax:
Project # **Status:** Requested

Comprehensive Plan Information

CIE Project: **N**
LOS/Concurrency: **N**
Plan Reference:
Project Need:

Project Location

North WRF

Description and Scope

This project includes the replacement of existing Legacy PLC systems and associated network hardware, OITs, and the addition of fiber optic cabling for modernization and standardization of equipment and added system resiliency at the N WRF.

Rationale

Upgrade outdated equipment and standardize PLC systems at the N WRF. Add resiliency to the Fiber Optic Network. Standardize PLC programming platform and applications.

Schedule of Activities

Activity	Start	End	Amount
Design:	1/22	12/22	406,250
Land:			
Construction:	1/22	7/24	1,375,000
Equipment:			
Project Mgt:			
Total Budgetary Cost Estimate:			1,781,250

Operating Budget Impacts

Category	Fiscal Year	Amount
Personal:		
Non-Personal:		
Operating Capital:		
Operating Total:		

Programmed Funding

Expended to Date	Appropriated to Date	FY2020	FY2021	FY2022	FY2023	FY2024	Future
0	0	0	332,500	835,000	613,750	0	0

Project Map

Funding Strategy

Utility Rates

Means of Financing

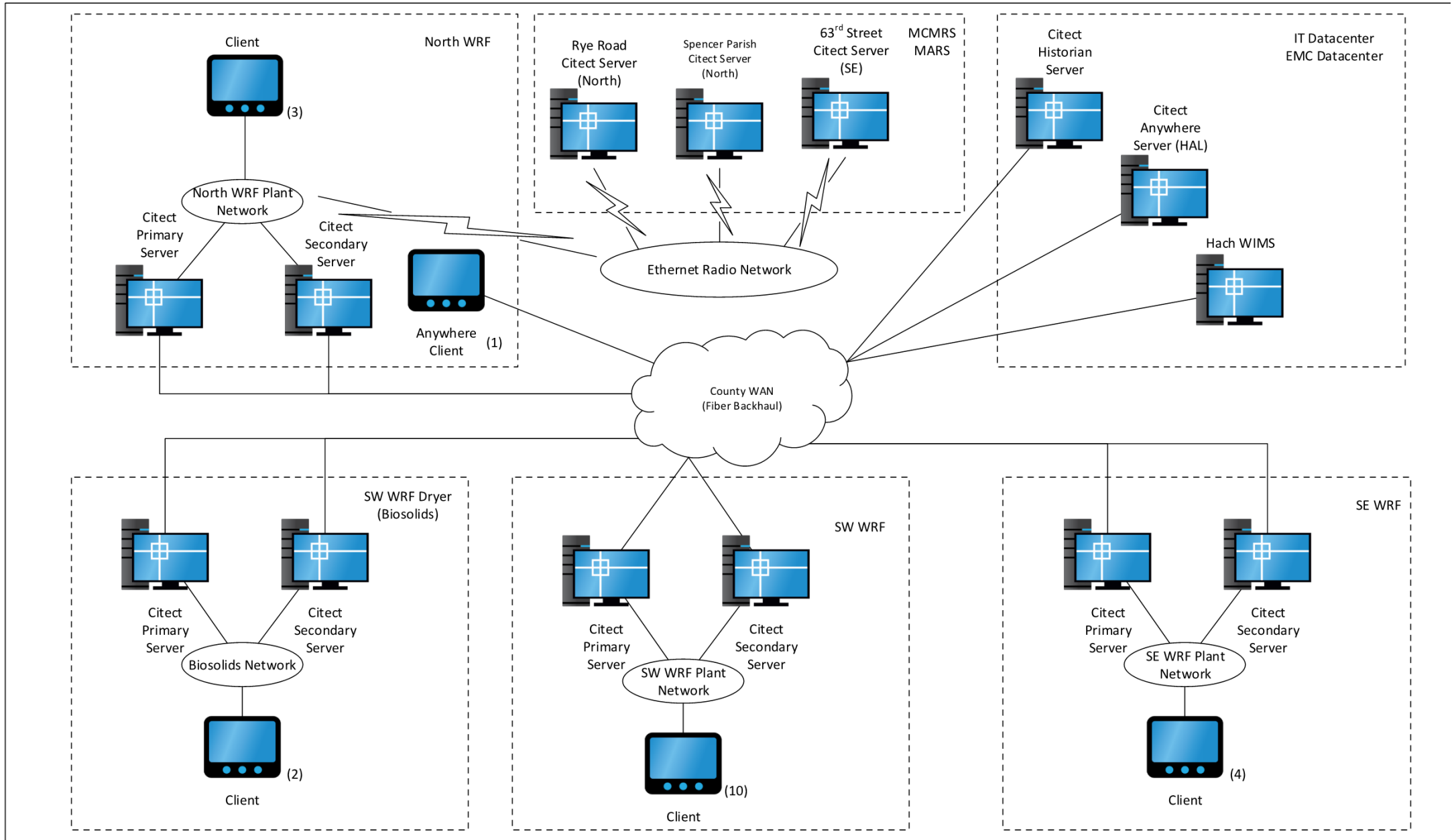
Funding Source	Amount
Rates	1,781,250
Total Funding:	1,781,250

// N WRF Upgrades

- Replace Existing Legacy PLCs – Distributed using CompactLogix
- Replace Legacy OITs – Thin Clients
- Upgrade network components – Stratix Switches
- New CitectSCADA (PlantSCADA) Application – Local redundancy centralized clustering
- Local WIN-911
- Master Historian with local buffering
- Deployment of local and centralized thin clients
- Upgraded Control Room
- Move server equipment to dedicated locked room

- Value Options
  - Use central Citect server for redundancy – single local server
  - Install WIN-911 at central server only

// N WRF Upgrades



// N WRF Upgrades

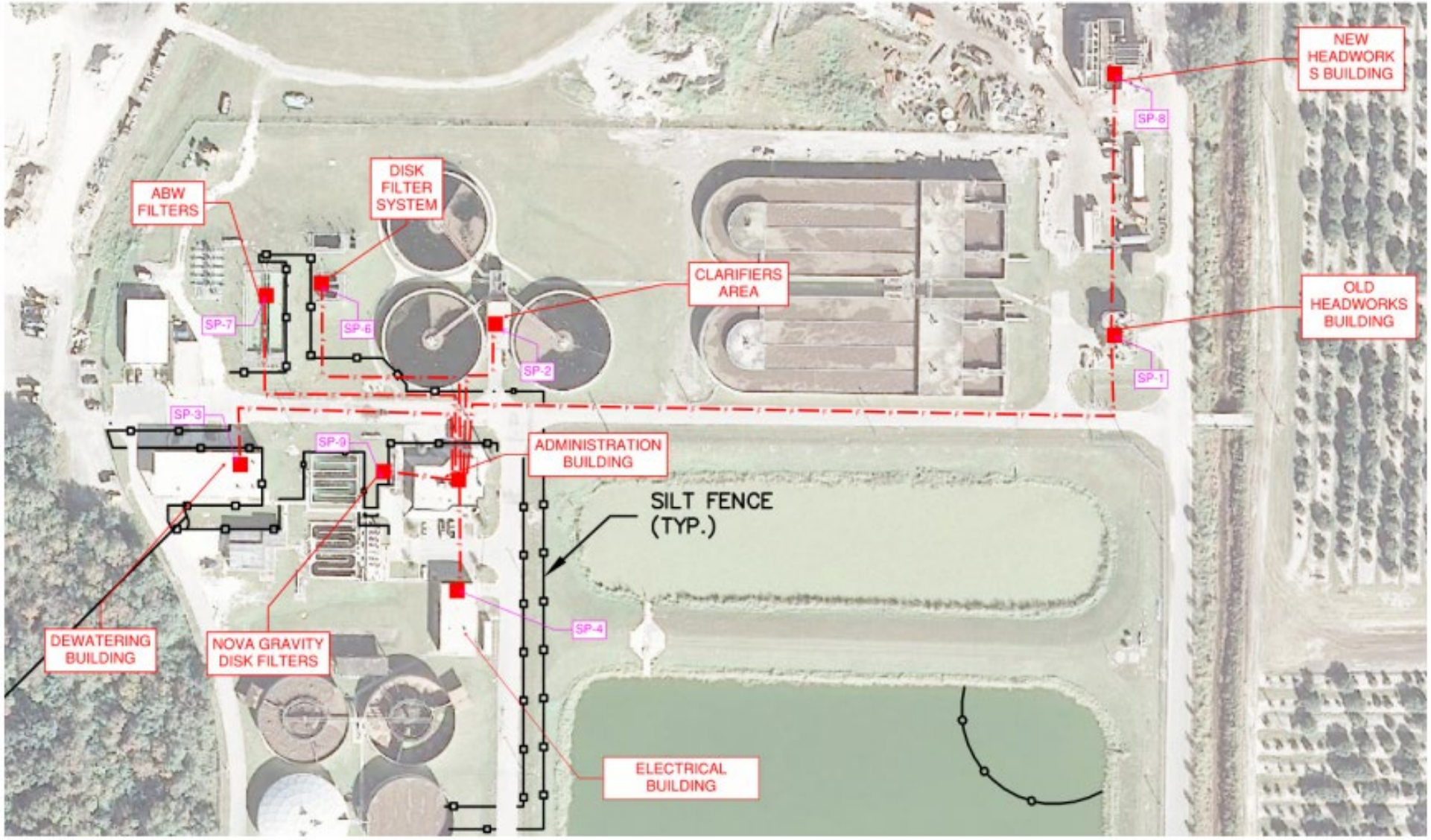


Figure 5.1 N WRF Existing Route is a Star Topology Originating From the Administration Building

// N WRF Upgrades

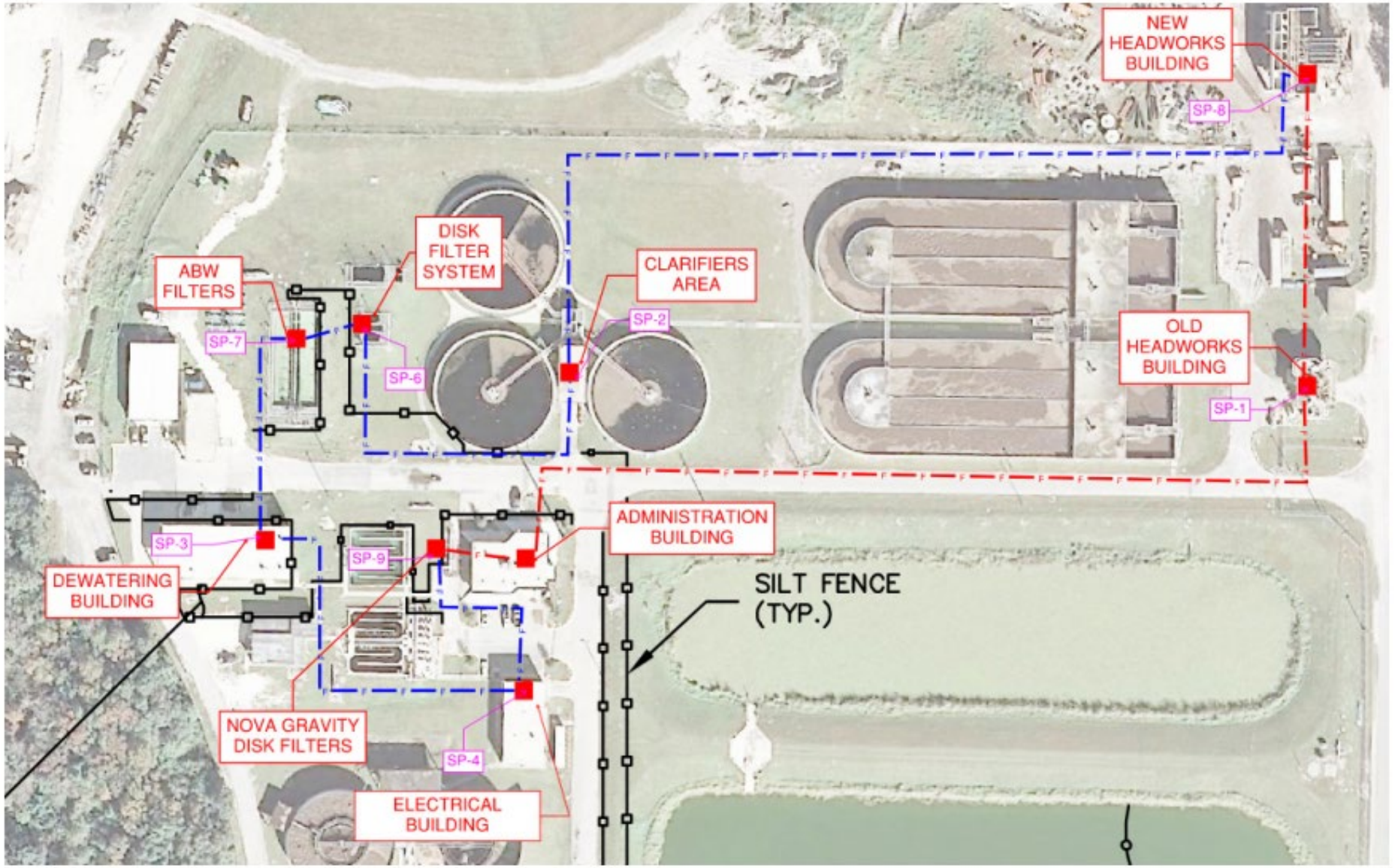


Figure 5.2 N WRF Route Proposes a Redundant Fiber Ring Around the Entire Plant Site.

// N WRF Upgrades

Table 8.4 N WRF SCADA System Project Cost Estimate

Activities	Cost
Design	
Specifications	20,000
Drawings	185,000
Meetings	15,000
Project Management	25,000
Construction Services	80,000
Design Total	**325,000**
Construction	
PLC Upgrades	350,000
Drawings	50,000
Testing	50,000
HMI Application Updates	200,000
Server Hardware and software	80,000
Control Room Upgrades	100,000
Fiber Optic Cable	110,000
Pull Boxes	70,000
Ethernet Switches	25,000
Fiber Patch Panels	15,000
Submittals	25,000
O&M	25,000
Construction Total	**1,100,000**
Subtotal	1,425,000
25% Contingency	356,250
Total	**1,781,250**

SCADA Governance

// SCADA Governance

Manatee County Government
Capital Improvement Program

FY 2020 – 2024

Category: Wastewater **Subcategory:** Wastewater Treatment
Project Title: SCADA Governance
Department: Public Works Projects
Project Manager:
Infra. Sales Tax:
Project # **Status:** Requested

Comprehensive Plan Information

CIE Project: **N** Plan Reference:
LOS/Concurrency: **N** Project Need:

Project Location

Countywide

Description and Scope

Development and maintenance of system documentation such as policies, procedures, specifications, and standards. SCADA asset management, change management, and document control. Development of disaster recovery plans and policies related to SCADA infrastructure.

Rationale

The purpose of the SCADA Governance plan is to ensure consistent management and maintenance of system assets and that employees follow the proper workflows for optimal business performance and to meet strategic objectives.

Schedule of Activities

Activity	Start	End	Amount
Design:	10/20	8/21	500,000
Land:			
Construction:			
Equipment:			
Project Mgt:			
Total Budgetary Cost Estimate:			500,000

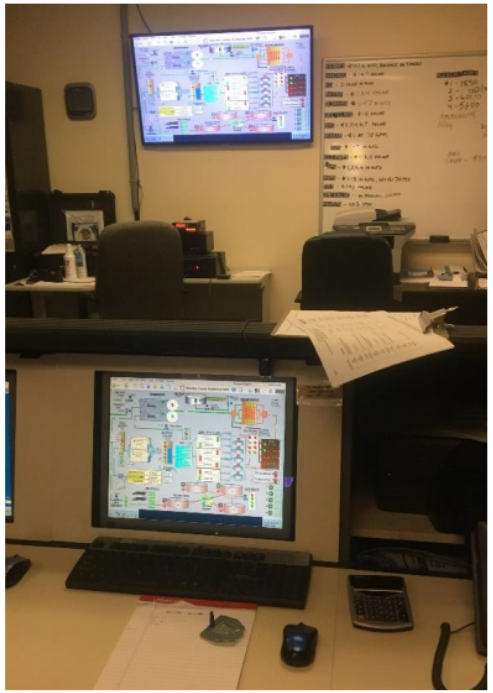
Operating Budget Impacts

Category	Fiscal Year	Amount
Personal:		
Non-Personal:		
Operating Capital:		
Operating Total:		

Programmed Funding

Expended to Date	Appropriated to Date	FY2020	FY2021	FY2022	FY2023	FY2024	Future
0	0	500,000	0	0	0	0	0

Project Map



Funding Strategy

Utility Rates

Means of Financing

Funding Source	Amount
Rates	500,000
Total Funding:	500,000

// SCADA Governance

This project includes the creation of a SCADA Governance plan. The purpose of the SCADA Governance plan is to ensure consistent management and maintenance of system assets and that employees follow the proper workflows for optimal business performance and to meet strategic objectives. The critical starting point for this task is for the utility to first create a SCADA Governance team of stakeholders to ensure all system users and managers have a stake in policy development and review of the group's activities. The SCADA Governance plan also outlines policies in the following key areas as they relate to the SCADA group and its management:

1. SCADA Group Organization.
2. Policy and Procedure Management.
3. Asset Management Policies.
4. Document Control Policies.
5. Change Management Procedures.
6. Work Order Policies.
7. Project Definition and Execution.

// SCADA Governance

These areas are key in establishing principles to meet the key objectives of:

- Availability - Staff and procedures in place to ensure systems are operational.
- Accountability - Justification of actions and decisions.
- Compliance - Changes and modifications are reviewed, tested, and documented.
- Standardization - All work and systems executed similarly.

The SCADA Governance Plan also includes the following sub policies which are part of other projects:

- Operational Policies.
- Disaster Recovery Policies.
- Emergency Response Policies.
- Cybersecurity Plan.
- Physical Security Plan.
- Standards and Specifications.

// Physical and Cyber Security Plan

Physical Security planning should include the following aspects:

- Risk and Vulnerability assessments in accordance with American Water Works Association (AWWA) G430 and J100 standards
- Mitigation planning
- Guidelines for perimeter security including the following
  - Fencing and gate requirements
  - Intrusion and entry detection and monitoring
  - Mitigation of entry points and entry risks
- Access credential management plan
- Facility exterior and interior access control requirements
- Definition of areas requiring camera and intrusion detection
- Lighting requirements
- IP Video management plan
- Equipment standards
- Training
- Response Planning

Part of security planning and modifications should include increased security at facilities to ensure the following:

- Process facilities cannot be accessed by general traffic at any time day or night without authenticated access.
- Buildings within facilities remain locked.
- Control rooms and critical control equipment can only be accessed by authorized staff.
- Camera and access control systems not associated with process control are located on non-process networks.
- SLAs or similar agreements are put in place with IT for standard electronic security component deployment.

Cybersecurity planning should include the following aspects:

- Risk and Vulnerability assessments in accordance with the AWWA cybersecurity use case tool and Industrial Control System-Cyber Emergency Readiness Team (ICS-CERT) Community Services Employment Training (CSET) utility
- Mitigation planning

- Roles and Responsibilities
- Audit Policies and Requirements
- Architecture and Security Configuration Policies, Requirements, and guidelines
- Data Security Policy and Procedures
- Device Security Policy and Procedures
- Access Control Policies and Procedures
- Intrusion Detection Design Considerations
- Personnel Security
- Incident Response
- Design Considerations - Cybersecurity Requirements
- Training
- Security Governance
- Asset management
- Recovery Plans

// Cyber Security

Table 7.3 Current Cybersecurity Controls Implementation Summary

Control Priorities	Fully Implemented	Partially Implemented	Not Implemented	Not Applicable
1	1	8	20	1
2	0	3	26	0
3	0	6	14	1
4	0	3	5	0

Table 7.2 Recommended Cybersecurity Controls Tracking

Category	Control	Priority	Referenced Standards	Level of Implementation	Project	Notes
AT-1	A security awareness and response program established to ensure staff is aware of security policies and incident response/notification procedures.	Priority 3 Controls	DHS CAT: 2.11 Security Awareness and Training ISA 62443-2-1: A.3.2.4 Staff Training and Security Awareness	Not Implemented	Physical and Cyber Security Plan	
AT-2	Security training including Incident response training for employees, contractors and third party users based on job roles.	Priority 3 Controls	AWWA G430-14: 4.3 Defined Security Roles and Employee Expectations DHS CAT: 2.11.3 Security Training	Not Implemented	Physical and Cyber Security Plan	
AT-3	A forensic program established to ensure that evidence is collected/handled in accordance with pertinent laws in case of an incident requiring civil or criminal action.	Priority 1 Controls	DHS CAT: 2.7.7 Investigation and Analysis	Not Implemented	Physical and Cyber Security Plan	Further enhanced through addition of logfile server in Core SCADA project.

// SCADA Governance

Table 8.5 SCADA Governance Project Cost Estimate

Activities	Cost Estimate
SCADA Governance Plan	200,000
GIS Plan	50,000
CMMS Plan	50,000
Cybersecurity Plan	100,000
Physical Security Plan	50,000
Coordination with other Division policies	25,000
Coordination with County policies	25,000
Total	**500,000**

This project addresses the following main items that were developed during staff workshops and recommendations of the SCADA Master Plan:

- Creation of a Governance Committee.
- Development and maintenance of system documentation such as policies, procedures, specifications, and standards.
- SCADA system management and maintenance.
- SCADA asset management, change management, and document control.
- Adherence to cyber and physical security best practices.
- Development of disaster recovery plans and policies related to SCADA infrastructure.

Add-on Projects

// Hach WIMS

8.7.1 Hach WIMs Development

As systems are expanded, more data is available, and more data is concentrated in the central historian, the existing Hach WIMs system should also be expanded to use this data for additional key performance indicators (KPIs), operator and management dashboards, and enhanced system maintenance capabilities as discussed in Chapter 6 of this report. Expansion of the Hach WIMs system could be included in facility projects to expand monitoring of that facility, however, finding integrators with good Hach WIMs experience can be difficult. It is more common for internal staff to continue development and build their own customized reports and dashboards. It is recommended to continue in this fashion as the County has already begun. In addition to the current Hach WIMs administrator and developer, it is recommended to train a member(s) of the operations staff in development within the Hach WIMs system as well. This provides for a backup person to assist with the system as well as operator insight in dashboard and report management.

The use of Hach Claros should also be explored to assist with instrument maintenance and as a mobile interface for data access. This system can be further integrated with ThinManager to provide more secure and centralized access.

// Power Monitoring

8.7.2 Power Monitoring

As a part of facility PLC upgrades, additional power monitoring should be added. Existing power monitoring equipment and motor control equipment that has Ethernet capabilities should be upgraded and connected as possible or replaced with new components to facilitate Ethernet integration of power monitoring data. By standardizing new power monitoring equipment on Allen-Bradley components, pre-built add-on instructions in the Allen-Bradley PLCs can be used to monitor these devices with minimal programming required. Existing system CTs and PTs can be utilized with upgraded power monitoring equipment to make transitions simpler and more cost effective. Facility power management screens should be developed to not only show power usage but to aid operations staff in making decisions to reduce power usage.

// CMMS Integration

8.7.3 CMMS Integrations

As a part of CitectSCADA upgrades, the equipment model within CitectSCADA should be utilized to organize data based on equipment. This organization will facilitate connectivity to CMMS systems as noted in previous chapters. The County can work with their CMMS provider and CitectSCADA vendor in order to facilitate this integration and determine if middleware such as Avantis Condition Manager are required to facilitate connectivity based on the County's intended use of this integration. This first step for this integration is for the County to clearly determine their desired outcomes of this integration so that the necessary components can be developed. This work can be included in SCADA governance development to create a cohesive asset management program for SCADA assets and work order management.

Summary

// Summary

Table 8.6 SCADA Master Plan Project Summary Table

Project Name	Estimated Start	Estimated Complete	Actual Start	Actual Complete	Budget
Core SCADA System	10/2020	7/2022			$1,431,250
SE WRF System SCADA	5/2021	5/2024			$2,462,500
SW WRF System SCADA	8/2021	12/2024			$2,531,250
N WRF System SCADA	1/2022	7/2024			$1,781,250
SCADA Governance	10/2020	8/2021			$500,000
Total	10/2020	FY24/25			$8,706,250