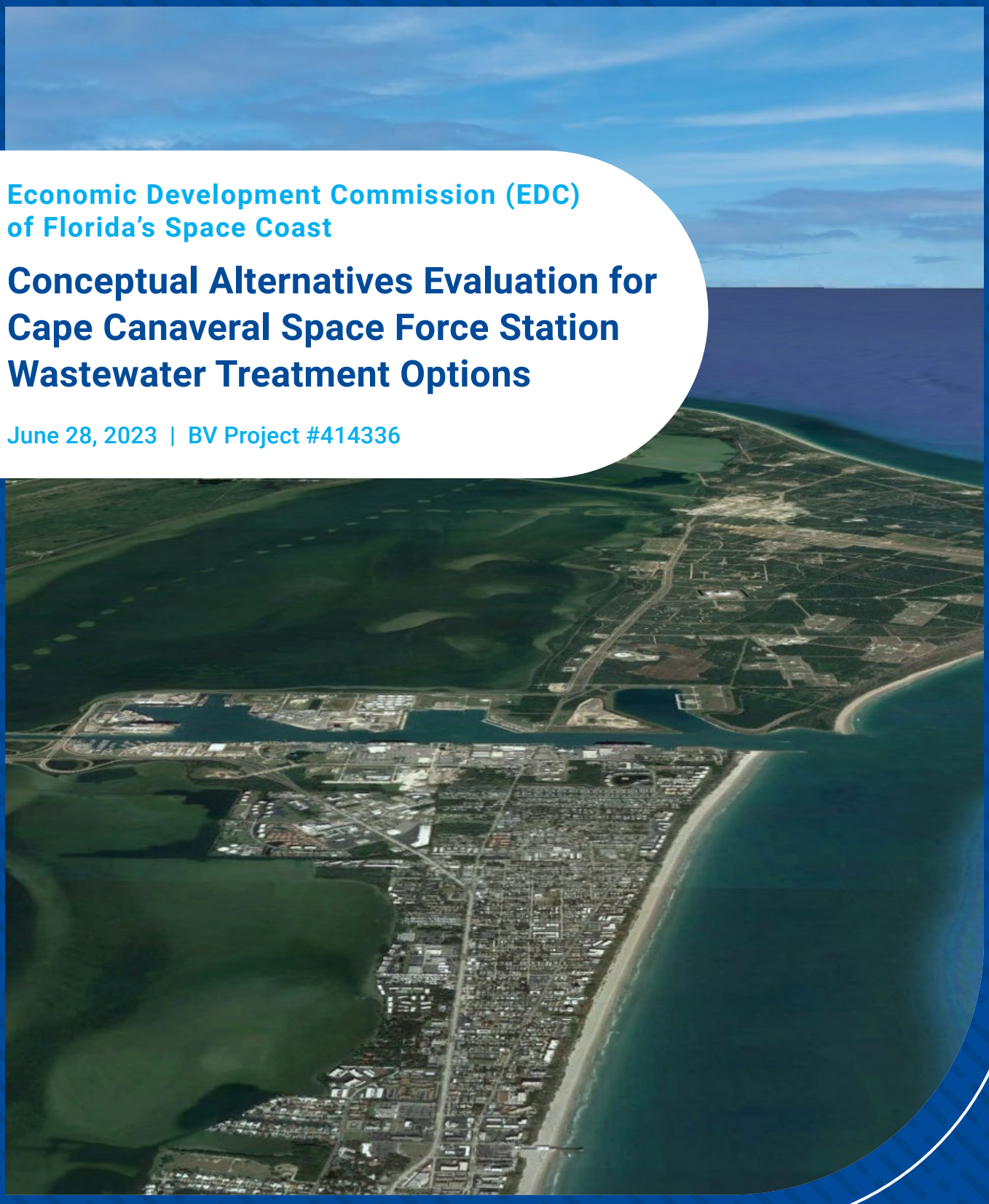
BLACK & VEATCH

IN PARTNERSHIP WITH:

TETRA TECH

G.E.A.R.

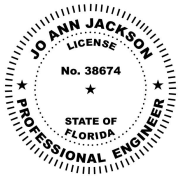


Economic Development Commission (EDC) of Florida's Space Coast

Conceptual Alternatives Evaluation for Cape Canaveral Space Force Station Wastewater Treatment Options

June 28, 2023 | BV Project #414336

Professional Engineer:

	06/29/2023
Signature	**Date**
Jo Ann Jackson	
Printed Name	
FL 38674	
License No.	

Approved by:

	06/29/2023
Signature	**Date**
Rasesh R. Shah	
Printed Name	

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Acronyms and Abbreviations

AADF	Annual Average Daily Flow
AFCP	Air Force Community Partnership
AFS	Air Force Station
AWT	Advanced Wastewater Treatment
BCUSD	Brevard County Utility Services Department
BMAP	Basin Management Action Plan
BNR	Biological Nutrient Removal
BRL	Banana River Lagoon
BRIC	Building Resilient Infrastructure and Communities
$CBOD_5$	Carbonaceous Biochemical Oxygen Demand
CCMP	Comprehensive Conservation Management Plant
CIE	Capital Improvements Element
CIRL	Central Indian River Lagoon
DAF	Department of the Air Force
DWRA	Division of Water Restoration Assistance
dt/yr	Dry Tons per Year
EDA	United States Economic Development Administration
EDC	Economic Development Commission of Florida's Space Coast
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FPL	Florida Power & Light
F.S.	Florida Statutes
HMGP	Hazard Mitigation Grant Program
IRL	Indian River Lagoon
IRLNEP	Indian River Lagoon National Estuary Program
KSC	Kennedy Space Center
M	Million
MG	Million Gallon
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
NEP	National Estuary Program

NIRL	North Indian River Lagoon
NMP	Nutrient Management Plans
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
O&M	Operations and Maintenance
RAS/WAS	Return Activated Sludge/Waste Activated Sludge
R&R	Renewal and Replacement
RIB	Rapid Infiltration Basin
SAF/IE	Secretary of the Air Force for Installations Environment and Energy
SFS	Space Force Station
SJRWMD	St. Johns River Water Management District
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
TM	Technical Memorandum
TMDL	Total Maximum Daily Loads
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VAR	Vector Attraction Reduction
WMD	Water Management District
WIFIA	Water Infrastructure Finance and Innovation Act
WRDA	Water Resources Development Act
WRF	Water Reclamation Facility
WWGP	Wastewater Grant Program
WWTF	Wastewater Treatment Facility

Executive Summary

Background

The overarching vision for this Economic Development Commission (EDC) of Florida's Space Coast planning initiative was developed from discussions among community leaders about sustaining growth and prosperity of coastal communities along the Space Coast. A central tenet of that discussion was identifying opportunities to deliver infrastructure improvements that would meet multiple stakeholder needs as the region positions itself for future growth and strengthens its coastal resilience to storms and sea level rise. There are few individual project opportunities that can be viewed as both historic and transformational. A new 21st century wastewater treatment facility to serve the rapid growth of activities and public- and private-sector workforce at Kennedy Space Center (KSC) and Cape Canaveral Space Force Station (SFS) is one of those rare opportunities. The Department of the Air Force (DAF) has a long history of partnering with communities their installations call home to tackle shared challenges. Installation leaders have worked with state and local governments, as well as private entities, to address issues that impact their mission, operations and quality of life.

In 2013, the Assistant Secretary of the Air Force for Installations, Environment, and Energy (SAF/IE) created a dedicated program, the Air Force Community Partnership (AFCP) program, to promote the idea of partnerships to support installations and communities as they pursued collaborations and develop policy that furthers these objectives. AFCP provides the framework through which installations and community leaders can leverage unique capabilities to enhance mission performance, reduce costs, and improve quality of life. In partnership with DAF, this project will utilize AFCP's structured process for:

- Identifying requirements.
- Liaising with collaborators.
- Formulating a course of action.
- Maintaining partner relationships.

In addition to the benefits to the National Aeronautics and Space Administration (NASA), Department of Defense (DOD), Space Force, and commercial space industry, improving wastewater treatment facilities and waste management practices can serve the growing population of north Brevard County and protect the water quality and living resources of the Indian River Lagoon (IRL). In 2016, the economic value of the IRL was estimated at $7.6 billion annually.

To advance the vision, the EDC of Florida's Space Coast received a Florida Defense Support Task Force Grant to conduct a conceptual alternatives evaluation of wastewater treatment options. The Space Coast is located within Brevard County, Florida, and is defined as the region around KSC and Cape Canaveral SFS. This is a first planning step in a phased strategy to initiate regional wastewater planning to address aging infrastructure and rapid growth of the Cape Canaveral SFS, NASA's KSC, and adjacent communities (Titusville, Mims, Port St. John) in the north Brevard County area and to protect the IRL from nutrient impairment.

Black & Veatch, supported by Tetra Tech and GEAR, was tasked to conduct this conceptual evaluation to address current and future needs for upgrading and expanding wastewater treatment to meet a minimum of advanced waste treatment (AWT) standards to reduce nutrient concentrations that could

impact the lagoon; accommodate needs at the Cape Canaveral SFS, KSC, and the growing local community that supports the economic development of the Space Coast; and increase infrastructure resilience and provide long-term benefit to the IRL. AWT standards require effluent concentrations of 5 milligrams per liter (mg/L) total suspended solids (TSS), 5 mg/L biochemical oxygen demand ($CBOD_5$), 3 mg/L total nitrogen (TN), and 1 mg/L total phosphorus (TP). This evaluation focuses on six wastewater facilities in the North IRL and Banana River Lagoon sub-watersheds that either do not treat to AWT standards or recently started to treat to AWT standards: Cape Canaveral Air Force Station (AFS) Regional Wastewater Treatment Facility; Brevard County Utilities Services Department's (BCUSD's) North Regional, Port St. John, and Sykes Creek Regional Facilities; and City of Titusville's Osprey and Blue Heron facilities. Through investigations for this evaluation, it was found that the City of Titusville's Blue Heron Wastewater Treatment Plant has been upgraded to meet AWT standards. This facility remained in the evaluation to determine expansion and biosolids upgrade needs and to consider consolidation of wastewater flows to a single regional wastewater treatment facility.

Indian River Lagoon

The IRL is a unique and diverse estuary that is one of 28 designated estuaries of National Significance in the National Estuary Program (NEP). However, the balance of this delicate ecosystem has been disturbed by many factors, including decades of development in the area that has led to elevated levels of nutrients, sediments, and organic material entering the IRL. There are a variety of sources for these pollutants, including treated wastewater effluent, septic systems, stormwater runoff, and fertilizer and pesticide applications. These pollutants impair the IRL's water quality and feed algal blooms, which negatively affect the seagrass community that provides habitat for much of the lagoon's marine life.

There have been legislative and regulatory initiatives over the last few decades to address the nutrient loadings, including the contribution from wastewater treatment facilities. In 2021, The Florida Department of Environmental Protection (FDEP) updated their Basin Management Action Plan (BMAP) for the IRL such that all wastewater treatment facilities with flows greater than 0.5 million gallons per day (mgd) must meet AWT standards if they discharge directly to the IRL or to rapid rate land application systems such as rapid infiltration basins (RIBs) present within the IRL watershed. Other systems, including reclaimed water, must achieve effluent concentrations of 10 mg/L TN and 6 mg/L TP, slightly higher than AWT standards. There is concern with these nutrients in reclaimed water reaching the IRL and statewide interest in requiring all facilities to meet AWT standards.

Wastewater Flow Projections

The Space Coast area of Florida is seeing rapid growth, spurred by the economic development of the space industry and related businesses. These new work opportunities are bringing more people to live and work in this region of Brevard County. Existing infrastructure, including wastewater treatment, will require improvements and expansion to accommodate this growth and prevent future nutrient impacts to the IRL. Current and projected wastewater flows for each of the six wastewater treatment facilities studied and the total combined flows for the facilities are shown in Table ES-1. Current and projected flow rates were provided by Cape Canaveral SFS, City of Titusville, and BCUSD. Total combined flows are projected to double over the next 20 years with the BCUSD Port St. John WWTF flows increasing over 7-fold because of the rapid residential and commercial growth anticipated in that portion of the county to support growth at NASA's KSC and the Cape Canaveral SFS.

Table ES-1 Projected Regional Wastewater Flows

Year	Projected Wastewater Flows mgd AADF						
	BCUSD North Regional WRF	BCUSD Port St. John WWTF	BCUSD Sykes Creek Regional WWTF	Cape Canaveral AFS Regional WWTF	Titusville Osprey WRF	Titusville Blue Heron WRF	TOTAL Regional Flow
2023	0.33	0.47	3.43	0.47	1.98	2.51	9.18*
2043	1.80	3.50	8.60	1.15	1.66	3.63	20.34**

* Current wastewater flow.

** Projected wastewater flow.

Detailed projections are provided in the main body of the report.

Conceptual Alternatives

Three conceptual alternatives were developed for this evaluation. The alternatives were intended to address three broad considerations to bracket the costs and non-cost factors as shown in Table ES-2.

Table ES-2 Evaluated Wastewater Treatment Facilities Alternatives

Alternative No.	Alternative Name	Description	Total No. of WRFs
1	Upgrade and Expand the Treatment Facilities in Place (Baseline Alternative)	No WWTF consolidation. Maintain six separate wastewater treatment facilities (WWTFs). Identify improvements and additional capacity needs to achieve AWT standards.	6
2	Construct a New Regional Facility on Merritt Island – BCUSD Port St. John and Cape Canaveral AFS Regional to BCUSD Sykes Creek Regional	Partial WWTF consolidation on Merritt Island. Consolidate by directing all Cape Canaveral AFS Regional WWTF and BCUSD Port St. John WWTF flows to BCUSD Sykes Creek WWTF. Maintain and upgrade the two City of Titusville and North Regional facilities to achieve additional capacity and meet AWT standards.	4
3	Construct a New Regional Facility on the Mainland	Complete WWTF consolidation. Divert all flows from all six facilities to a new WWTF on the mainland.	1

Alternative 1, shown on Figure ES-1, includes expanding the six facilities individually to meet future flow requirements and upgrading each to meet AWT standards. The facilities would be expanded and upgraded at their existing location with the exception of the BCUSD Port St. John WWTF, which is located in an easement owned by Florida Power and Light (FPL) and thus would be relocated to a new site nearby. This alternative does not fully address the coastal vulnerability of the Cape Canaveral AFS Regional WWTF or BCUSD Sykes Creek Regional WWTF but provides a baseline for comparing the other alternatives.

Alternative 2, shown on Figure ES-2, was initially based on delivering flow from five facilities to a regional facility at the existing BCUSD Sykes Creek Regional WWTF on Merritt Island. After reviewing permits and flow projections, it was discovered that the City of Titusville WWTFs are permitted to meet or nearly meet AWT standards and have sufficient capacity to treat flows through the end of the planning horizon (2043). To take advantage of this existing infrastructure, Alternative 2 was modified to only include the Cape Canaveral AFS WWTF and BCUSD Port St. John WWTF flows being delivered to an upgraded and expanded BCUSD Sykes Creek Regional WWTF serving as the new regional facility on Merritt Island. Because of distance, the BCUSD North Regional WWTF is proposed to remain in place in this alternative, but it could be considered to be consolidated with the City of Titusville facilities in future evaluations.

Alternative 3, shown on Figure ES-3, is based on delivering the flow from all six facilities to a new regional facility on the mainland in the vicinity of the BCUSD Port St. John WWTF. This alternative also provides a baseline for comparison, recognizing that a permutation of this alternative, that allows some of the existing mainland facilities to remain in place or a phased development approach may be a more realistic option for future evaluation.

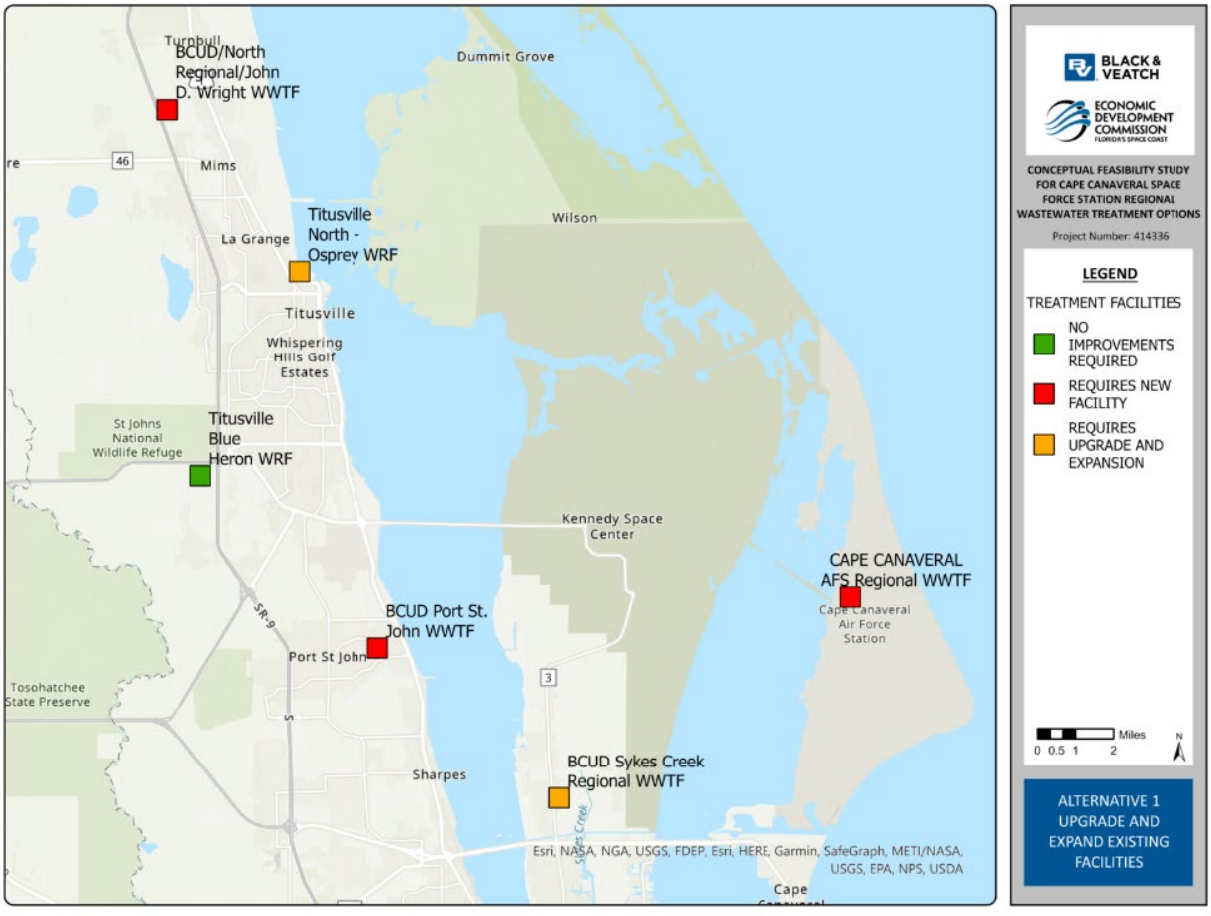


Figure ES-1 Alternative 1 – Upgrade and Expand Existing Facilities

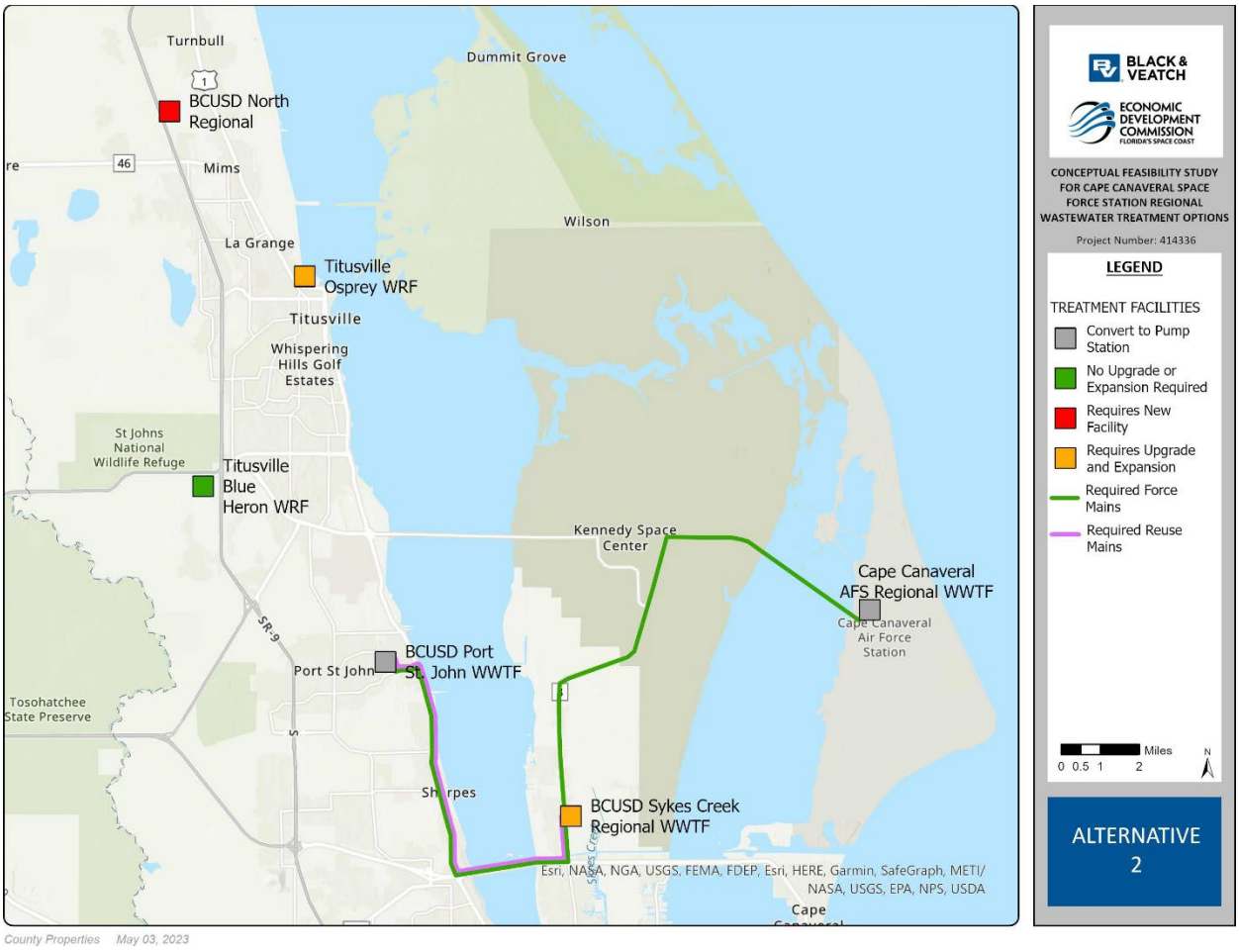


Figure ES-2 **Alternative 2 Layout – Construct a New Regional Facility on Merritt Island for Partial Consolidation**

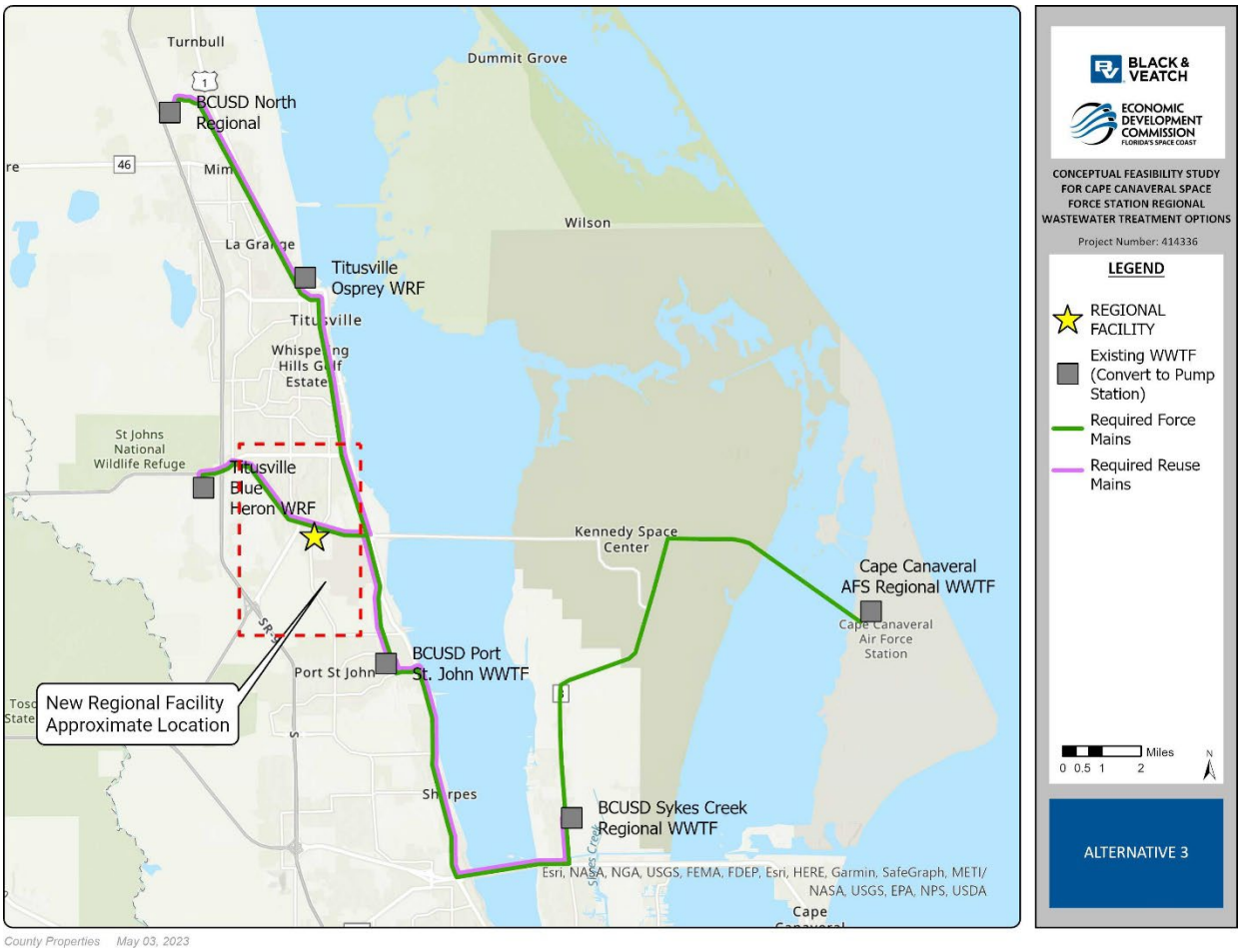


Figure ES-3 Alternative 3 – Regional Facility on Mainland

Some of the key goals of the evaluation are to increase the resiliency and reduce vulnerability of the WWTFs in the service area and protect IRL from nutrients due to groundwater seepage and runoff from reclaimed water use by using state-of-the-industry advanced treatment technologies. To reduce the nutrient loading to the IRL, it was assumed that all the WWTFs in the service area will achieve AWT. It is assumed that the facilities that cannot achieve AWT standards with their current treatment process will be upgraded. The 5-Stage Bardenpho process was used for cost estimates for this evaluation, but other technologies can be evaluated further in future studies to identify the best suited technology for the service area and future reclaimed water use.

Existing effluent/reclaimed water management at the six facilities includes public access reuse, constructed wetlands with discharge to the St. Johns River, RIBs, adsorption fields, and deep injection wells. None of the six facilities currently discharge directly to the IRL, but there has been concern expressed by FDEP and other agencies that, with exception of the deep injection wells, these systems could contribute nutrients to the IRL unless upgraded to AWT. The public access reuse systems provide a water conservation benefit. If taken out of service, they would require an alternative water supply, and could place an additional burden on the aquifer and the public water supply systems. For this study, it is assumed that these existing public access reuse systems will remain in place and expanded as needed, but with AWT treatment to better protect the IRL. The Titusville Blue Heron constructed wetlands provide an ecological benefit and wildlife habitat and are also assumed to remain in service. Deep

injection wells, which involve injecting treated effluent into a zone of the aquifer that is not viable as an underground source of drinking water and is confined from upper drinking water aquifers, are a viable alternative that do not impact IRL water quality and could remain in place. Deep injection wells can be also considered for future wet weather backup to reuse systems and for the purposes of alternative comparison. In future studies, other beneficial options that are also protective of the IRL, such as potable reuse can be considered. The consolidated regional WWTF site selected should have available space for future treatment steps.

Conceptual costs were estimated for each alternative. For comparison purposes net present value (NPV)/life-cycle costs were developed so that all costs could be considered on an equivalent basis. As summarized in Table ES-3, the NPV/life-cycle costs of the alternatives range from $1,129 million (M) to $1,192 M. From NPV/life-cycle cost basis, all three conceptual alternatives are considered equivalent with only a 5.5 percent difference between the lowest and highest NPV cost.

Table ES-3 NPV Life-Cycle Costs by Type and Alternative ($M)

Alternative No.	Alternative 1	Alternative 2	Alternative 3
Total No. of WWTFs/WRFs	6	4	1
Operations and Maintenance (O&M)	$270	$257	$200
Land Acquisition	$2	$3	$5
Capital Transmission System and Effluent/Reclaimed Water Handling	$39	$97	$265
Capital WWTFs/WRFs	$497	$461	$499
Renewal and Replacement (R&R)	$338	$312	$222
Total	**$1,146**	**$1,129**	**$1,192**

1. All costs expressed in April 2023 $M.
2. Costs are -50 percent to +50 percent.

Evaluation of Alternatives

When evaluating alternatives, it is important to consider important factors in addition to cost. For this evaluation, these include the following criteria:

- System reliability and resilience.
- Maintenance reliability.
- Ease of operations.
- Climate and environmental vulnerability.
- Sustainability.
- Public perception.

While cost is a critical factor, these other criteria also play a role in determining the most desirable alternative for more detailed development and evaluation in the next phase. These criteria are not all equal in importance to the EDC or the region, and typically weighting factors are used to allow for ranking the criteria from most to least importance. These criteria and weightings can be subjective and depend on local and project-specific information. Criteria weights used for this evaluation are summarized in Table ES-4.

Table ES-4 Evaluation Criteria Weights

Evaluation Criteria	Weight
System Reliability and Resilience	15 percent
Maintenance Reliability	10 percent
Ease of Operations	10 percent
Climate and Environmental Vulnerability	20 percent
Sustainability	15 percent
NPV/Life-Cycle Cost	20 percent
Public Perception	10 percent
Total	**100 percent**

The primary purpose of this evaluation is to identify an alternative that will reduce climate and environmental vulnerability, including the potential for impacts by climate hazards such as flood events, sea level rise, and storm surge while also reducing nutrients for greater protection of the IRL. It can be considered one of the most important criteria, equal to cost; therefore, climate and environmental vulnerability are weighted the same as cost for this evaluation, both at 20 percent. System reliability and resilience and sustainability are also important but weighted slightly less at 15 percent each. Ease of operations and public perception each are ranked at 10 percent. Each alternative was ranked on a scale of 1 to 3 with 3 being the most desirable/highest ranked and 1 representing the least desirable/lowest ranked. Using these criteria and weights, the alternatives were ranked, as shown in the consolidated scoring results in Table ES-5.

Table ES-5 Consolidation Scoring Results

Scoring Criteria	Weight, %	Alternative 1 Maintain/Upgrade Existing WWTFs	Alternative 2 Partial Consolidation	Alternative 3 New Regional Facility
System Reliability and Resilience	15	1.5	2	2.5
Maintenance Reliability	10	1	2	3
Ease of Operations	10	1.5	2	2.5
Climate and Environmental Vulnerability	20	1	1.5	2.5
Sustainability	15	1.5	2	3
NPV/Life-Cycle Cost	20	2	2	2
Public Perception	10	1.5	1.5	2.5
Final Score with Weights		1.5	1.9	2.5

Alternative 3 – Construction of a New Regional Facility on the Mainland – is the highest ranked. This alternative delivers the flow from all six facilities to a new regional facility on the mainland in the vicinity of Port St. John.

Conclusions and Next Steps

This evaluation presented conceptual alternatives that provide a range of protection from climate stress factors. Alternative 1 provides the least protection by keeping all existing facilities remaining in place with some additional hardening and protection from stressors, but with Cape Canaveral AFS WWTF and BCUSD Sykes Creek Regional WWTF remaining in vulnerable locations on the barrier islands. Alternative 2 moves the flows from the most vulnerable facility, the Cape Canaveral AFS Regional WWTF, to a slightly less vulnerable location at the BCUSD Sykes Creek Regional WWTF on Merritt Island, along with flows from the BCUSD Port St. John Facility. Alternative 3 moves all facilities off the barrier islands and consolidates flows from all six facilities included in the study in one regional facility in a much less vulnerable location on the mainland. With NPV/life-cycle costs being nearly equal for each alternative, reducing climate and environmental vulnerability contributed to Alternative 3 being ranked as the preferred option.

The next phase of this study could further develop stakeholders for the selected alternative, including establishing a project sponsor or owner of the regional facility, determining which WWTFs/WRFs will participate in a regional facility, developing project phasing, and applying for grant funding.

A possible phasing plan is presented on Figure ES-4, which can allow for the region to manage the wastewater flows more rapidly from the most vulnerable areas while developing the new mainland regional facility. The phasing plan can be summarized as follows:

- Phase I – Allows for the immediate needs of the Space Florida/NASA's KSC area to be served via a pipeline to the BCUSD Sykes Creek Regional WWTF.
- Phase II – Includes phased construction of a new facility on the mainland that receives flows from the Cape Canaveral AFS WWTF, BCUSD Sykes Creek WWTF, and BCUSD Port St. John WWTF. Flows from the barrier islands to the mainland can go through a northern pipeline route or through a southern route (shown as alternate route on Figure ES-4).
- Phase III – The new regional facility will be expanded in the future to accept flows from the BCUSD North Regional WRF, Titusville Osprey WRF, and Titusville Blue Heron WRF to the new mainland facility.

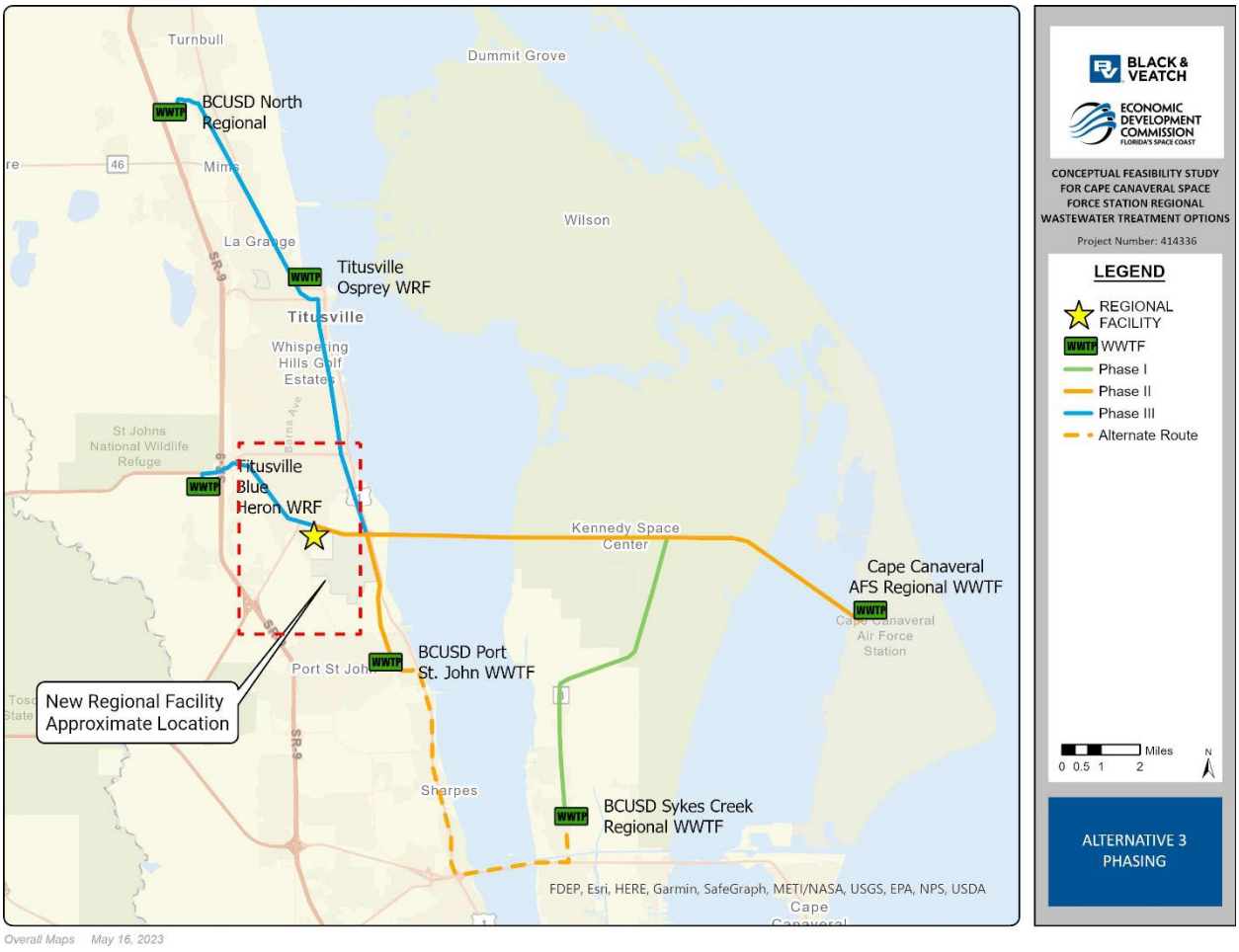


Figure ES-4 Potential Phasing Plan for Alternative 3

1.0 Introduction

The EDC of Florida's Space Coast received a Florida Defense Support Task Force Grant to conduct a conceptual alternatives evaluation of wastewater treatment options. This is a first planning step in a phased strategy to initiate regional wastewater planning to address aging infrastructure and rapid growth of the Cape Canaveral SFS, NASA's KSC, and adjacent communities and to protect the IRL from nutrient impairment.

Black & Veatch, supported by Tetra Tech and GEAR, was tasked to conduct this conceptual evaluation to address current and future needs for upgrading and expanding wastewater treatment to meet AWT standards to reduce nutrient concentrations that could impact the IRL; address biosolids management to meet or exceed regulatory requirements; accommodate needs at the Cape Canaveral SFS, KSC, and growing local community that supports the economic development of the Space Coast; and increase infrastructure resilience and provide long-term benefit to the IRL.

The Cape Canaveral SFS and NASA's KSC have a joint wastewater collection and treatment system that is located at the Cape Canaveral SFS on a barrier island where it is vulnerable to storm events and sea level rise. All collected wastewater in this joint system is treated by the Cape Canaveral AFS Regional WWTF. Parts of the system date to the 1950s when the installations were constructed. These facilities are connected by a collection system of nearly 100 miles of sewer mains, about 50 miles of which are located at KSC. The growth in the area over the past decade has strained Cape Canaveral SFS's wastewater system and growth is projected to continue over the next decade. In addition, the Cape Canaveral AFS Regional WWTF was not historically required to meet AWT standards. These standards require effluent concentrations of 5 mg/L TSS, 5 mg/L $CBOD_5$, 3 mg/L TN, and 1 mg/L TP, (often referred to as 5/5/3/1) on monthly average basis. There is concern that nutrients (TN and TP) in the reclaimed water used to recharge the shallow aquifer through RIBs could seep toward the lagoon and adversely impact water quality.

In addition to the Cape Canaveral SFS wastewater system, there are five wastewater treatment plants in the space coast area that are not currently permitted to meet AWT standards or were only recently upgraded. The six facilities studied as part of this evaluation are shown on Figure 1-1 (Note: all facility names are as listed on their FDEP permits):

- Cape Canaveral AFS Regional WWTF.
- BCUSD North Regional Water Reclamation Facility (WRF).
- BCUSD Port St. John WWTF.
- BCUSD Sykes Creek Regional WWTF.
- Titusville Osprey WRF.
- Titusville Blue Heron WRF.

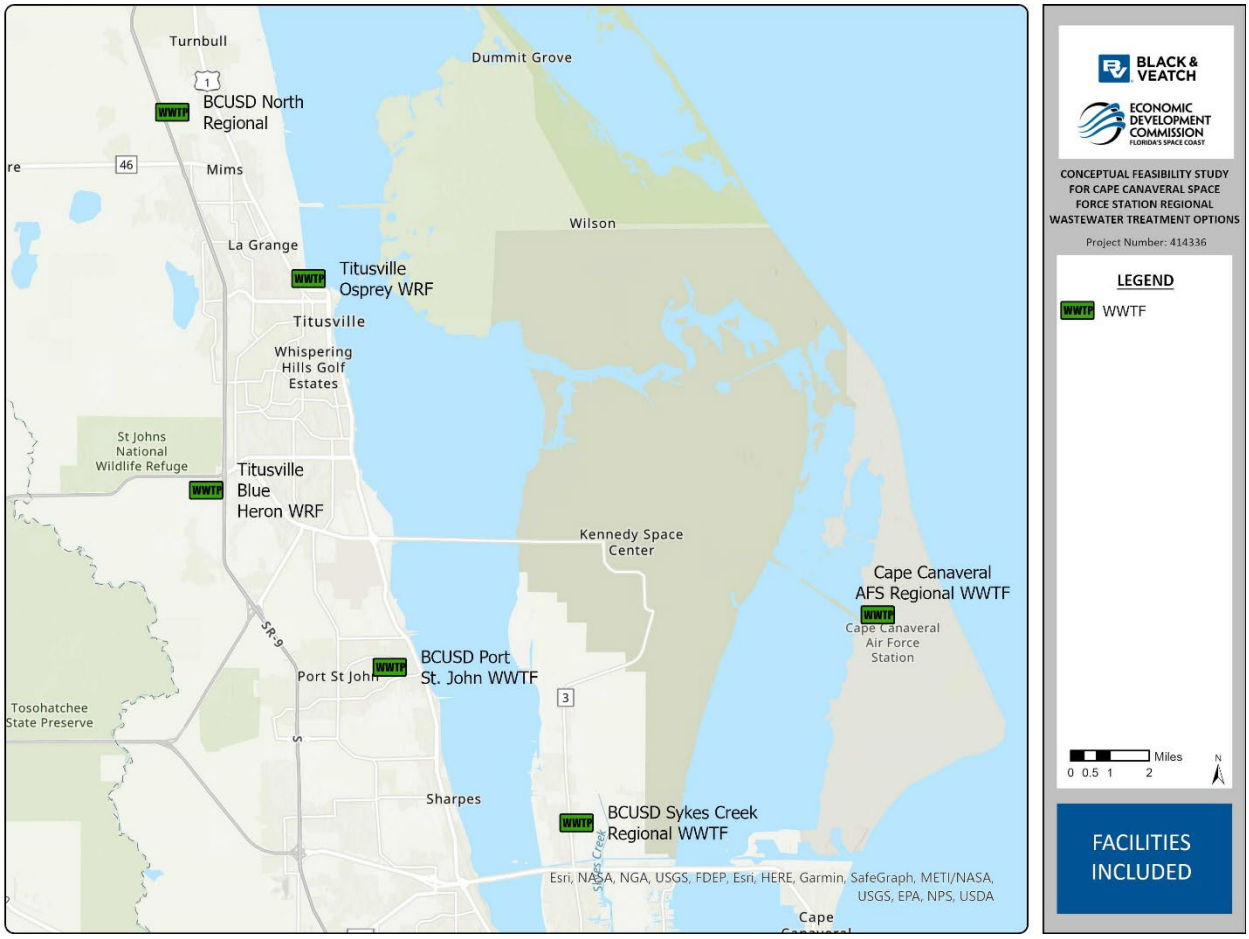


Figure 1-1 Wastewater Treatment Facilities Included in Evaluation

While none of these facilities currently discharge treated effluent directly to the IRL, there are concerns that reclaimed water applied to the land through RIBs, adsorption fields, or landscape irrigation may contribute nutrients through runoff or groundwater seepage to the IRL.

This evaluation quantifies existing and future projected wastewater flows and considerations for providing for future treatment that meets AWT standards and upgraded processes for biosolids. The following three conceptual alternatives were developed for this evaluation:

- Alternative 1 – Upgrade and Expand the Six Wastewater Treatment Facilities in Place.
- Alternative 2 – Construct a New Regional Facility on Merritt Island for Partial Consolidation.
- Alternative 3 – Construct a New Regional Facility on the Mainland.

Each of these alternatives considers upgrading levels of treatment to meet AWT standards (i.e., 5/5/3/1), providing capacity for future growth and development and providing added resilience to address coastal vulnerabilities. The alternatives were evaluated and compared using a technology selection matrix that identifies selection criteria that go beyond just cost and establishes a scoring methodology based on alignment with the stated goals.

2.0 Indian River Lagoon Background

The IRL is a unique and diverse estuary that is one of 28 designated estuaries of National Significance in the NEP. However, the balance of this delicate ecosystem has been disturbed as decades of development in the area has led to harmful impacts because of elevated levels of nutrients, sediments, and organic material entering the IRL. There are a variety of sources contributing these pollutants, including wastewater effluent, septic systems, stormwater runoff, and excess fertilizer applications. These pollutants contribute to cloudy conditions in the IRL and feed algal blooms, which negatively affect the seagrass community that provides habitat for much of the lagoon's marine life.

In 2009, to improve IRL water quality and restore seagrass, FDEP adopted total maximum daily loads (TMDLs) for TN and TP allowed to discharge to the Banana River Lagoon, North IRL, and Central IRL, as shown on Figure 2-1. The purpose of these TMDLs is to reduce nutrients that lead to the growth of algae, which block sunlight from seagrass and create low dissolved oxygen conditions that affect aquatic species in the IRL. To implement these TMDLs, FDEP adopted three BMAPs that outline stakeholders' responsibilities for nutrient reductions, list water quality improvement projects, and stipulate a timeline for implementation. The intent of the nutrient reductions is to provide water quality conditions that should result in a return of seagrass to historical levels in the IRL.

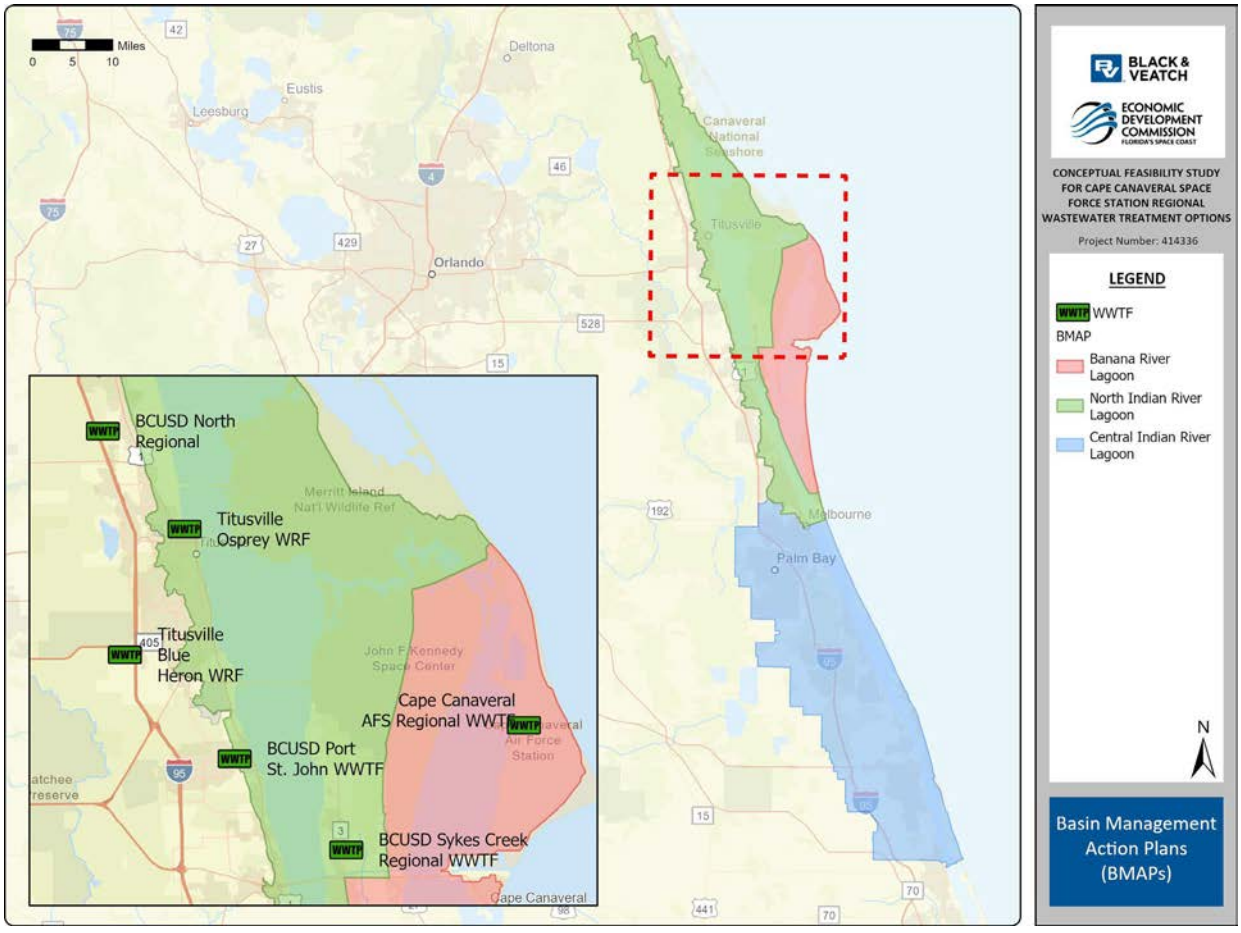


Figure 2-1 Location of the Banana River Lagoon (BRL), Central IRL (CIRL), and North IRL (NIRL) BMAP Areas

The facilities in this evaluation are located in the North IRL and Banana River Lagoon sub-watersheds. Allocations for the wastewater treatment facilities were established by FDEP within the 2009 *TMDL Report: Nutrient and Dissolved Oxygen TMDLs for the Indian River Lagoon and Banana River Lagoon*. BCUSD's North Regional, Port St. John, and Sykes Creek Regional WWTFs are not named in the TMDL due to the locations of their discharges. The Cape Canaveral AFS Regional WWTF, Titusville Osprey WRF, and Titusville Blue Heron WRF were not considered significant nutrient contributors due to the reuse of the reclaimed water produced and were not assigned allocations. However, since adoption of the TMDL, regulations have changed and there are additional expectations for wastewater treatment facilities, even those not discharging directly to the IRL.

FDEP updated the BMAPs in 2021, which included additional requirements for wastewater treatment levels based on the size of the facility. Wastewater treatment facilities (e.g., WWTFs, WRFs) with permitted average daily flows greater than or equal to 0.5 mgd, which includes the six facilities in this evaluation, must meet AWT standards for direct surface discharges and rapid rate land application systems. Other disposal methods, including reuse, must achieve effluent concentrations of no more than 10 mg/L of TN and 6 mg/L of TP.

In the 2020 Florida Legislative session, Senate Bill 712, known as the Clean Waterways Act, was enacted, and signed into law on July 1, 2020. This Act included amendments to section 403.067, Florida Statutes (F.S.), which require local governments to develop wastewater treatment plans where FDEP determines that wastewater treatment facilities are a significant contributor of nutrient pollution, which is the case for the IRL. The plan must provide information on the construction, expansion, or upgrades required to meet TMDL requirements, and a timeline to implement those requirements. These wastewater plans must be adopted into the BMAPs by July 1, 2025. FDEP is currently coordinating with local governments on development of these plans to meet BMAP requirements. The Act also amends section 403.0855, F.S., related to biosolids management, which includes provisions regarding where and how biosolids can be applied. It also prohibits disposal of treated wastewater into the IRL, including any tributaries, if the treated wastewater does not meet AWT standards starting July 1, 2025.

In the 2021 Florida Legislative session, Senate Bill 64 was enacted, which amended Section 403.064, F.S. The bill required that wastewater utilities that dispose of effluent or reclaimed water by surface water discharge must prepare a plan for FDEP review and approval for eliminating any nonbeneficial surface water discharges by January 1, 2032.

As the team was preparing this report, the 2023 Florida Legislative session was underway. There are a few bills that would place additional requirements within the IRL watershed and would affect these wastewater treatment facilities, when enacted. One major bill is House Bill 1379, which prioritizes AWT and creates the Indian River Lagoon Protection Program.

In addition to the BMAPs, there are other restoration efforts underway in the IRL watershed that highlight the need for high quality wastewater treatment and appropriate disposal. In 2016, Brevard County citizens approved a 10-year half cent sales tax for IRL restoration projects, which went into effect in January 2017. Brevard County developed the Save Our Indian River Lagoon Project Plan (Plan) to outline the projects that would be implemented using the funding from the sales tax. One category of projects includes wastewater treatment upgrades to reduce nutrients and improve the quality of reuse water. In the Plan, BCUSD's Port St. John and North Regional WWTFs, Cape Canaveral AFS Regional WWRF, and Titusville's Osprey WRF were noted for having TN effluent concentrations higher than 6 mg/L. Since the Plan went into place, the City of Titusville has received sales tax funding to upgrade the Osprey WRF.

In 2020, the IRLNEP completed a revision of its Comprehensive Conservation and Management Plan (CCMP) – Looking Ahead to 2030. The CCMP identified 32 “vital signs” that are important issues that contribute to the restoration and health of the IRL. One of these vital signs is for wastewater, which was one of the six vital signs ranked as “Level 1: Critical.” “Level 1: Critical” is described as ”a condition that threatened immediate and long-term prognosis for lagoon health. Indicators are unfavorable. Trend is negative. Immediate and aggressive intervention is urgently needed to stop and reverse trend.” The CCMP included three actions related to wastewater treatment:

- Wastewater 1: Ensure compliance with the IRL Act (Chapter 90-262, Laws of Florida, 1990).
- Wastewater 2: Reduce or remove all wastewater discharges to the IRL (including direct, indirect through reuse, and emergency loadings of nutrients and other pollutants).
- Wastewater 3: Research, identify, and recommend funding sources and alternatives for upgrading wastewater treatment infrastructure and to reduce or remove domestic and industrial effluents.

3.0 Description of Facilities Included

3.1 Cape Canaveral AFS Regional WWTF

The Cape Canaveral AFS Regional WWTF provides wastewater treatment for the United States government and Space Launch Programs at the Cape Canaveral SFS as well as NASA's KSC. The existing treatment facility was constructed in 1997 and is located on Scrub Jay St. in the Cape Canaveral SFS as shown on Figure 3-1. This facility is permitted to operate under a National Pollutant Discharge Elimination System (NPDES) permit (Permit Number FL0102920) that allows it to accept "P" listed waste (defined by the EPA as "acute hazardous"). The facility receives slugs of cooling water and washdown water associated with rocket launches. In meetings conducted as part of this evaluation, SFS representatives indicated that they are investigating alternate disposal for these slug flows that dilute the wastewater entering the WWTF and utilize system capacity. The Annual Average Daily Flow (AADF) to this facility in 2020 was, on average, 0.436 mgd, which is equal to 55 percent of its treatment capacity, but higher peak flows have been observed during heavy rain events.

Several commercial, private sector, and government programs are planned in the KSC area that will significantly increase the wastewater flows to the facility, which has prompted a search for alternatives to handle these additional flows. Investigations are underway by Space Florida, the aerospace economic development agency of the State of Florida, and KSC to send future flows to the BCUSD Sykes Creek Regional WWTF because of concerns with the Cape Canaveral AFS Regional WWTF having sufficient capacity for increased wastewater flows anticipated with growth.

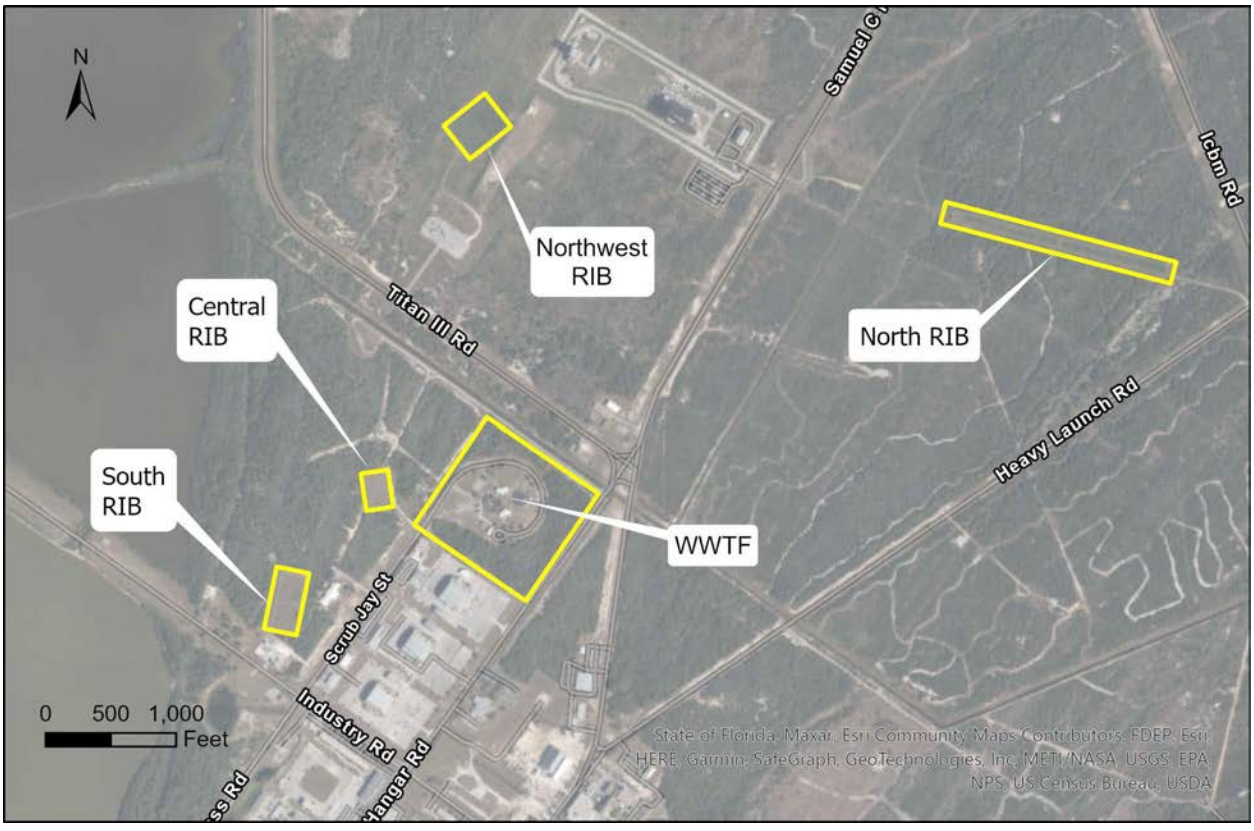


Figure 3-1 Cape Canaveral AFS Regional WWTF

Treatment at this facility consists of an extended aeration process that includes screening, grit removal, flow equalization, a closed loop reactor that provides nitrification, denitrification, addition of carbon glycerin food source, secondary clarification, filtration, disinfection by chlorination, and aerobic digestion of biosolids. The resulting biosolids are then transported to drying beds and trucked to a landfill, and the leachate is returned to the plant headworks.

The treated effluent from this facility goes to a 0.8 mgd RIB system as depicted on Figure 3-2, which consists of eight RIBs with a total wetted area of 5.48 acres. Reclaimed water is also used for in-plant wash down and lawn irrigation at the WWTF site.

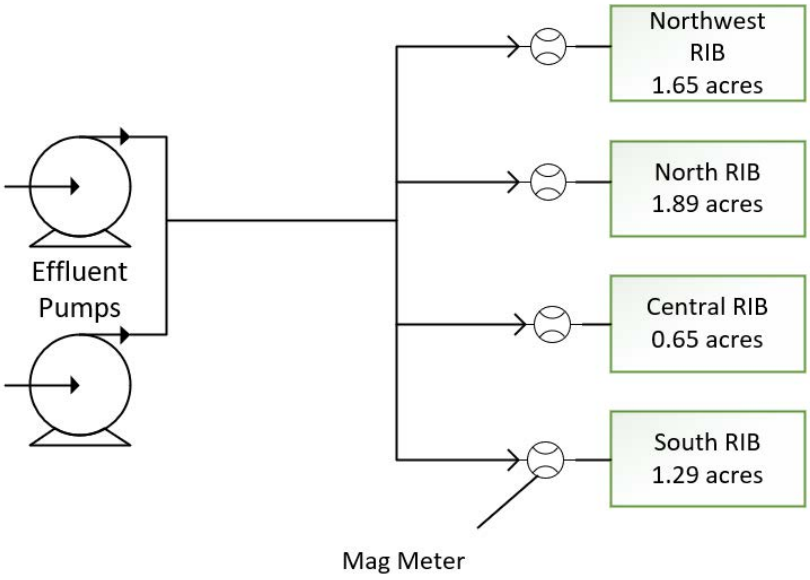


Figure 3-2 Cape Canaveral AFS Regional WWTF Effluent Disposal

3.2 BCUSD North Regional WRF

The North Regional WRF is located at 3205 Indian River Parkway in Mims, Florida, and is permitted to treat 0.99 mgd of domestic wastewater on an AADF basis. Figure 3-3 shows the facility location. BCUSD owns this facility and operates it under FDEP permit FLA010263. The WWTF serves the area bounded to the east by US-1, to the West by Fawn Lake Complex, Burkhol Road to the North and Parrish Road to the south, which includes Mims, Walkabout, Hidden Lakes, Oakwood, and Robinswood developments. In 2021, flow to this facility was 0.286 mgd, which is 29 percent of its total treatment capacity.

Figure 3-3 BCUSD North Regional WRF

Treatment at this WRF consists of an extended aeration oxidation ditch with dual carrousels, dual secondary clarifiers, dual flocculators, dual tertiary filters, chemical feed, a 0.5 million gallon (MG) reuse storage tank and pump station, chlorination, and a biosolids dewatering rotary fan press.

The WRF is permitted to provide reclaimed water to a slow rate public access reuse system with a capacity of 1.25 mgd or discharged into a 13.78 acre, 0.75 mgd RIB, as shown on Figure 3-4. Currently, the Indian River Preserve Golf Course is the only large reuse customer with over 1 mgd annual average demand, and about 0.1 mgd goes to other small public access reuse customers.

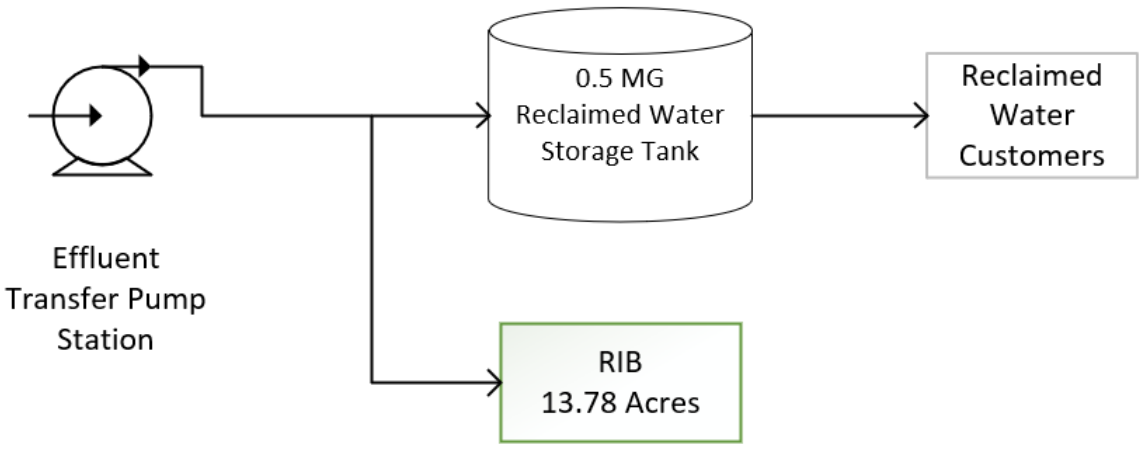


Figure 3-4 North Regional WRF Effluent Handling

Wastewater flows from the served area are expected to increase due to the growth throughout the unincorporated areas of the county. This growth consists partly of new construction that is occurring in the Indian River Preservice Golf Course area.

3.3 BCUSD Port St. John WWTF

The BCUSD Port St. John WWTF is located at 3170 Juanita St. in Port St. John and is permitted to treat 0.49 mgd of domestic wastewater on an AADF basis. The facility is owned and operated by BCUSD under FDEP permit FLA102750 and it serves a primarily residential area. The average wastewater flow to this facility in 2020 was 0.408 mgd, or 83 percent of its permitted capacity. The facility location is shown on Figure 3-5.

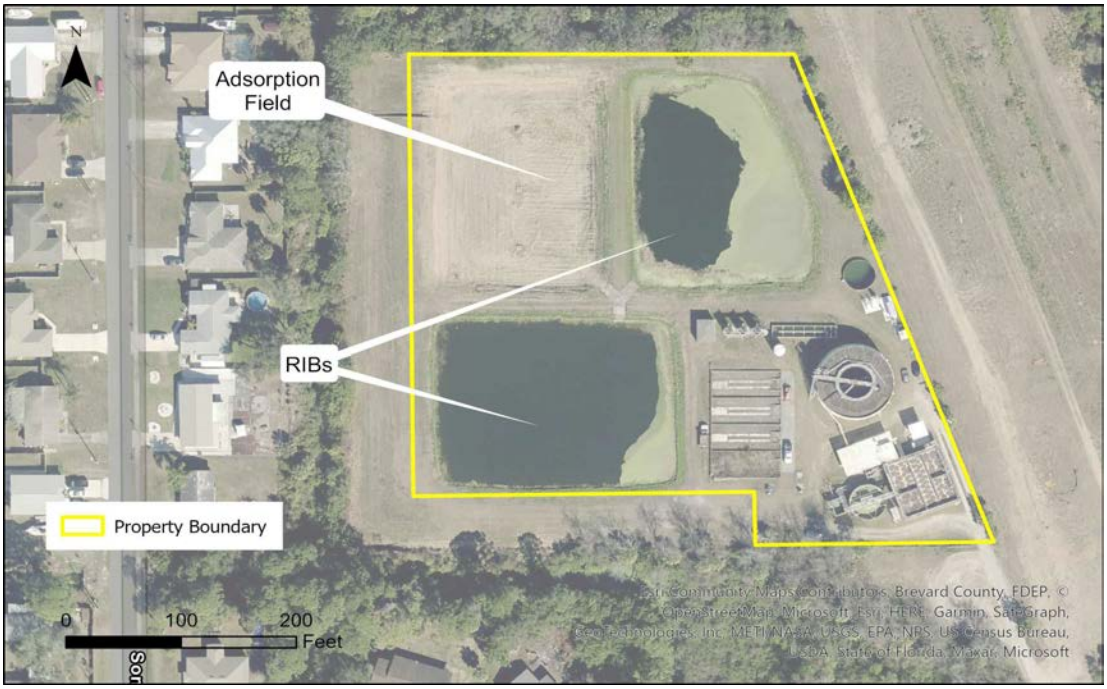


Figure 3-5 BCUSD Port St. John WWTF

Treatment in this facility consists of contact stabilization activated sludge with tertiary filtration and high-level disinfection. Treated effluent is discharged to a slow-rate public access reuse system (0.250 mgd), RIBs, and rapid-rate restricted access absorption system. Biosolids at this facility are dewatered in a drying bed and disposed of at the Brevard County landfill and liquid residuals are trucked to be blended with the BCUSD Sykes Creek Regional WWTF biosolids for final disposal at the landfill.

Reclaimed water can be sent to the reuse system to be used for irrigation of local medians or used at the FPL Cape Canaveral Power Plant located about a mile from the WWTF along N Cocoa Blvd. It can also be conveyed to RIBs or an adsorption field, as shown on Figure 3-6.

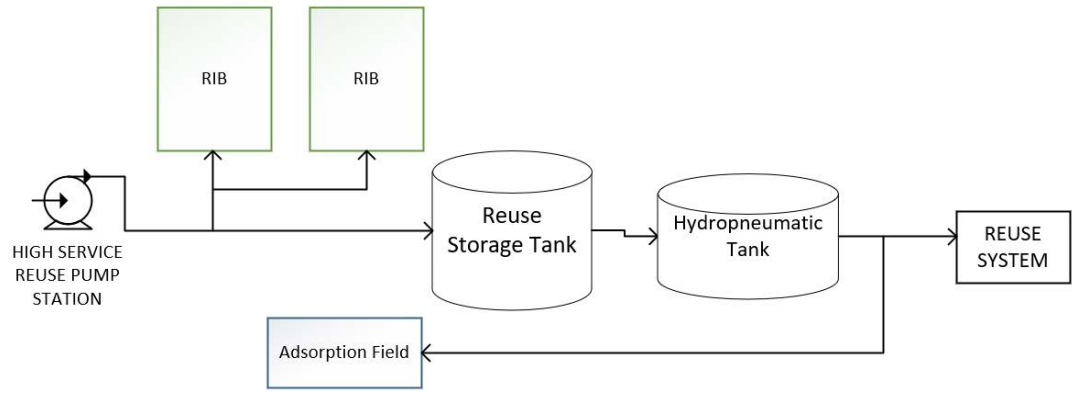


Figure 3-6 BCUSD Port St. John WWTF Effluent Handling

3.4 BCUSD Sykes Creek Regional WWTF

The BCUSD Sykes Creek Regional WWTF is located at 3630 N Courtenay Parkway in Merritt Island and is permitted to treat 6.0 mgd AADF of domestic wastewater. It is owned and operated by BCUSD under FDEP permit number FLA102695. Refer to Figure 3-7.

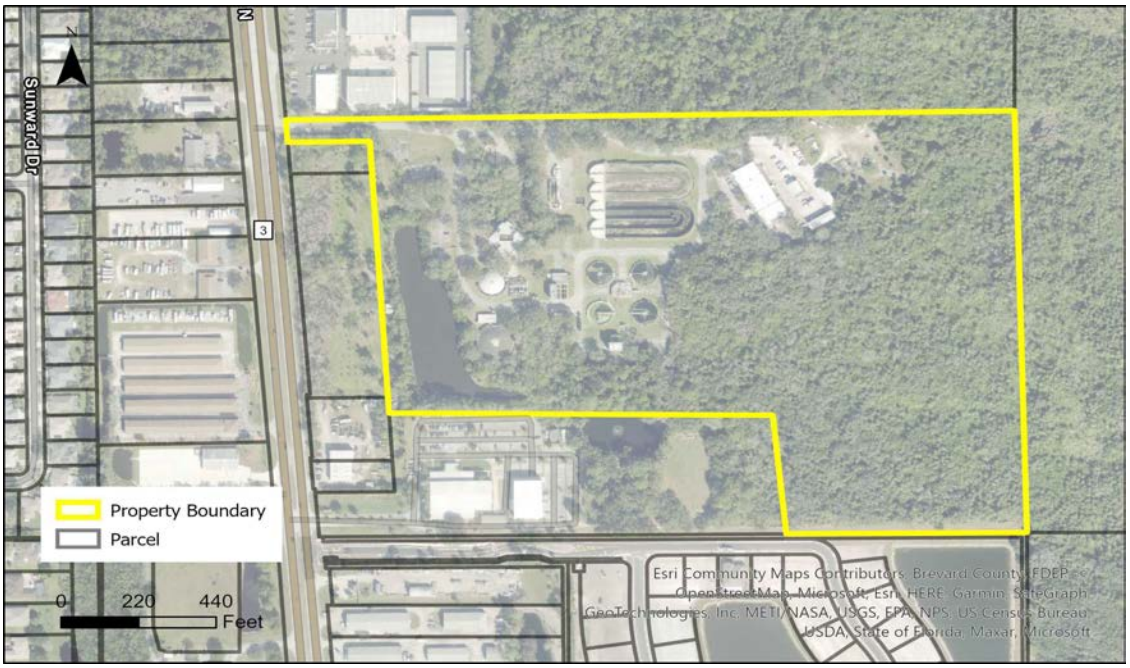


Figure 3-7 BCUSD Sykes Creek Regional WWTF Location

The facility was completed in 1987 and is a Carrousel® extended aeration facility. The treatment process includes influent screening, grit removal, two Carrousel® aeration basins, chemical feed facilities, secondary clarification, tertiary filtration, chlorination, and dewatering of biosolids. Biosolids from this facility are disposed of in the Brevard County landfill. Effluent from the facility is injected via deep injection well and is also permitted to discharge for reuse in a slow-rate public access reuse system. Plant flows in 2020 were 3.05 mgd, which account for about 51 percent of the permitted treatment capacity.

Effluent from this facility can be handled in two ways as shown on Figure 3-8: underground injection to a 6.0 mgd system that consists of two Class I deep injection wells, or discharge into a 4.5 mgd capacity slow-rate public access system that provides irrigation to residential lawns, golf courses, parks, playgrounds, landscaped areas, highway medians, and rights-of-way within the reuse service area.

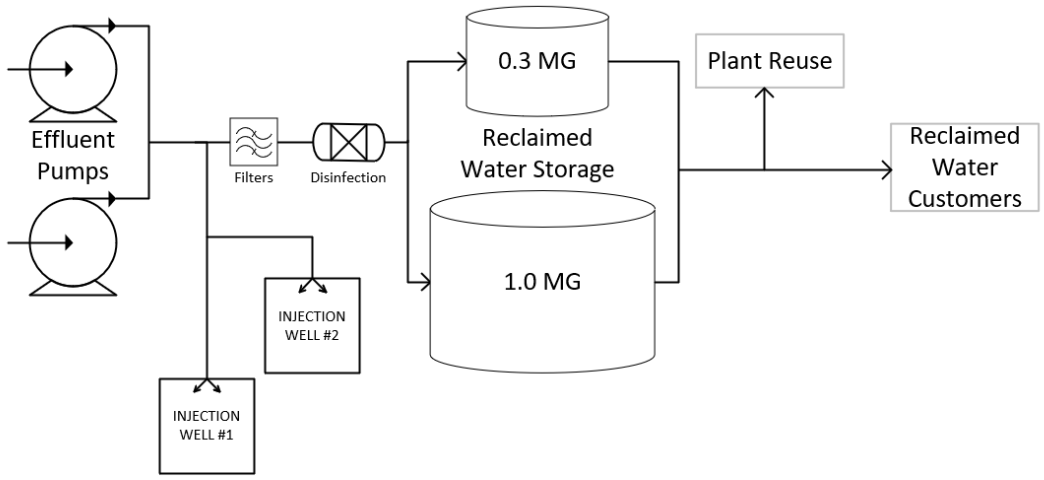


Figure 3-8 BCUSD Sykes Creek WWTF Effluent Handling

3.5 Titusville Osprey WRF

The Titusville Osprey WRF is located at 1105 Buffalo Road in the northern portion of the City of Titusville. It is one of two facilities that serves the city, the second one being the Blue Heron WRF. Titusville Osprey WRF is owned and operated by the City of Titusville under FDEP permit FL0103268 and has a treatment capacity of 2.75 mgd AADF. An upgrade to meet partial AWT standards (TN concentration of 6 mg/L and TP concentration of 1 mg/L) in 2022 limits the capacity to 2.0 mgd AADF. The 2016 Brevard County Save Our Lagoon Project Plan identified the need for a nutrient removal upgrade for the Osprey WRF to decrease nutrient load from runoff from reclaimed water that is reused from the Osprey WRF.

The treatment is provided by a step-feed process consisting of anaerobic, anoxic, and aerobic tanks in series, with biological phosphorus and nitrogen removal. It includes screening and grit removal, biological nutrient removal (BNR) using activated sludge, secondary clarification, tertiary filtration, and high-level disinfection. Biosolids are thickened with a dissolved flotation thickener, aerobically digested and dewatered via belt press and disposed of via land application or in the Brevard County landfill.

Reclaimed water from the facility can flow to a 2.75 mgd permitted capacity slow-rate public access reuse system that provides irrigation water for residential lawns, parks, playgrounds, cemeteries, golf courses, and highway medians within the service area. Reclaimed water can also be conveyed to the

flow convergence box upstream of the wetlands at the Blue Heron WRF during wet weather. Flows to the facility averaged 2.098 mgd in 2020, which amounts to about 76 percent of its treatment capacity. Figure 3-9 shows the facility's location. Effluent/reclaimed water handling is combined with the Titusville Blue Heron WRF.

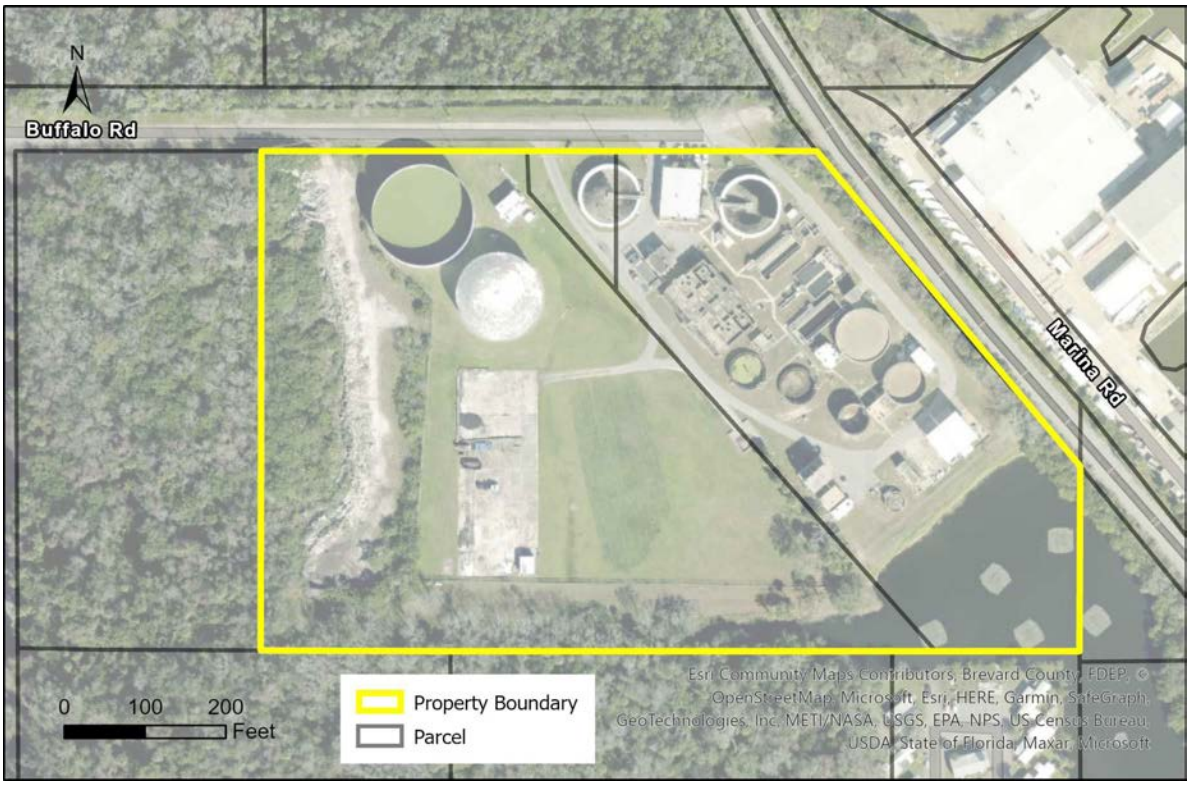


Figure 3-9 Titusville Osprey WRF Location

3.6 Titusville - Blue Heron WRF

The Titusville Blue Heron WRF is located at 4800 Deep Marsh Road, east of I-95. This facility is owned and operated by the city under FDEP Permit FL0103349 and has a treatment capacity of 4.0 mgd AADF. This facility currently meets AWT standards (i.e., 5/5/3/1). The treatment process consists of the influent screening and grit removal, BNR, secondary clarification, tertiary filtration, and high-level disinfection. Biosolids are digested, thickened and dewatered on-site, and are hauled by FDEP-approved contractors for land application. Refer to Figure 3-10 for the site location.

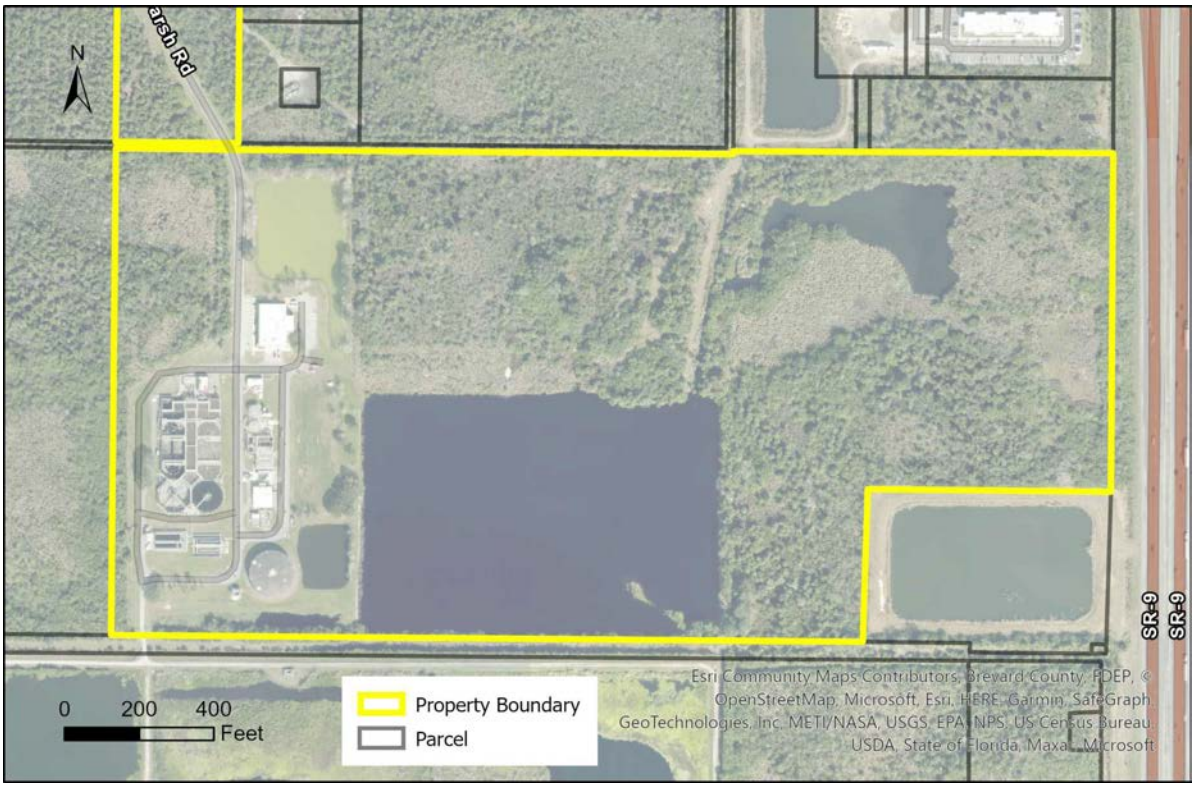


Figure 3-10 Blue Heron WRF Location

Reclaimed water from the facility can be discharged into a 4.68 mgd permitted capacity created wetland that discharges into the Addison Canal and Bird Lake ditches, a tributary to St. Johns River, or to a 3.57 mgd AADF public access reuse system, which is common to the Osprey and Blue Heron facilities. This system serves residential lawns, parks, golf courses, cemeteries, and medians within the service area. The effluent handling system is detailed on Figure 3-11. Flows to the facility averaged 1.974 mgd in 2020, which amounts to about 49 percent of its treatment capacity.

In 2021, Senate Bill 64 called for the elimination of all non-beneficial discharges to surface waters in Florida by January 1, 2032. Utilities were required to submit plans to FDEP by November 1, 2021, detailing how they would comply with this legislation. The legislation had several considerations for allowing continued discharge, one being that discharge could be continued if 90 percent of a facilities' flow is beneficially reused. The City of Titusville's plan to comply with Senate Bill 64 is to reduce the discharge from the wetland to the tributaries of the St. Johns River by increasing reuse capacity within the city to 90 percent.

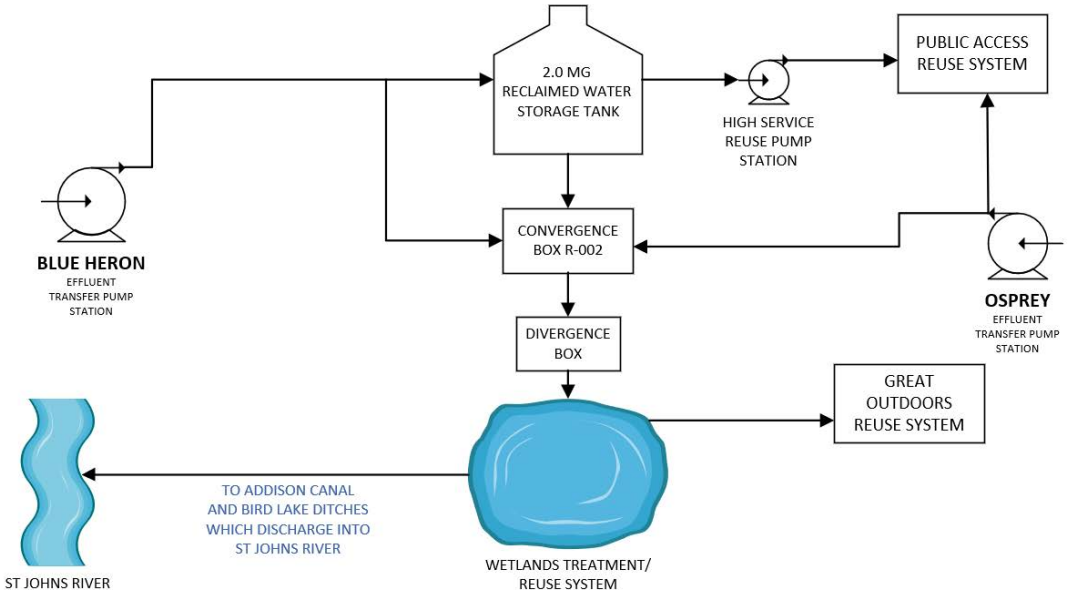


Figure 3-11 Titusville Blue Heron and Osprey WRF Effluent Handling

4.0 Flow Projections

Several sources of information were used to estimate future regional wastewater treatment needs. Where available, current plant flows and flow projections were obtained from operating records and planning documents for the facilities such Capacity Analysis Reports, that are required to be submitted by wastewater facilities every 5 years once flows reach 50 percent of the permitted capacity and other documents and estimates provided by the utilities. Buildout projections were provided by BCUD for their facilities. For the purposes of this conceptual analysis it was assumed buildout will occur in 2045.

In cases where no flow projections were available, or the projections did not extend to the end of the planning horizon of this evaluation, projections were estimated based on population forecasts for the service area of the facility using the University of Florida Bureau of Economic and Business Research projections and the Brevard County, Florida 2040 Population Projections prepared for the county (2020). The process followed for each facility is detailed below.

4.1 Cape Canaveral AFS Regional Wastewater Treatment Facility

The area served by the Cape Canaveral AFS WWTF is experiencing increased wastewater flows due to commercial program increases as well as government, commercial, and private sector development activities that are planned for NASA KSC. Flow projections were obtained from the estimates developed for the 2022 Domestic Wastewater Feasibility Analysis for Space Florida.

Flow projections for the facility are summarized in Table 4-1. It should be noted that although average flows to the facility range between 0.4 and 0.5 mgd, flows have often exceeded the facility's permitted capacity primarily during heavy rain events. The facility also receives deluge and washdown water during rocket launches. Flows are projected to exceed the facility's permitted treatment capacity by 2030, as illustrated on Figure 4-1.

A proposed draft policy will require new construction or launch pad modifications to recycle or discharge deluge and washdown water in accordance with an FDEP Industrial Waste permit which should reduce flows during those events. Current deluge and washdown discharges are to be phased out over time as existing facilities are substantially modified or replaced. This could result in a 10 to 15 percent reduction in existing flows over time, but due to the uncertainty of when these small reductions would occur, these were not deducted from the flow projections for this conceptual evaluation.

Table 4-1 Cape Canaveral AFS Regional WWTF Projected Flow

Year	Projected Flow AADF (mgd)
2021	0.41
2022	0.43
2023	0.47
2024	0.56
2025	0.65
2026	0.69
2027	0.73
2028	0.77
2029	0.82
2030	0.85
2031	0.93
2032	0.99
2033	1.06
2034	1.12
2035	1.19
2036	1.19
2037	1.19
2038	1.19
2039	1.19
2040	1.19
2041	1.19
2042	1.19
2043	1.19

* Actual flow to the facility in 2021.

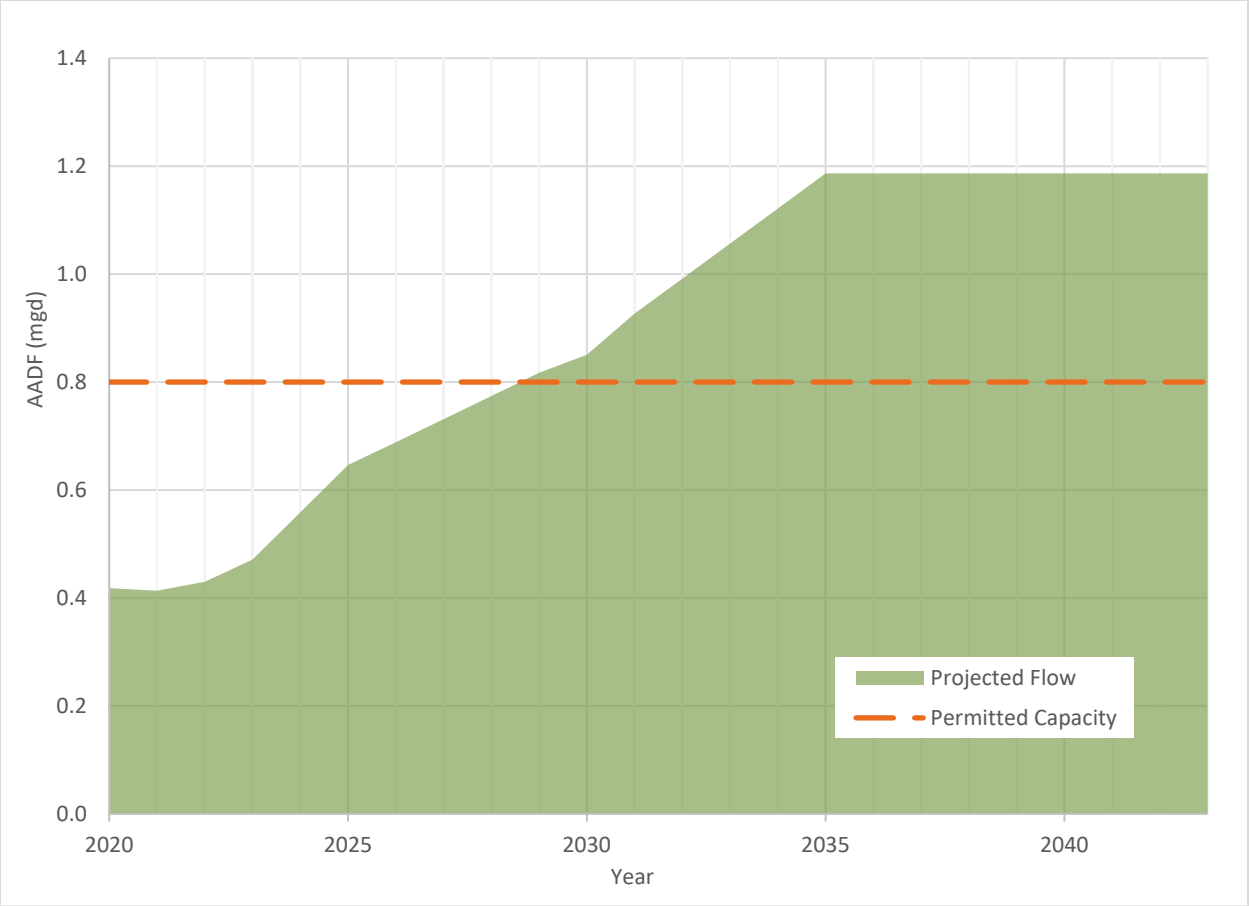


Figure 4-1 Cape Canaveral AFS Regional WWTF Projected Flows versus Permitted Capacity

4.2 BCUSD North Regional WRF

Flow projections for BCUSD's North Regional WRF were estimated by Brevard County based on planned new development and expected connection of areas served by septic tanks to WRF. The estimated flow in 2043 is 1.734 mgd. Projected flows by year for this facility were estimated by linear interpolation of the 2043 projection and the 2020 flows. Table 4-2 and Figure 4-2 show the projected flows by year. Based on these projections, the facility would reach its permitted capacity in 2032 and need an additional 0.81 mgd treatment capacity in 2043.

Table 4-2 BCUSD North Regional WRF Projected Flow

Year	Projected Flow AADF (mgd)
2021	0.282*
2022	0.288
2023	0.326+
2024	0.400
2025	0.473
2026	0.547
2027	0.621
2028	0.695
2029	0.768
2030	0.842
2031	0.916
2032	0.989
2033	1.063
2034	1.137
2035	1.210
2036	1.284
2037	1.358
2038	1.432
2039	1.505
2040	1.579
2041	1.653
2042	1.726
2043	1.800

* Actual flow to the facility in 2021.
+ Actual flow to the facility during April 2022 – March 2023.

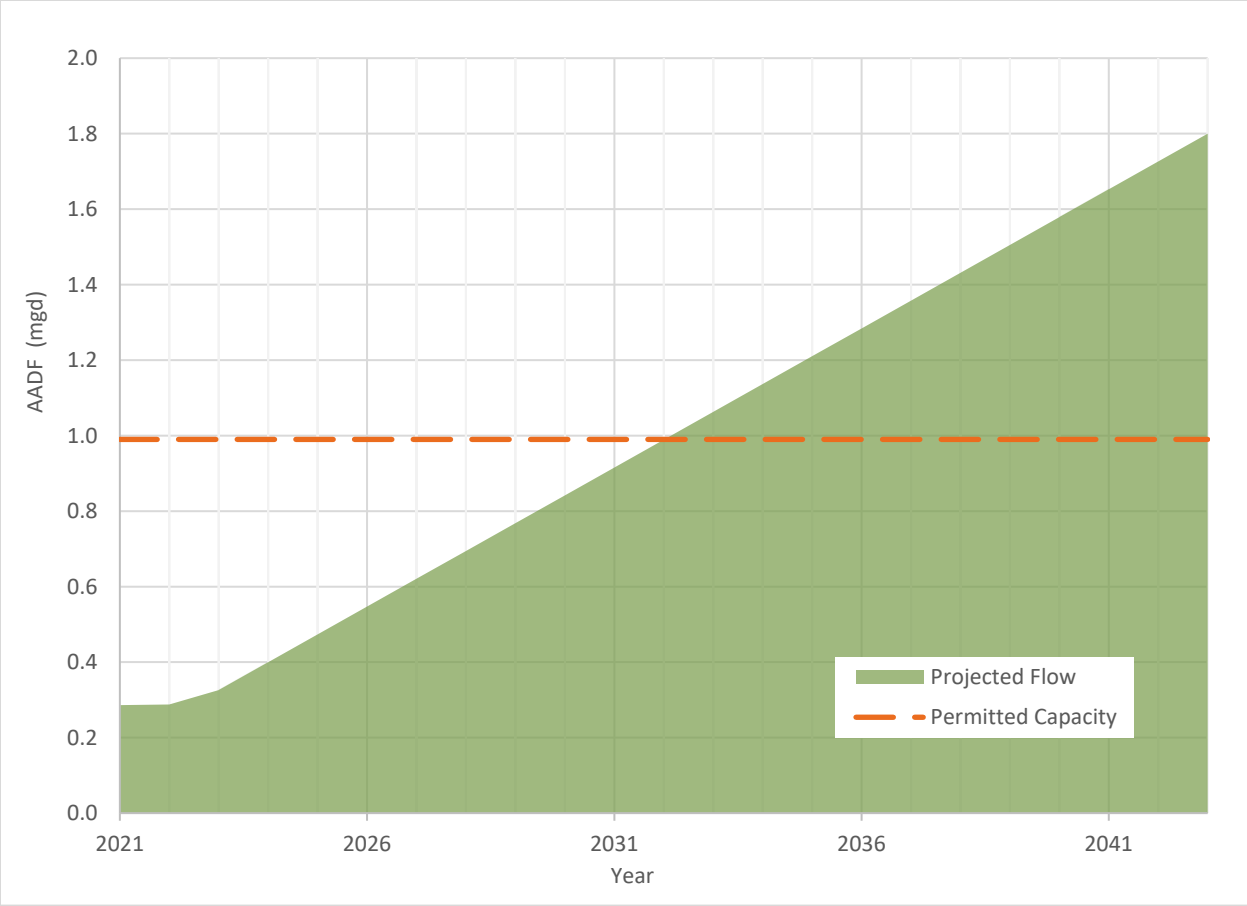


Figure 4-2 BCUSD North Regional WRF Flow Projections

4.3 BCUSD Port St. John WWTF

Wastewater flows to the BCUSD Pot St. John WWTF were 0.41 mgd in 2021 and Brevard County estimates that flows will reach 3.5 mgd in 2043 based on expected growth in the service area. This service area is projected to have increased residential population to support economic development and growth at KSC and the SFS. Projected flows for this facility were estimated by interpolating the County's 2043 projection and the 2021 flows. Table 4-3 shows the projected flows by year, and Figure 4-3 shows a comparison of flow projections and current permitted capacity. Based on these projections, the facility would reach its permitted capacity in 2023 and need an additional 3.1 mgd treatment capacity in 2043.

Table 4-3 BCUSD Port St. John WWTF Projected Flow

Year	Projected Flow AADF (mgd)
2021	0.40*
2022	0.44
2023	0.47+
2024	0.62
2025	0.77
2026	0.93
2027	1.08
2028	1.23
2029	1.38
2030	1.53
2031	1.68
2032	1.83
2033	1.99
2034	2.14
2035	2.29
2036	2.44
2037	2.59
2038	2.74
2039	2.89
2040	3.05
2041	3.20
2042	3.35
2043	3.50

* Actual flow to the facility in 2021.
+ Actual flow to the facility during April 2022 – March 2023.

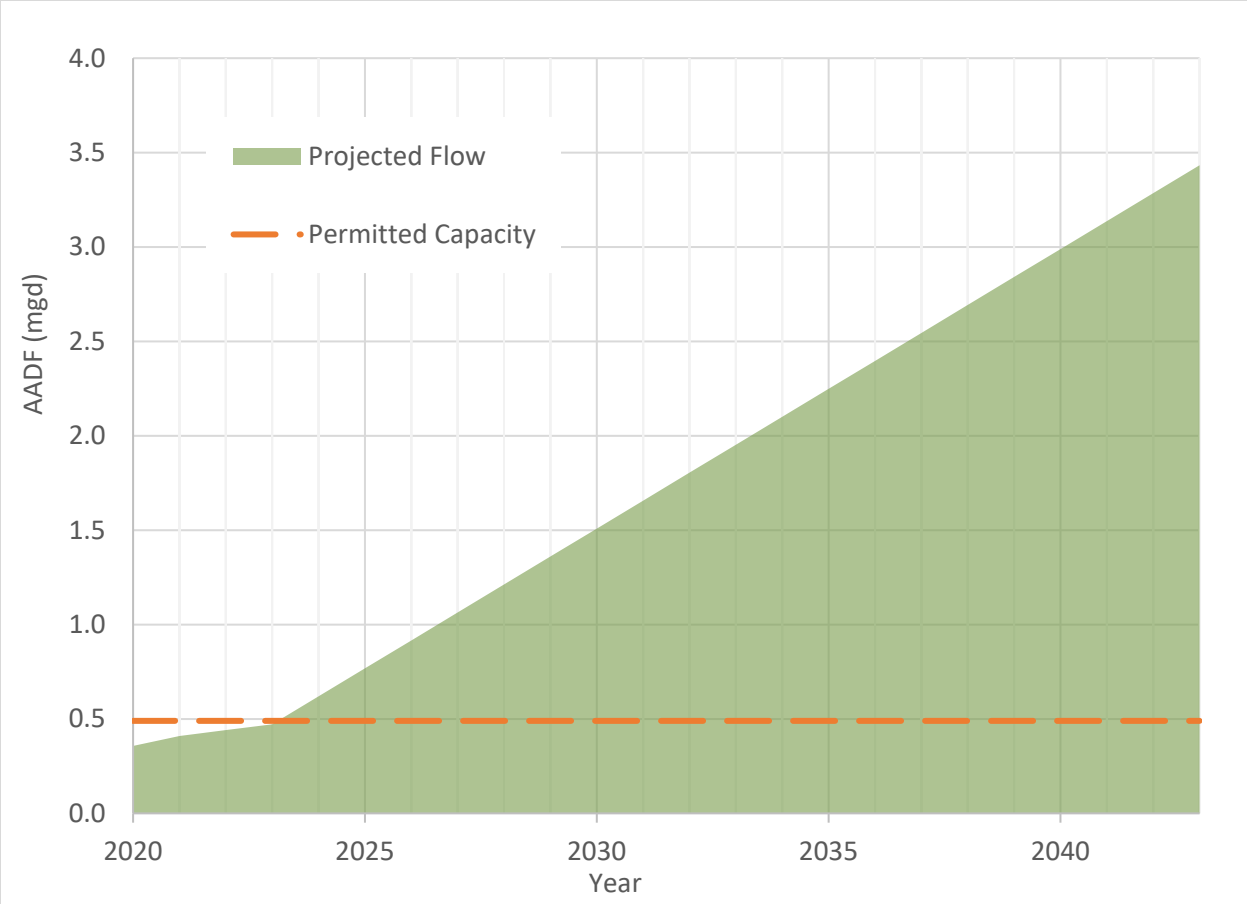


Figure 4-3 BCUSD Port St. John WWTF Flow Projections

4.4 BCUSD Sykes Creek Regional WWTF

Brevard County generated projection estimates for this facility through 2043 based on the number of parcels in the service area that are not yet connected to the system. A linear interpolation between 2021 flows and the projected 2043 flows was used to generate yearly flow estimates. The projected flows are summarized in Table 4-4.

Table 4-4 BCUSD Sykes Creek Regional WWTF Projected Flows

Year	Projected Flow AADF (mgd)
2021	3.18*
2022	3.31
2023	3.43+
2024	3.69
2025	3.95
2026	4.20
2027	4.46
2028	4.72
2029	4.98
2030	5.24
2031	5.50
2032	5.76
2033	6.01
2034	6.27
2035	6.53
2036	6.79
2037	7.05
2038	7.31
2039	7.57
2040	7.82
2041	8.08
2042	8.34
2043	8.60

* Actual flow to the facility in 2021.
+ Actual flow to the facility during April 2022 – March 2023.

The facility treated on average 3.05 mgd in 2020, which is 51 percent of its treatment capacity. Based on the flow projections, the plant flows will reach the permitted capacity in 2032 and will need 2.6 mgd of additional capacity through 2043. Figure 4-4 shows a comparison of the projected flows versus the treatment capacity.

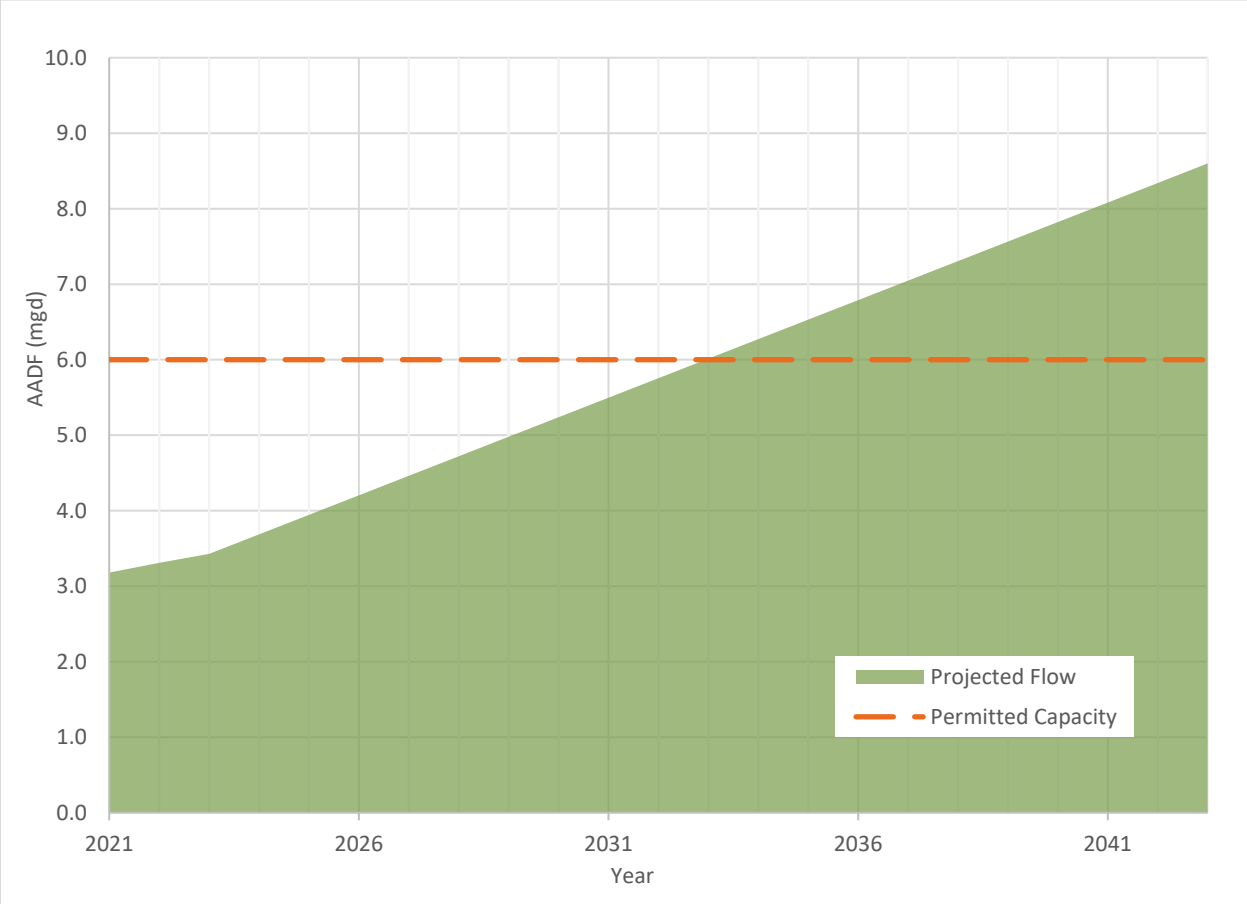


Figure 4-4 BCUSD Sykes Creek Regional WWTF Flow Projections

4.5 Titusville Osprey WRF

The City of Titusville is served by two WRFs, Osprey WRF and Blue Heron WRF. Flow projections are typically generated for the system as a whole instead of for individual facilities. In its 2022 Annual Update to the Capital Improvements Element (CIE), the City generated flow projections for the combined service area based on the current average demand on the system of 4.364 mgd as of 2022, and the future commitments to properties currently being developed. These projections extend to 2027, the last year of the CIE and were allocated to each facility based on the location of new developments.

Flow projections for the period of 2028 to 2043 were estimated using population projections for the City of Titusville from the Brevard County 2040 Population Projections. Using 2027 projections as a base, flow increases for each year were estimated by multiplying population increase by the per capita average wastewater flow of 80 gallons based on the city's Comprehensive Plan. The combined flows were then proportionally allocated to each facility based on current plant flows to obtain individual projections for each facility.

Based on communications from the City of Titusville, starting in 2028, 0.5 mgd of wastewater from the Osprey WRF will be conveyed to the Blue Heron WRF. This operational change is reflected in the projections. The projected flows for the Osprey WRF are summarized in Table 4-5.

Table 4-5 Titusville Osprey WRF Flow Projections

Year	Projected Flow AADF (mgd)
2021	1.61
2022	1.97*
2023	1.98
2024	1.99
2025	2.00
2026	2.01
2027	2.02
2028	1.53
2029	1.54
2030	1.55
2031	1.56
2032	1.57
2033	1.58
2034	1.59
2035	1.60
2036	1.61
2037	1.61
2038	1.62
2039	1.63
2040	1.64
2041	1.65
2042	1.65
2043	1.66

* Actual flow to the facility in 2022.

Osprey WRF treated on average 1.97 mgd in 2022, which comprises 72 percent of its treatment capacity. Based on the flow projections, the plant will reach its maximum projected flow of 2.02 mgd in 2027, with flows decreasing the following year when the flow diversion begins. Based on these projections and the City's commitment to transfer 0.5 mgd of flow from Osprey WRF to Blue Heron WRF, Osprey WRF has sufficient capacity to treat flows through 2043. Figure 4-5 shows a comparison of the projected flows versus the permitted treatment capacity.

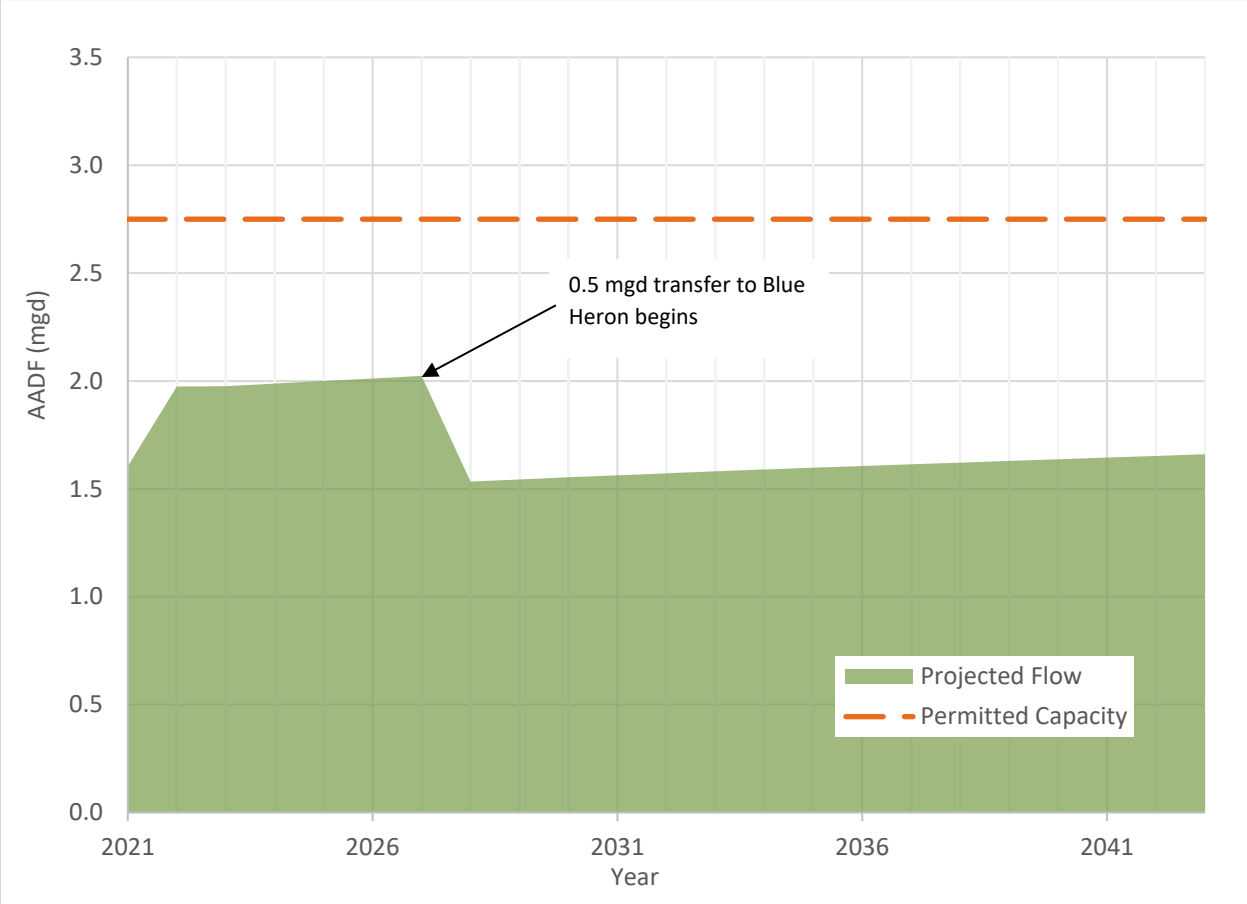


Figure 4-5 Titusville - Osprey WRF Projected Flow versus Treatment Capacity

4.6 Titusville Blue Heron WRF

Following the methodology described in Section 4.5, projections were allocated to this facility based on projected 2027 flows. As shown in Table 4-6, flows for this facility are projected to reach 3.63 mgd in 2043, which is 91 percent of the permitted capacity. This is illustrated on Figure 4-6.

Table 4-6 Titusville Blue Heron WRF Projected Flows

Year	Projected Flow AADF (mgd)
2021	2.32
2022	2.40*
2023	2.51
2024	2.61
2025	2.72
2026	2.82
2027	2.93
2028	3.44
2029	3.46
2030	3.47
2031	3.49
2032	3.50
2033	3.51
2034	3.53
2035	3.54
2036	3.55
2037	3.56
2038	3.57
2039	3.58
2040	3.59
2041	3.61
2042	3.62
2043	3.63

* Actual flow to the facility in 2022.

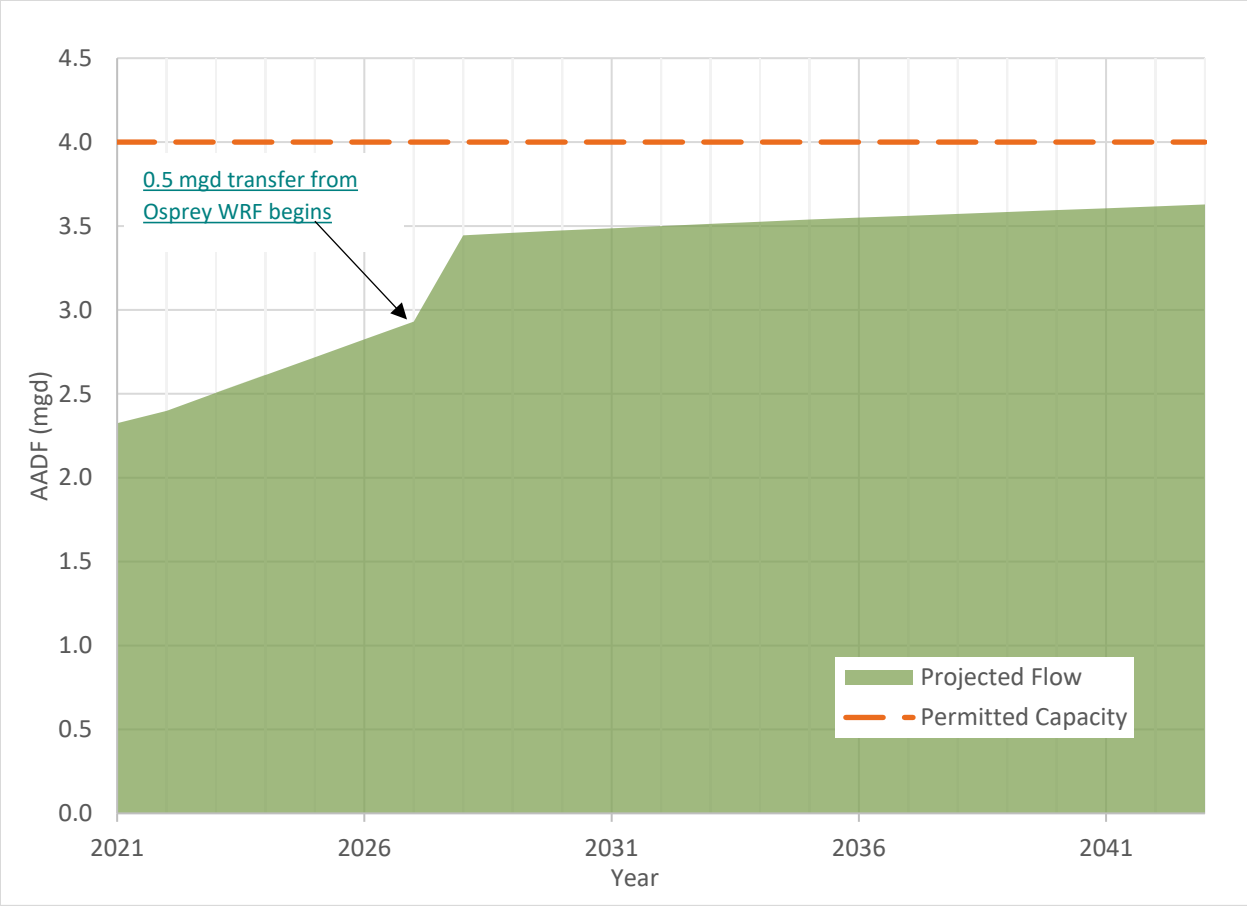


Figure 4-6 Titusville - Blue Heron WRF Projected Flow versus Treatment Capacity

4.7 Combined Regional Flows

Flow projections for each facility were combined to establish projected future wastewater treatment needs for a regional facility accepting flows from the six wastewater treatment facilities. As shown in Table 4-7 and on Figure 4-7, total flows for the region are projected to increase from 8.21 mgd in 2021 to 20.38 in 2043. These projections are based on utility estimates on the basis of current information and do not account for zoning changes in the service areas.

Table 4-7 Regional Projected Flows

Year	Projected Flow mgd AADF						
	BCUSD North Regional WRF	BCUSD Port St. John WWTF	BCUSD Sykes Creek Regional WWTF	Cape Canaveral AFS Regional WWTF	Titusville Osprey WRF	Titusville Blue Heron WRF	TOTAL Projected Regional Flow
2021	0.286	0.40	3.18	0.41	1.61	2.32	8.21
2022	0.288	0.44	3.31	0.43	1.97	2.40	8.83
2023	0.326	0.47	3.43	0.47	1.98	2.51	9.18
2024	0.400	0.62	3.69	0.56	1.99	2.61	9.87
2025	0.473	0.77	3.95	0.65	2.00	2.72	10.56
2026	0.547	0.93	4.20	0.69	2.01	2.82	11.20
2027	0.621	1.08	4.46	0.73	2.02	2.93	11.85
2028	0.695	1.23	4.72	0.77	1.53	3.44	12.40
2029	0.768	1.38	4.98	0.82	1.54	3.46	12.95
2030	0.842	1.53	5.24	0.85	1.55	3.47	13.49
2031	0.916	1.68	5.50	0.93	1.56	3.49	14.07
2032	0.989	1.83	5.76	0.99	1.57	3.50	14.64
2033	1.063	1.99	6.01	1.06	1.58	3.51	15.21
2034	1.137	2.14	6.27	1.12	1.59	3.53	15.78
2035	1.210	2.29	6.53	1.19	1.60	3.54	16.35
2036	1.284	2.44	6.79	1.19	1.61	3.55	16.86
2037	1.358	2.59	7.05	1.19	1.61	3.56	17.36
2038	1.432	2.74	7.31	1.19	1.62	3.57	17.86
2039	1.505	2.89	7.57	1.19	1.63	3.58	18.36
2040	1.579	3.05	7.82	1.19	1.64	3.59	18.87
2041	1.653	3.20	8.08	1.19	1.65	3.61	19.37
2042	1.726	3.35	8.34	1.19	1.65	3.62	19.87
2043	1.800	3.50	8.60	1.19	1.66	3.63	20.38

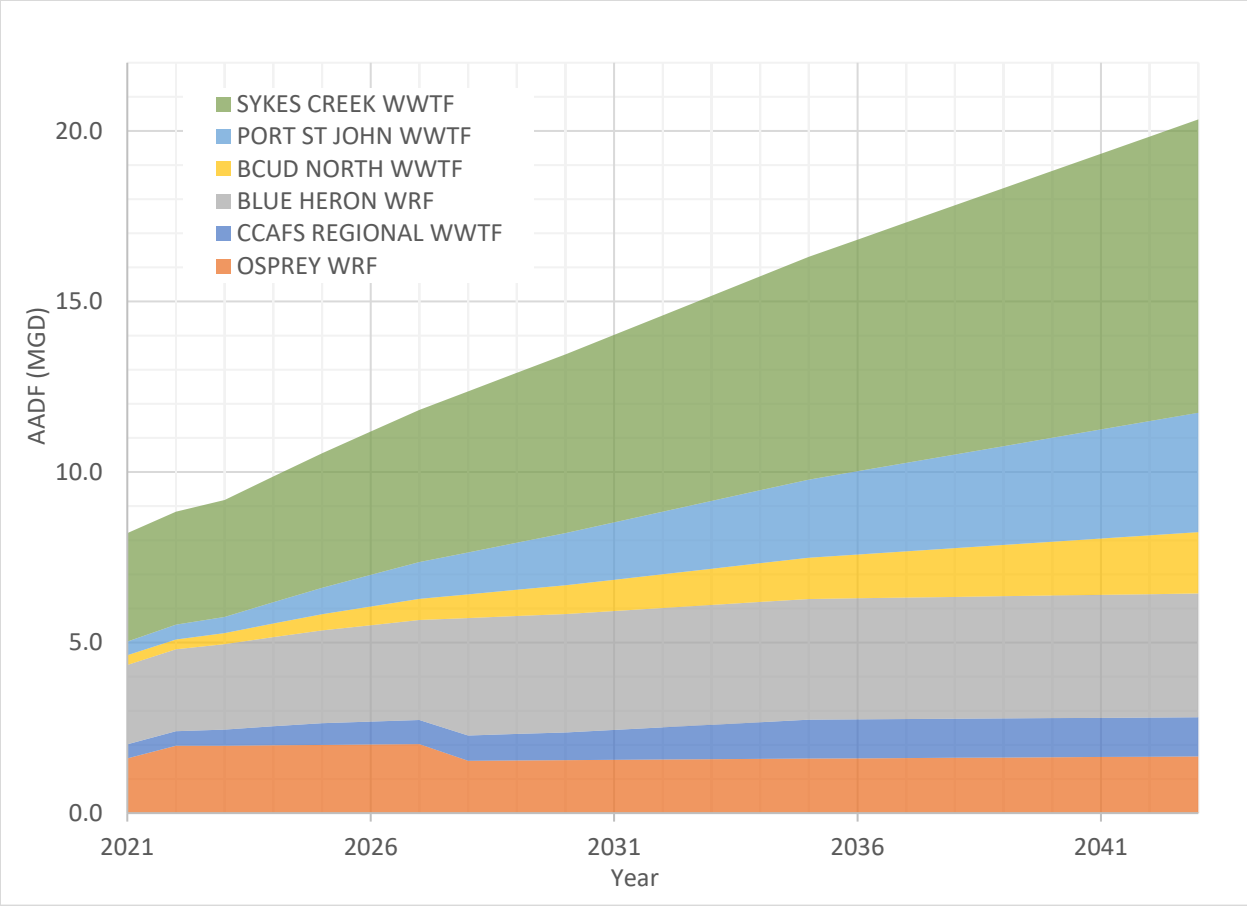


Figure 4-7 Combined Regional Flow Projections

5.0 Wastewater Treatment Facilities Evaluation

5.1 Alternative Development

The scope of work for this evaluation was based on evaluating three main alternatives:

- Alternative 1 – Upgrade and Expand the Six Wastewater Treatment Facilities in Place.
- Alternative 2 – Construct a New Regional Facility on Merritt Island for Partial Consolidation.
- Alternative 3 – Construct a New Regional Facility on the Mainland.

Alternative 1 includes expanding each of the six facilities to meet future flow requirements and upgrading each to meet AWT standards. The facilities would be expanded and upgraded at their existing location with the exception of the BCUSD Port St. John WWTF, which is located in the FPL easement and would be relocated to a new site nearby.

Alternative 2 was initially based on delivering the flow from five facilities to a regional facility at the existing BCUSD Sykes Creek Regional WWTF on Merritt Island. After permits and flow projections were reviewed, it was identified that the City of Titusville WRFs are permitted to meet or nearly meet AWT standards and would have sufficient capacity through the end of the planning horizon (2043). To take advantage of this existing infrastructure, Alternative 2 was modified to only include the Cape Canaveral AFS Regional WWTF and BCUSD Port St. John WWTF flows being delivered to an upgraded and expanded BCUSD Sykes Creek Regional WWTF serving as the New Brevard Regional Facility on Merritt Island. Because of distance, the BCUSD North Regional WRF is proposed to remain in place in this alternative, but it could be considered to be consolidated with the City of Titusville facilities in future evaluations.

Alternative 3 is based on delivering the flow from all six facilities to a new regional facility on the mainland in the vicinity of Port St. John. This alternative was developed for comparison purposes. It is recognized that a permutation of this alternative, similar to Alternative 2, allowing some of the existing mainland facilities to remain in place, or a phased development approach may be a more realistic option for future evaluations.

These three proposed alternatives were confirmed with the EDC prior to proceeding with evaluation. The evaluation of the potential wastewater treatment alternatives took all the major components of managing a wastewater treatment facility into consideration, including but not limited to capacity, renewal and replacement, regulations, effluent management, biosolids, and costs. These were then compared to each other using weighted criteria, which were created from the EDC's objectives and goals. The three alternatives that were evaluated are summarized in Table 5-1.

Table 5-1 Evaluated Wastewater Treatment Facilities Alternatives

Alternative No.	Alternative Name	Description	Total No. of WRFs
1	Upgrade and Expand the Treatment Facilities in Place (Baseline Alternative)	No WWTF/WRF consolidation. Maintain six separate WWTFs/WRFs. Identify improvements and additional capacity needs to meet AWT standards.	6
2	Construct a New Regional Facility on Merritt Island – BCUSD Port St. John and Cape Canaveral AFS Regional to BCUSD Sykes Creek Regional	Partial WWTF/WRF consolidation on Merritt Island. Consolidate by directing all Cape Canaveral AFS Regional WWTF and BCUSD Port St. John WWTF flows to BCUSD Sykes Creek WWTF. Maintain and upgrade the two City of Titusville and the BCUSD North Regional facilities to achieve additional capacity and meet AWT standards.	4
3	Construct a New Regional Facility on the Mainland	Complete WWTF/WRF consolidation. Divert all flows from all six facilities to a new WWTF/WRF on the mainland.	1

Some of the key goals of the EDC are to increase the resiliency and reduce vulnerability of the wastewater treatment facilities in the service area and protect IRL from nutrients due to groundwater seepage and runoff from reclaimed water use. To reduce the nutrient loading to the IRL, it was assumed that all the WWTFs/WRFs in the service area will achieve AWT standards which is described as effluent $CBOD_5$, TSS, TN, and TP concentrations of 5, 5, 3, and 1 mg/L, respectively. It is assumed that the facilities that cannot achieve AWT standards with their current treatment process will be upgraded to the 5-stage Bardenpho process consisting of anaerobic, pre-anoxic, aerobic, post-anoxic, and reaeration basins with chemical storage and feed systems for additional TN and TP removal. Although this evaluation assumed 5-Stage Bardenpho for cost estimates, other technologies can be evaluated further in future feasibility studies to identify the best suited technology for the service area as the decisions can be impacted by many factors. It is also assumed that aeration basins will be equipped with plug flow reactors with fine bubble diffusers and blowers for aeration. The proposed process flow diagram with 5-stage Bardenpho used for this evaluation is presented on Figure . A typical AWT WWTF was assumed to have the following unit processes:

- Influent pump station.
- Flow equalization.
- BNR process (5-stage Bardenpho).
- Fine bubble diffused aeration system with centrifugal blowers.
- Circular secondary clarifiers.
- Cloth media disk filters.
- Effluent disinfection with sodium hypochlorite.
- Chemical storage and feed system for carbon source and alum.

- Reclaimed water storage tank.
- High service pump station.
- Biosolids treatment facilities.

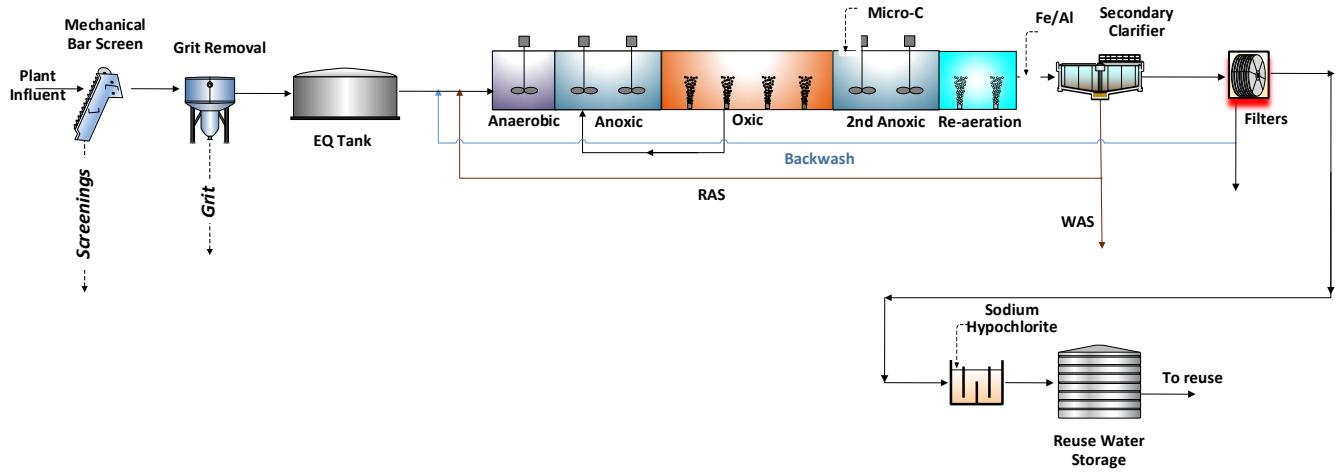


Figure 5-1 Proposed Typical Process Flow Diagram for AWT WWTF

Existing effluent/reclaimed water management at the six facilities includes public access reuse, constructed wetlands with discharge to the St. Johns River, RIBs, adsorption fields and deep injection wells. None of the facilities currently discharge directly to the IRL, but there has been concern expressed by FDEP, that with exception of the deep injection wells, these systems could contribute nutrients to the IRL unless upgraded to remove nutrients from the reclaimed water through AWT. The public access reuse systems provide a water conservation benefit. If taken out of service, they would require an alternative water supply, and could place an additional burden on the aquifer and the public water supply systems. For this study, it is assumed that these existing public access reuse systems will remain in place. The Titusville Blue Heron wetlands also provides an ecological benefit and wildlife habitat and will also be assumed to remain in service. Deep injection wells, which involve injecting treated effluent into a zone of the aquifer that is not viable as an underground source of drinking water and is confined from upper drinking water sources, are a viable alternative that does not impact IRL water quality and should remain in place and can be considered for future effluent disposal for the purposes of alternative comparison. In future studies, other beneficial options that are also protective of the IRL, such as potable reuse can be considered.

For the purposes of this conceptual level alternatives evaluation, the following broad assumptions were made:

- Where WWTFs/WRFs will remain in place, existing reuse will be continued and expanded as needed to meet future reuse needs.
- Public access/slow rate reuse systems will remain in operation even if wastewater flows are sent to a regional facility. A reuse pipeline will be required to return reclaimed water to these customers.
- Deep injection wells will be added or expanded to address the disposal of excess flows that cannot be reused and to eliminate the need for surface water discharge as a backup to reuse.

- Existing RIBs and adsorption fields will be taken out of service in the alternatives where the WWTFs/WRFs are taken out of service and wastewater flows delivered to a regional WWTF.
- The Titusville Blue Heron wetland system will remain in service for all alternatives although flows to the St. Johns River system will be reduced because of the increase in reuse as part of the City's Senate Bill 64 plan.

5.2 Alternative 1 – Upgrading and Expanding the Treatment Facilities in Place

5.2.1 Process Evaluation

As shown on Figure , Alternative 1 is the baseline alternative, consisting of maintaining the six wastewater treatment facilities individually and replacing existing equipment and structures "in-kind" while planning for population growth in each service area, but no capacity consolidation or flow transfer would occur among the six facilities. This alternative assumes the following based on the flow projections, the existing plant conditions, and their ability to achieve AWT standards:

- Cape Canaveral AFS Regional WWTF is projected to exceed its capacity before 2043. A new facility is considered for this evaluation due to additional capacity needs and its inability to achieve AWT standards.
- The BCUSD North Regional WWTF is projected to exceed its capacity before 2043 and a new facility is recommended due to its poor condition, and its inability to achieve AWT standards.
- The BCUSD Port St. John WWTF is projected to exceed its capacity before 2043 and a new facility is considered for this evaluation because of its poor condition and its inability to achieve AWT standards. It is also currently located on land owned by FPL; so a new site is required.
- The BCUSD Sykes Creek Regional WWTF is projected to exceed its capacity before 2043. The facility needs major improvements because of the poor condition of the existing facilities and its inability to achieve AWT standards.
- The Titusville Blue Heron WRF has a 5-stage Bardenpho process and can achieve AWT standards and has sufficient treatment capacity for the planning period. Therefore, it is assumed the facility does not require any major improvements or upgrades.
- Although Titusville Osprey WRF was recently upgraded to reduce effluent TN to 6 mg/L and TP to 1 mg/L with a step-feed process, it will need additional improvements to reduce effluent TN to 3 mg/L. In addition, the facility was designed to achieve the proposed TN and TP limit at only 2 mgd AADF although the facility has a permitted treatment capacity of 2.75 mgd. Therefore, the new step-feed process will require upgrades and additional treatment capacity to achieve AWT standards.

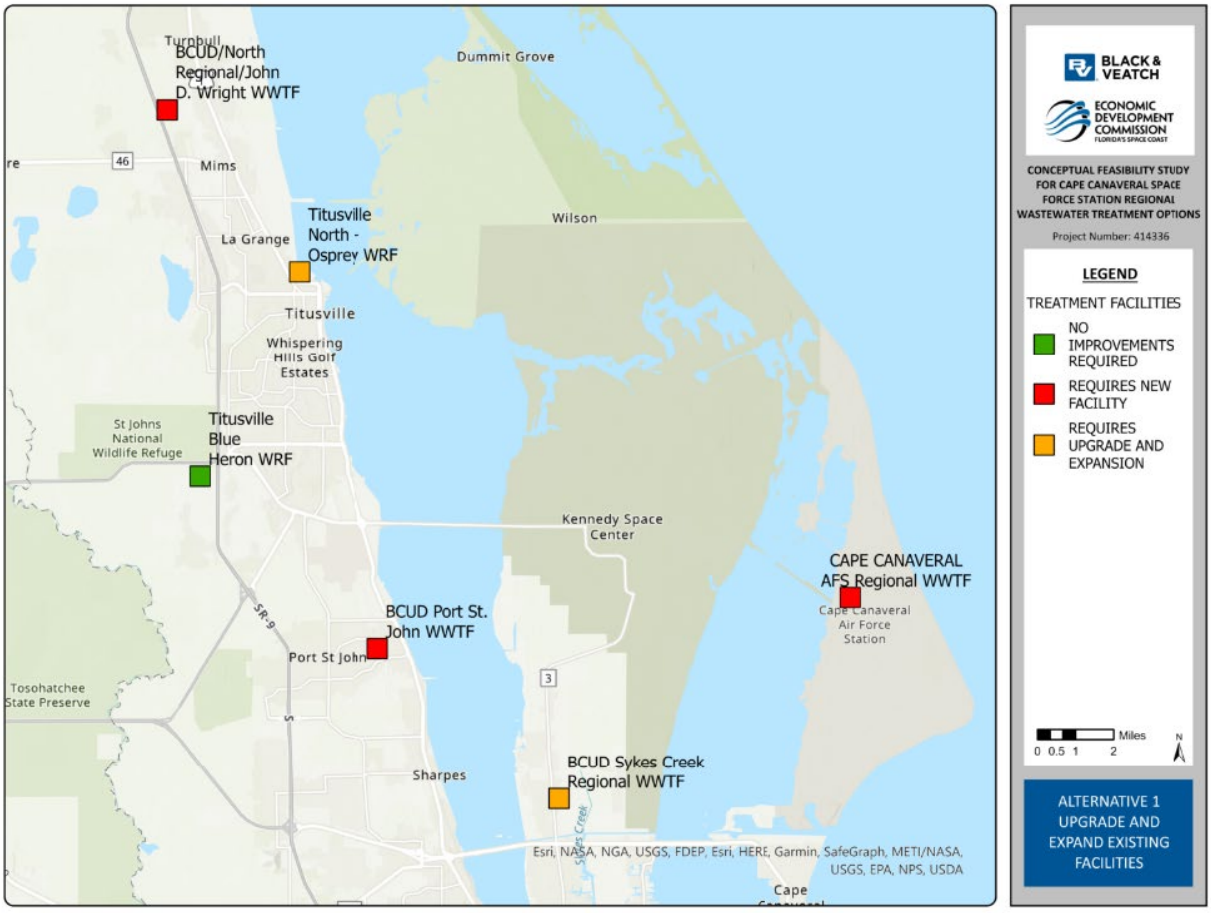


Figure 5-2 Alternative 1 - Upgrade and Expand Existing Facilities

5.2.1.1 Cape Canaveral AFS Regional WWTF

The Cape Canaveral AFS Regional WWTF is projected to exceed the existing treatment capacity of 0.80 mgd AADF prior to 2043. The projected flow for 2043 is 1.15 mgd AADF. The treatment processes at the Cape Canaveral AFS Regional WWTF are reaching the end of their useful life and a new facility at the same or different location is needed. The new facility would be designed to have a capacity of 1.5 mgd AADF consisting of two 0.75 mgd AADF Bardenpho trains. Chemical addition such as alum or carbon source might be needed to improve nitrogen and phosphorus removal. For this conceptual evaluation, the following is considered for this facility:

- Headworks with a grit removal system and two screens.
- Influent pump station.
- Two 0.75 mgd AADF Bardenpho process trains with fine bubble diffused aeration system and multistage centrifugal blowers.
- Two secondary clarifiers with a return activated sludge/waste activated sludge (RAS/WAS) pump station.
- Two cloth media disk filters.

- Two chlorine contact tanks.
- A service pump station.
- One admin and maintenance building.
- Chemical feed and storage systems for carbon source, metal salt, and sodium hypochlorite.

Although it is assumed that a conventional biological treatment process consisting of 5-stage Bardenpho will be used for the new facility, the existing facility treats industrial wastewater and may require a different treatment process configuration, chemical , advanced treatment technologies to achieve AWT standards. Therefore, more detailed evaluation is required to understand the wastewater composition and the best treatment process. However, the 5-stage Bardenpho process assumed for cost estimates should be conservative from the cost perspective and is used for this evaluation.

5.2.1.2 BCUSD North Regional WWTF

The BCUSD North Regional WRF has a permitted treatment capacity of 0.99 mgd AADF. The facility was designed for 1.0 mgd AADF and the existing treatment processes consist of a pretreatment structure, influent pump station, two carrousels, two secondary clarifiers, two flocculators, two dual media sand filters, chlorine disinfection, chemical feed, 0.50 million-gallon (MG) reuse storage tank and pump station, and biosolids dewatering by a rotary fan press. The BCUSD North Regional WRF is projected to exceed the existing treatment capacity of 1.0 mgd AADF by 2043. According to the Capital Improvements Program/R&R Evaluation Report dated December 2022, most of the existing structures at the plant were constructed in 1986 and are nearing the end of their useful life. The headworks facility does not include grit removal or screens which are essential to protect the downstream processes and extend the longevity of the equipment. Considering the major improvements recommended for the operations building, the need to increase capacity, and the need for a new maintenance building, this report assumed that a new 2.0 mgd AADF facility with all typical structures will be constructed. The new facility will consist of the following:

- Headworks with a grit removal system and two screens.
- Influent pump station.
- Two 1.0 mgd AADF Bardenpho process trains with fine bubble diffused aeration system and multistage centrifugal blowers.
- Two secondary clarifiers with a RAS/WAS pump station.
- Two cloth media disk filters.
- Two chlorine contact tanks.
- A high service pump station.
- One 1 MG reclaimed water storage tanks.
- One admin and maintenance building.
- Chemical feed and storage systems for carbon source, metal salt, and sodium hypochlorite.

It is assumed that the existing two carrousels with 0.36 MG capacity each, will be retrofitted to produce exceptional quality (EQ) sludge. The aerobic sludge holding tanks which will be equipped with coarse bubble diffusers and positive displacement blowers.

5.2.1.3 BCUSD Port St. John WWTF

The BCUSD Port St. John WWTF is considered to exceed capacity by 2043 and the BCUSD considers that the BCUSD Port St. John WWTF treatment processes have reached the end of their useful life and a new facility at the same or different location is needed. The existing facility was not configured to achieve AWT standards. For this evaluation, it is assumed that a new facility with 4.0 mgd AADF capacity will be constructed and will consist of two 2.0 mgd Bardenpho trains to achieve AWT standards. Chemical addition such as alum or carbon source might be needed to improve nitrogen and phosphorus removal. The facility would consist of the following:

- Headworks with coarse screens and a grit removal system.
- Influent pump station.
- One flow equalization tank with pumps.
- Two 2.0 mgd AADF Bardenpho process trains.
- Two secondary clarifiers with a RAS/WAS pump station.
- Two cloth media disk filters.
- Two chlorine contact tanks.
- A high service pump station.
- One 1.5 MG reclaimed water storage tanks.
- One administration and maintenance building.
- Chemical feed and storage systems for carbon source, metal salt, and sodium hypochlorite.
- One 1.0 mgd deep injection well system for effluent disposal.

The BCUSD St. Port John WWTF was constructed in an easement owned by FPL; therefore, when the new facility is constructed, another site may need to be identified and purchased.

5.2.1.4 Sykes Creek Regional WWTF

The BCUSD Sykes Creek Regional WWTF has a permitted treatment capacity of 6 mgd AADF. The existing treatment processes consist of influent screening, grit removal, two carrousel-style oxidation ditch secondary treatment aeration basins, secondary clarification, tertiary filtration, disinfection, and dewatering biosolids. The BCUSD Sykes Creek Regional WWTF is projected to reach existing treatment capacity by 2043 and therefore additional treatment capacity will be needed during the planning period. In addition, treatment enhancement is required to achieve AWT standards. The current biological treatment was designed to achieve $CBOD_5$ and TSS removal as well as nitrification. To improve the treatment and increase capacity at the BCUSD Sykes Creek Regional WWTF, it is assumed that four new 2.5 mgd AADF Bardenpho trains will be constructed to achieve AWT standards and the existing oxidation ditches will be converted to an equalization tank. The construction will also include new headworks at a higher elevation and four new secondary clarifiers. The proposed improvements to the BCUSD Sykes Creek Regional WWTF for this evaluation are consistent with the “Sykes Creek Wastewater Treatment Plant Evaluation” dated June 2022. For this conceptual evaluation, the BCUSD Sykes Creek Regional WWTF will consist of the following:

- New headworks with coarse screens and grit removal systems.
- Four 2.5 mgd AADF Bardenpho process trains.

- Four new secondary clarifiers with (RAS/WAS) pump stations.
- Replace sludge holding tank blowers and diffusers.
- Convert oxidation ditches into flow equalization tanks.
- One new sludge holding tank.
- New administration/maintenance building.

Although, the BCUSD Sykes Creek Regional WWTF site appears to have some land available, some areas are wetlands and there does not appear to be enough land for new structures. It is assumed for this conceptual evaluation that land acquisition is needed for the new structures.

5.2.1.5 Titusville Osprey WRF

The Titusville Osprey WRF has a permitted treatment capacity of 2.75 mgd AADF. The existing treatment processes consist of influent screening, grit removal, odor control, two treatment trains consisting of anaerobic/anoxic/aerobic basins (A_2O process), secondary clarification, chemical feed facilities, filtration, and high-level disinfection. Biosolids are thickened, stabilized utilizing aerobic digestion and dewatered using a belt filter press. The Preliminary Design Report (September 2019) presented that the facility was to be upgraded to reduce effluent TN to 6 mg/L and TP to 1 mg/L with a step-feed process. The existing A2O process was converted to three pass step feed followed by post anoxic and reaeration basins. Although the facility has a permitted treatment capacity of 2.75 mgd, the new improvements were designed to enable the facility to achieve the proposed effluent TN and TP limits at 2.0 mgd AADF. Therefore, the Preliminary Design Report proposed addition of one future 1.0 mgd AADF BNR train to increase capacity to 3.0 mgd AADF. It is assumed that the 2.0 mgd AADF step-feed process can meet AWT standards by reducing effluent TN from 6 mg/L to 3 mg/L with addition of a carbon source to the post-anoxic basins. The following improvements are assumed for the Titusville Osprey WRF to achieve AWT standards at the permitted treatment capacity of 2.75 mgd AADF:

- A new 1.0 mgd AADF 5-stage Bardenpho train.
- One new secondary clarifier.
- Replace automatic backwash filters with cloth media disk filters.
- Carbon source storage and feed system.

According to the Operations and Maintenance Performance Report (2019), an inspection of the Titusville Osprey WRF was conducted on February 21-22, 2019, and it was determined that the Osprey WRF was operating in a satisfactory condition and no major upgrades are needed for the existing processes other than renewal and replacement of equipment.

5.2.1.6 Blue Heron WRF

The Titusville Blue Heron WRF has a permitted treatment capacity of 4 mgd AADF. The existing treatment processes consist of influent screening, grit removal, odor control, BNR (Bardenpho process), secondary clarification, chemical feed facilities, filtration, and high-level disinfection by chlorination. Biosolids are thickened, stabilized utilizing autothermal thermophilic aerobic digestion and dewatered using a belt filter press. According to the 2019 Operations and Maintenance Performance Report (2019), an inspection of the Blue Heron WRF was conducted on February 21-22, 2019. Based on the 2019 inspection, the Titusville Blue Heron WRF is operating in a satisfactory condition and no major upgrade is needed. The projected flow rate at Blue Heron WRF for 2043 is 2.68 mgd AADF which is less than the treatment capacity of 4 mgd AADF. Therefore, an expansion is not anticipated. As far as nutrient

removal and treatment efficiency, the process at the Titusville Blue Heron WRF currently meets AWT limits for CBOD, TSS, TN, and TP and no treatment upgrades are proposed.

5.2.2 Treated Effluent Management/Reuse

For the purposes of this conceptual evaluation, it is assumed that the existing effluent management and reuse systems for each facility will remain in place and these same systems will be expanded to meet future needs. No new facilities will be assumed to discharge to surface waters of the IRL.

In the case of the BCUSD Port St. John WWTF, it was assumed that a 3.5 mgd capacity deep injection well system will be used to replace the percolation ponds and adsorption field since these are located in the FPL easement and the new facility is likely to be constructed in a different location. The existing reuse system would remain in operation and expanded to serve new growth in the area and the new deep injection well will serve as additional effluent disposal and as a back up to reclaimed water management.

5.2.3 Indian River Lagoon Water Quality and Infrastructure Resilience

For Alternative 1, upgrading and expanding the existing wastewater treatment facilities, the 2022 flows and 2022 annual average TN and TP concentrations from each facility's discharge monitoring report were used to estimate the current TN and TP nutrient loads in pounds per year (lbs/y). The 2043 projected flows from Section 4.0 and AWT nutrient concentrations (3 mg/L of TN and 1 mg/L of TP) were used to estimate the future TN and TP loads. A 75 percent reduction in both the current and future loads was applied to account for environmental attenuation/uptake of some of the nutrients in the reclaimed water, based on estimates from FDEP. This means that only a portion of the nutrients in the reclaimed water used for irrigation would have the opportunity to migrate to the IRL or one of its tributaries. Table 5-2 summarizes the estimated TN and TP load reductions from Alternative 1. The BCUSD facilities have a large projected increase in flows. Therefore, while nutrient concentrations will be lower in the future, the higher flows mean that there are no or minimal load reductions at these facilities.

The facility data showed that BCUSD Sykes Creek Regional WWTP effluent TN and TP concentrations averaged 2.7 mg/L and 1.4 mg/L, respectively, in 2022. The effluent TN was below AWT limit of 3 mg/L and the effluent TP was very close to the AWT limit of 1 mg/L. The facility has only oxidation ditches, which are not designed to achieve AWT standards. When the ditches are operated at lower dissolved oxygen conditions at reduced capacity, significant TN and TP removal can occur. The 6-mgd AADF facility operated under 4 mgd AADF in 2022, which allowed a low dissolved oxygen operation. However, when the facility operates at higher flows in the future, such low effluent TN and TP levels cannot be achieved with the current design.

Table 5-2 Alternative 1 Estimated TN and TP Load Reductions

Facility	2022 Flows (mgd)	2022 Average TN Concentration (mg/L)	2022 Average TP Concentration (mg/L)	2043 Projected Flows (mgd)	Proposed TN Concentration (mg/L)	Proposed TP Concentration (mg/L)	Estimated TN Load Reduction (lbs/y)*	Estimated TP Load Reduction (lbs/y)*
Cape Canaveral AFS Regional	0.50	14.58	2.16	1.15	3.00	1.00	2,972	0
BCUSD North Regional	0.29	11.73	7.12	1.80	3.00	1.00	0	194
BCUSD Port St. John	0.36	13.50	1.15	3.50	3.00	1.00	0	0
BCUSD Sykes Creek Regional	3.91	2.70	1.40	8.60	3.00	1.00	0	0
Titusville Osprey	1.97	11.89	1.21	1.89**	3.00	1.00	13,740	392
Titusville Blue Heron	2.40	4.80	0.31	3.40	3.00	0.31	1,022	0

*Load estimates include a 75 percent reduction to account for environmental attenuation/uptake of some of the nutrients in the reuse water based on FDEP estimates. Any calculated negative values are shown as zero reductions.

5.3 Alternative 2 – Construct a New Regional Facility on Merritt Island for Partial Consolidation

5.3.1 Process Evaluation

Alternative 2 consists of diverting all raw wastewater flows from the BCUSD St. Port John and Cape Canaveral AFS Regional WWTFs to the BCUSD Sykes Creek Regional WWTF. The BCUSD North Regional WRF, Titusville Osprey WRF, and Titusville Blue Heron WRF would be maintained and upgraded as needed to provide sufficient treatment capacity and achieve AWT standards. This alternative is shown on Figure 5-3.

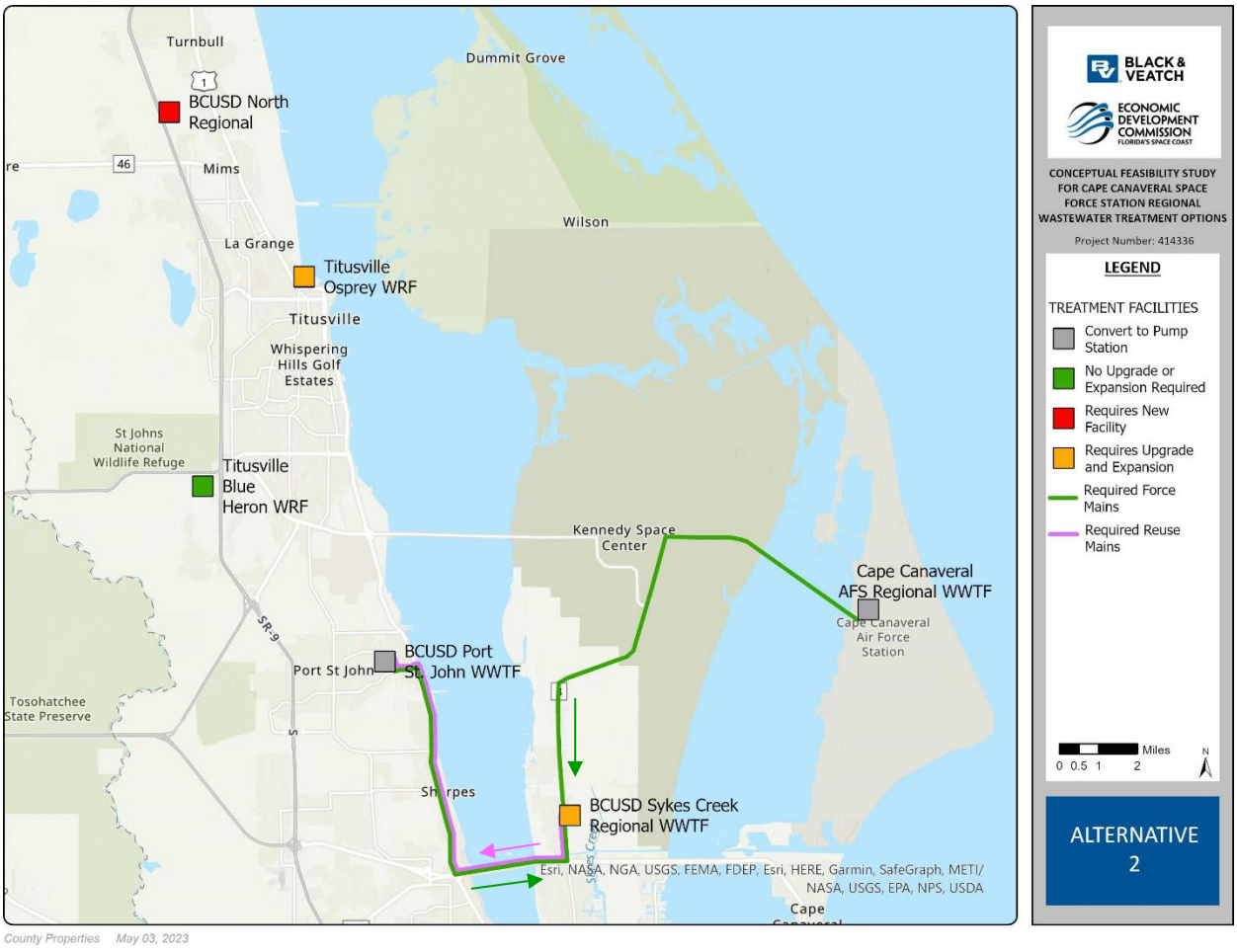


Figure 5-3 Alternative 2 Layout – Construct a New Regional Facility on Merritt Island for Partial Consolidation

The current combined flows from BCUSD Sykes Creek Regional WWTF, BCUSD St. Port John WWTF, and Cape Canaveral AFS Regional WWTF is about 4.86 mgd AADF and the combined wastewater flows are projected to reach 13.25 mgd AADF by 2043. The BCUSD Sykes Creek WWTF currently has a permitted treatment capacity of 6 mgd AADF. Therefore, the BCUSD Sykes Creek Regional WWTF would have to be expanded to accommodate the projected future flows from BCUSD Port St. John and Cape Canaveral AFS Regional WWTFs. Also, as mentioned in the previous section, the BCUSD Sykes Creek Regional WWRF needs AWT improvements and other upgrades. The BCUSD Sykes Creek Regional WWTF is proposed for this conceptual evaluation to be expanded to 15 mgd AADF under Alternative 2 with the following improvement and upgrades:

- New headworks.
- Four 3.75 mgd AADF Bardenpho process trains.
- Four new secondary clarifiers with RAS/WAS pump stations.
- Cloth media disk filters.
- Replace sludge holding tank blowers and diffusers.
- Add an additional sludge holding tank.
- New administrative/maintenance building.

A new facility is recommended for the BCUSD North Regional WRF for the reasons described in the previous section. The new facility will consist of the same processes listed in Subsection 5.2.1.2. Treatment process improvements are needed for the Titusville Osprey WRF to meet capacity and full AWT standards. Recommended improvements are described in Subsection 5.2.1.5.

5.3.2 Treated Effluent Management/Reuse

For this alternative, it is assumed that the existing public access reuse system at the BCUSD Port St. John WWTF will remain in place and be expanded to serve growth in the service area. The RIBs at the Cape Canaveral AFS Regional WWTF and the RIBs and adsorption field at the BCUSD Port St. John WWTF will be taken out of service. The BCUSD Sykes Creek Regional WWTF has an existing 4.5 mgd public access reuse system and two 8.0 mgd deep injection wells that will also remain in service and be expanded to meet future needs.

Flows in excess of the current system capacity that result from the proposed reconfiguration will be handled by expanding the existing BCUSD Sykes Creek Regional WWTF reuse system and the deep injection system capacity. The two injection wells at this facility are currently designed for a maximum flow of 8 mgd for each well. It is possible that the existing two injection wells may need rehabilitation to increase the permitted capacity. Additional review of the existing deep injection well system operation is necessary to determine if the wells can accommodate the additional flow. If the aquifer will not accept the additional flow or if the rehabilitation of the wells is unsuccessful, it may be necessary to drill a new 6 mgd well and a corresponding monitoring well. The total system cost may be considerably less if the wells can be rehabilitated, but for cost estimating purposes it was assumed that a new injection well will be constructed.

5.3.3 Indian River Lagoon Water Quality and Infrastructure Resilience

Under Alternative 2, diverting the wastewater flow from Cape Canaveral AFS WWTF and BCUSD Port St. John to the BCUSD Sykes Creek Regional WWTF and upgrading the other facilities to AWT, the 2022 flows and 2022 annual average TN and TP concentrations from each facility's discharge monitoring report were used to estimate the current TN and TP nutrient loads. The 2043 projected flows from Section 3.0 and AWT concentrations were used to estimate the future TN and TP nutrient loads. A 75 percent reduction in both the current and future loads was applied to account for anticipated environmental attenuation/uptake of nutrients in the reclaimed water, based on estimates from FDEP. This means that only a portion of the nutrients applied from the reclaimed water would have the opportunity to migrate to the IRL or one of its tributaries. Table 5-3 summarizes the estimated TN and TP load reductions from Alternative 2. The BCUSD facilities have a large projected increase in flows through 2043. Therefore, while nutrient concentrations will be lower in the future with AWT, the higher flows mean that there is no nutrient load reduction from diverting the Cape Canaveral AFS Regional and BCUSD Port St. John WWTFs to the BCUSD Sykes Creek Regional WWTF.

Table 5-3 Alternative 2 Estimated TN and TP Load Reductions

Category	Cape Canaveral AFS Regional and BCUSD Port St. John to BCUSD Sykes Creek Regional TN Load (lbs/y)*	Cape Canaveral AFS Regional and BCUSD Port St. John to BCUSD Sykes Creek Regional TP Load (lbs/y)*	BCUSD North Regional TN Load (lbs/y)*	BCUSD North Regional TP Load (lbs/y)*	Titusville Osprey TN Load (lbs/y)*	Titusville Osprey TP Load (lbs/y)*	Titusville Blue Heron TN Load (lbs/y)*	Titusville Blue Heron TP Load (lbs/y)*
2022 Load	17,564	5,392	2,615	1,587	18,129	1,845	8,916	576
2043 Estimated Load	30,765	10,255	4,179	1,393	4,388	1,463	7,894	789
Estimated Reduction	0	0	0	194	13,470	382	1,022	0

*Load estimates include a 75 percent reduction to account for environmental attenuation/uptake of some of the nutrients in the reuse water from FDEP estimates. Any calculated negative values are shown as zero reductions.

5.4 Alternative 3 – Construction of a New Regional WWTF on the Mainland

5.4.1 Process Evaluation

Alternative 3 consists of diverting all the raw wastewater flows from the six facilities to a new regional facility located on the mainland as shown on Figure 5-4.

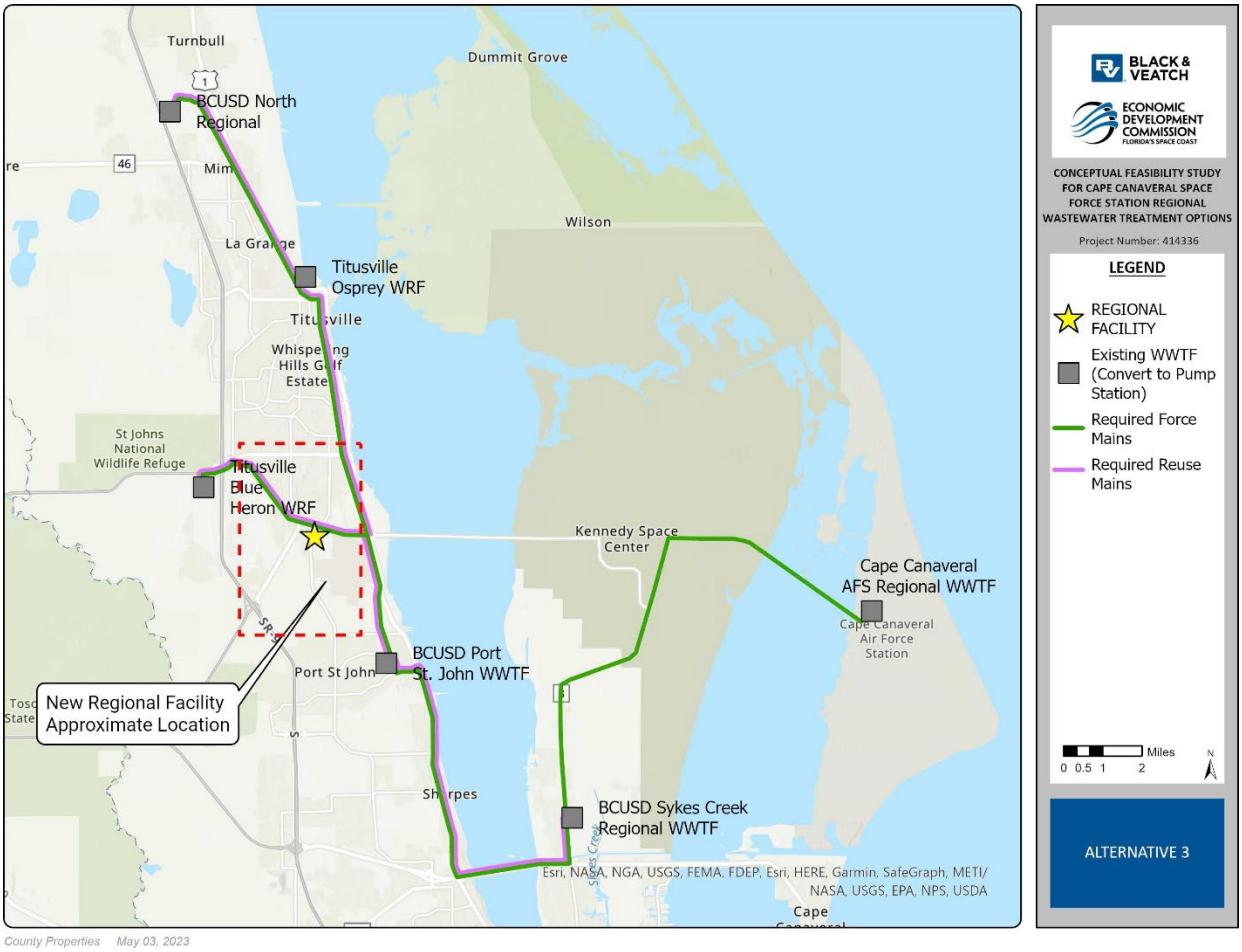


Figure 5-4 Alternative 3 Regional Facility on Mainland

The projected combined flow for all six facilities is 20.34 mgd AADF for 2043 (Table 4-7); therefore, the proposed treatment capacity for the regional facility is 21 mgd AADF. The proposed facility BNR process is 5-stage Bardenpho consisting of four 5.25 mgd trains. The regional facility was assumed to consist of the following components:

- Administrative and maintenance building.
- Influent pump station.
- Two flow equalization tanks.
- Headworks with mechanical coarse screens (two duty and one standby and grit removal system (two duty).

- Four 5.25 mgd Bardenpho process trains with fine bubble diffused aeration system and multistage centrifugal blowers.
- Six secondary clarifiers with RAS/WAS and scum pump stations.
- Five cloth media disk filters.
- Four chlorine contact tanks for disinfection.
- Two 1.5 MG reclaimed water storage tanks.
- Reclaimed water high service pump station, four master reuse pump stations, two duty and one standby.
- Chemical feed and storage systems for carbon source, metal salt, and sodium hypochlorite.

5.4.2 Treated Effluent Management/Reuse

Reclaimed water from the new regional facility will be returned to the existing and future expanded reuse systems associated with each of the existing WWTFs/WRFs. A 21 mgd deep injection well system is included at the regional site to provide disposal of excess flows and as a backup to reuse. An injection well system of this size requires at least two injection wells (for operational redundancy) paired with one monitoring well. It is also assumed that reclaimed water will be delivered to Titusville's Blue Heron Wetlands in this alternative. The RIBs at the Cape Canaveral AFS Regional WWTF, RIBs and adsorption field at the BCUSD Port St. John WWTF and the RIBs at the BCUSD North Regional WWTF will be taken out of service.

5.4.3 Indian River Lagoon Water Quality and Infrastructure Resilience

For Alternative 3, diverting the wastewater flow from the six facilities to a new consolidated AWT facility on the mainland, the 2022 flows and 2022 annual average TN and TP concentrations from each facility's discharge monitoring report were used to estimate the current TN and TP nutrient loads. The 2043 projected flows from Section 3.0 and AWT concentrations were used to estimate the future TN and TP nutrient loads. A 75 percent reduction in both the current and future loads was applied to account for environmental attenuation/uptake of some of the nutrients in the reuse water, based on estimates from FDEP. This means that only a portion of the nutrients applied from the reuse water would have the opportunity to migrate to the IRL or one of its tributaries. Table 5-4 summarizes the estimated TN and TP load reductions from Alternative 3. In the future, the total flow is 2.2 times the current flow. Therefore, even with the lower nutrient concentrations from AWT, the overall TN and TP loading will be higher.

Table 5-4 Alternative 3 Estimated TN and TP Load Reductions

Category	Consolidated WWTF TN Load (lbs/y)*	Consolidated WWTF TP Load (lbs/y)*
2022 Load	47,223	9,400
2043 Estimated Load	47,227	15,742
Estimated Reduction	0	0

*Load estimates include a 75 percent reduction to account for environmental attenuation/uptake of some of the nutrients in the reuse water.

5.5 Climate Change Stressors

The 2021 Indian River Lagoon Climate Ready Estuary report prepared for the IRL NEP evaluated risks from wastewater resulting from climate change stressors, including warmer temperatures, changes in precipitation, increased storminess, acidification, and sea level rise, with the main risk being an increase of pollutant loads to the IRL. Risk resulting from each of the five climate stressors were scored with a total score ranging from 4 to 12, with 12 being the highest risk. The climate stressors for wastewater and associated risk scores were warmer temperatures (6), changes in precipitation (9), increased storminess (10), acidification (6), and sea level rise (9).

Average observed sea level in the United States has risen by more than 0.1 meter (0.33 foot) since 1970, and sea level rise at the current trajectory will result in an additional 0.25 meter (0.82 foot) to 0.30 meter (0.98 foot) by 2050, as shown on Figure 5-5.

Predicted sea level rise will cause flooding and storm surge heights to increase and reach further inland. By 2050, “moderate” (typically damaging) flooding is expected to occur, on average, more than 10 times as often as it does today (NOAA 2022). The proximity of WWTFs and discharges from RIBs, treatment wetlands, and reclaimed irrigation water to the coast can significantly contribute to the increase in pollutant loads. Furthermore, a rise in sea level and resulting rise in the water table will reduce the available capacity of land reuse applications. These factors may be mitigated by moving these facilities to higher elevations further from surface water.

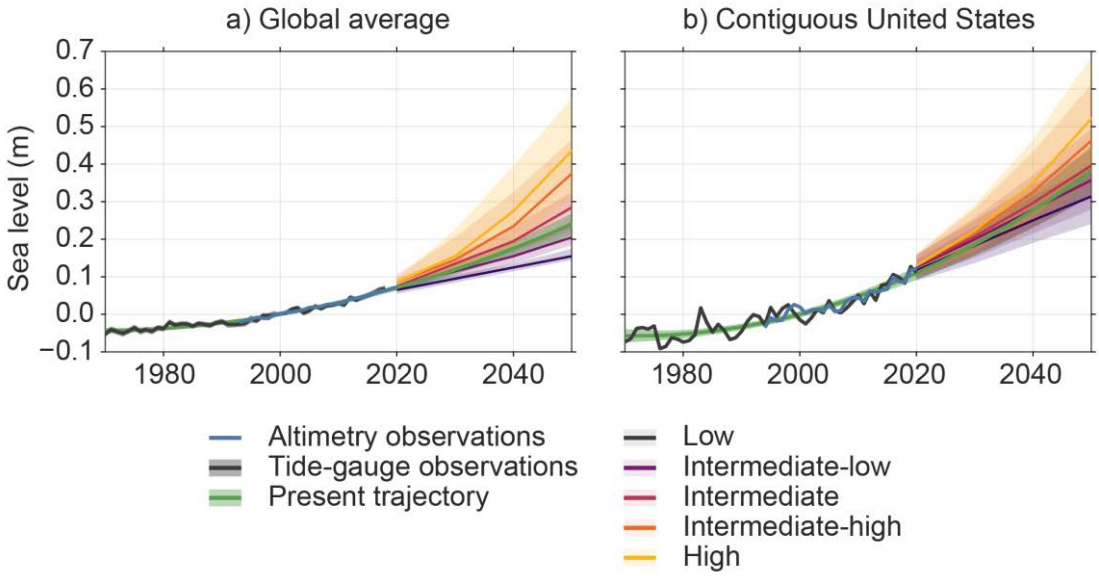


Figure 5-5 Sea Level Rise Predictions (NOAA 2022)

Changes in precipitation and increased storminess will affect the entire landscape, but will have additional impacts relative to wastewater treatment facilities in locations prone to flooding and storm surge. Therefore, sea level rise and the resulting changes to flooding and storm surge risks were evaluated to determine the potential effects for the selected each alternative.

Each facility was evaluated for direct effects from sea level rise using a 2-foot sea level rise scenario. Based on the NOAA 2022 projections for Trident Pier, in Cape Canaveral, Florida, a 2 foot rise in sea level

is between the intermediate high (1.87 feet) and high (2.30 feet) scenario by 2060 and is between the intermediate low (1.64 feet) and intermediate (2.33 feet) scenario by 2080. These predictions suggest that a 2 foot rise in sea level is likely to occur during the design life of any upgrades or new construction of WWTFs. It is important to note that these sea level rise values are mean high high-water values, and do not present additional risk from flooding events that may occur from increased storm events, high rain events, storm surge, or king tide events.

The 2 foot sea level scenario for the BCUSD North Regional WWTF is presented on Figure 5-5, which indicates no sea level rise impacts within the view area for this time period. This facility is located on the coastal ridge, away from surface waterbodies, at an elevation of approximately 30 feet mean sea level (msl); therefore, there is low vulnerability to sea level rise and other climate stressors.

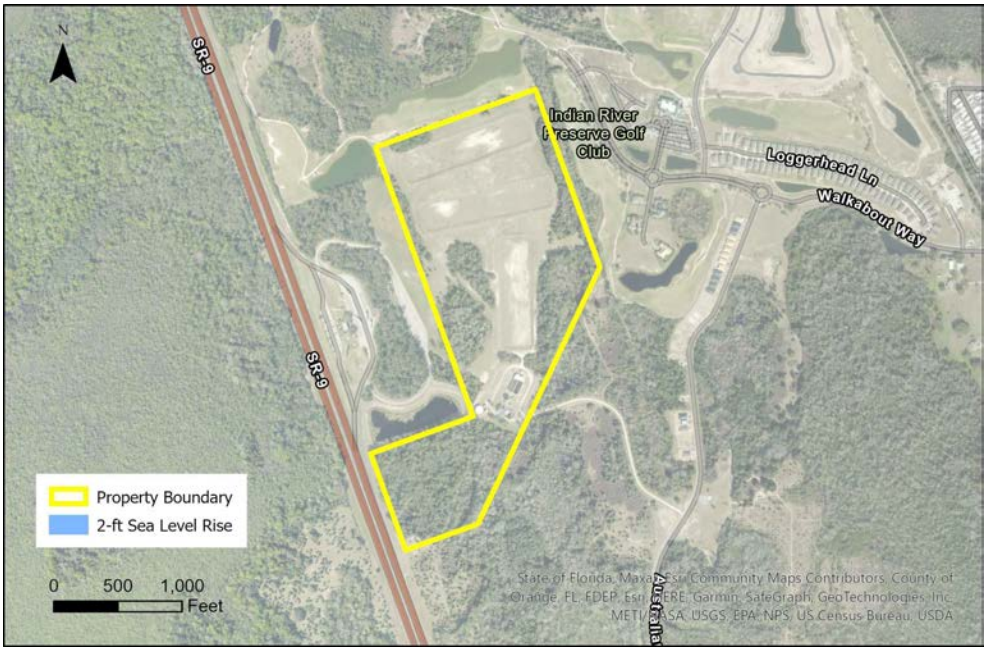


Figure 5-6 BCUSD North Regional WRF Depicting a 2 Foot Sea Level Rise Scenario (NOAA 2022)

The BCUSD Sykes Creek Regional WWTF is located on Merritt Island, adjacent to Sykes Creek, at an elevation of approximately 15 feet msl. Figure 5-7 depicts a 2 foot level sea rise scenario on this facility, with the blue colors depicting sea level rise encroaching the facility from Sykes Creek to the east, and the eastern portion of the property as being normally under water. The proximity to Sykes Creek, island location, and available area for expansion on this site projected to be normally below sea level under a 2 foot sea level rise scenario makes expanding this facility highly vulnerable to sea level rise and other climate stressors.

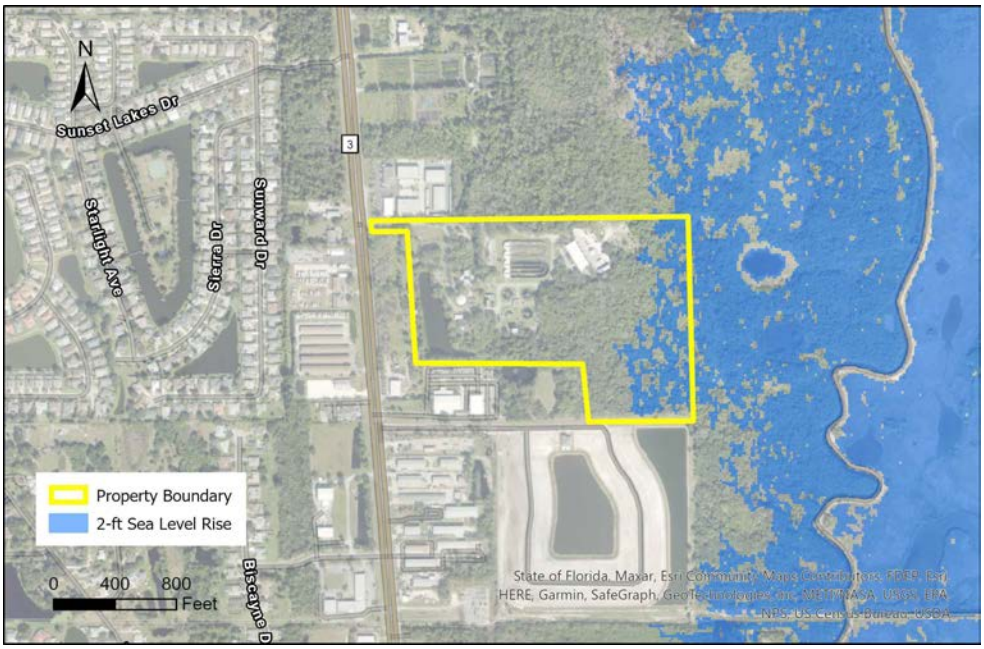


Figure 5-7 BCUSD Sykes Creek Regional WWTF Depicting a 2 Foot Sea Level Rise Scenario (NOAA 2022)

The Cape Canaveral AFS Regional WWTF is presented on Figure 5-8; the blue colors depict sea level rise impacting the IRL shoreline to the west, and the green depicts minor encroachment through stormwater ditches and ponds to the east and west. This facility is located on the barrier island, adjacent to the IRL, at an elevation of approximately 20 feet. The proximity to the IRL and barrier island location makes this facility moderately vulnerable to sea level rise, storm surge, and other climate stressors.

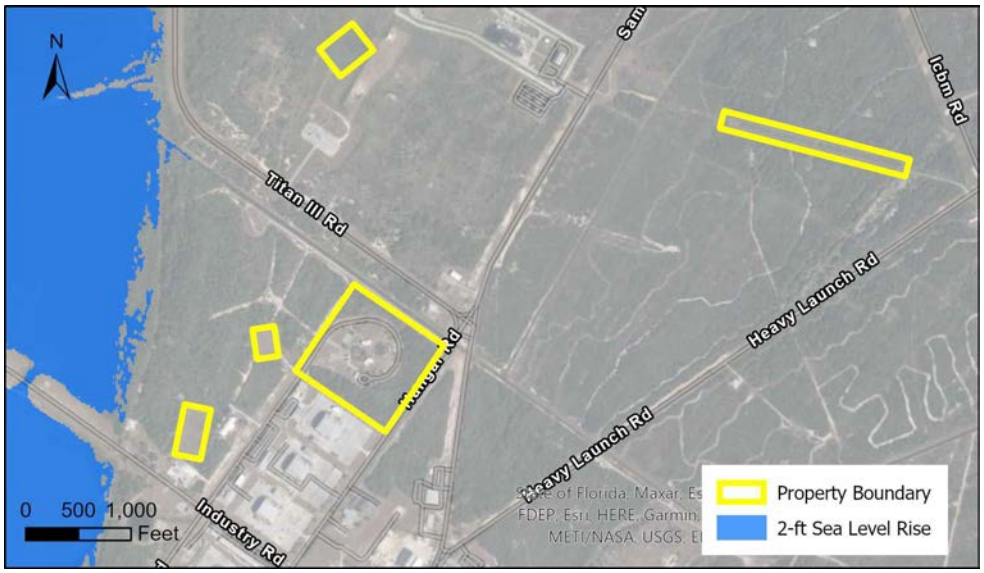


Figure 5-8 Cape Canaveral AFS Regional WWTF Depicting a 2 Foot Sea Level Rise Scenario (NOAA 2022)

The Titusville Osprey WRF is presented on Figure 5-9 and depicts limited impacts along the IRL shoreline to the east. The pond located immediately south of the facility expands considerably under the 2 foot sea level rise scenario, and a pond forms to the north of the facility as well. This facility is located near the western shoreline of the IRL, at an elevation of approximately 15 feet. The impacts from sea level rise to this facility are somewhat protected by the bulkhead shorelines and railroad bed to the east; however, review of sea level rise scenarios of 3 and 4 feet shows water ponding on the west side of the railroad, and the southern area of the facility under water. This would suggest that under increased storm and flooding conditions, the facility would be vulnerable. The proximity to the IRL and adjacent wetlands make this site moderately vulnerable to sea level rise and other climate stressors.

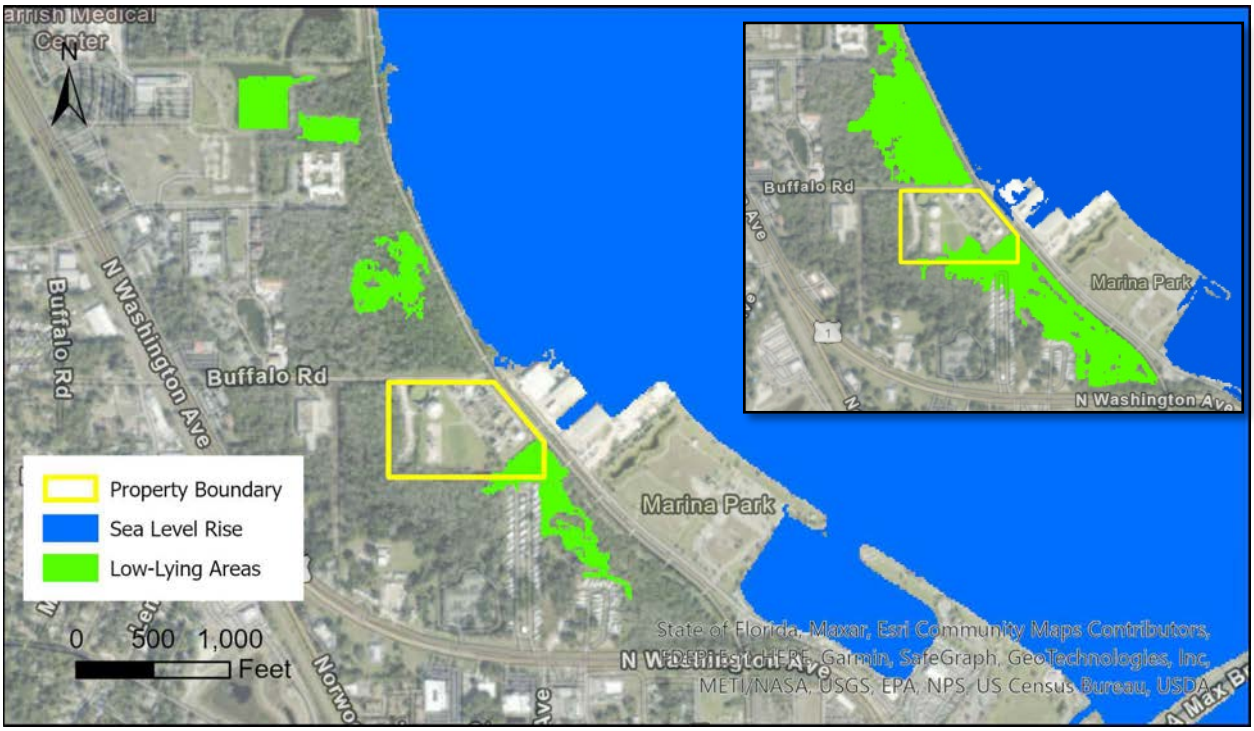


Figure 5-9 **Titusville Osprey WRF Depicting a 2 Foot Sea Level Rise Scenario and the Inset Depicting a 3 Foot Sea Level Rise Scenario (NOAA 2022)**

The Titusville Blue Heron WRF is presented on Figure 5-10. This facility is located on the coastal ridge, away from surface waterbodies, at an elevation of approximately 25 feet; therefore, this site has a low vulnerability to sea level rise and other climate stressors. A rise in sea level will also alter the depth to groundwater and may reduce the reuse capacity of the treatment wetlands.

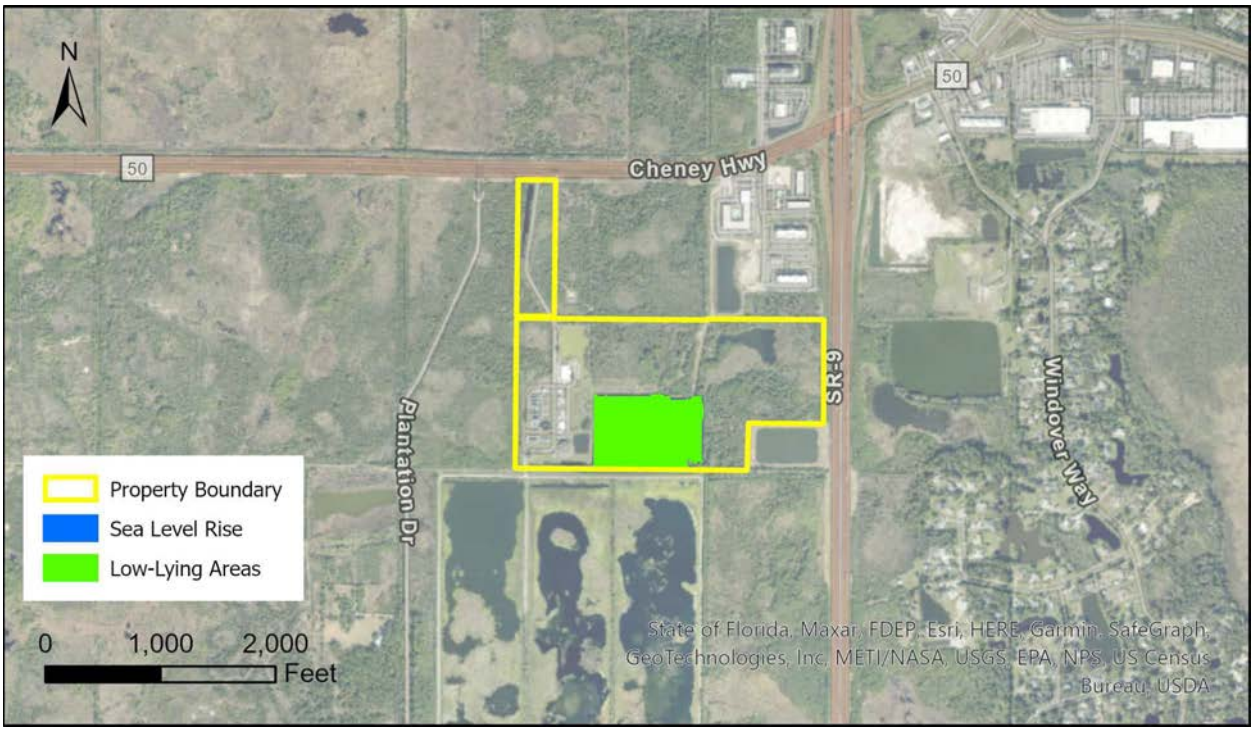


Figure 5-10 Titusville – Blue Heron WRF Depicting a 2 Foot Sea Level Rise Scenario (NOAA 2022)

Under Alternative 3, diverting the wastewater flow from the six facilities to a new consolidated AWT facility would improve vulnerability to sea level rise and climate change stressors based on the selected general location shown on Figure 5-11. The proposed location is on the coastal ridge, away from surface waterbodies, at an elevation generally greater than 20 feet; therefore, this proposed regional facility would have a low vulnerability to sea level rise and other climate stressors. This location is significantly less vulnerable to sea level rise and other climate stressors compared to BCUSD Sykes Creek Regional WWTF (high vulnerability), Cape Canaveral AFS WWTF (moderate vulnerability), and Titusville Osprey WRF (moderate vulnerability).

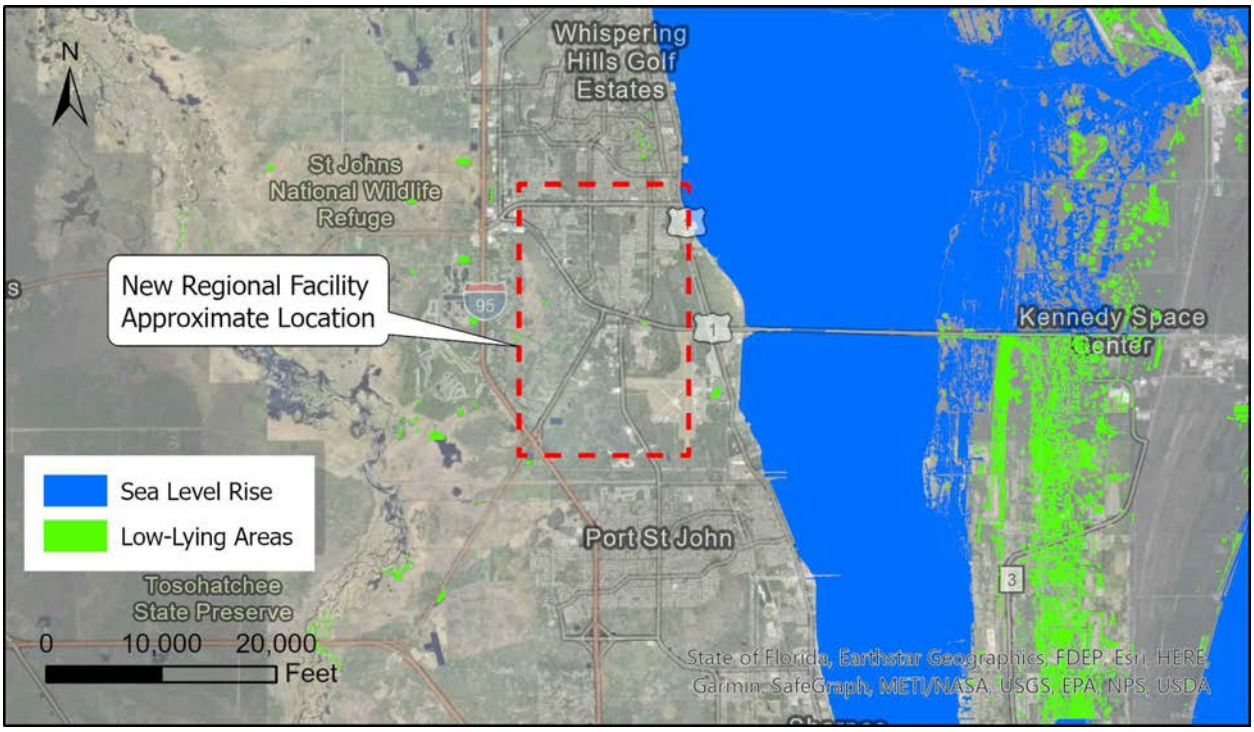


Figure 5-11 Proposed General Location of Consolidated Regional AWT Facility Depicting a 2 Foot Sea Level Rise Scenario (NOAA 2022)

5.6 Biosolids Management Assessment Approach

5.6.1 Federal Regulations

The 40 Code of Federal Regulations Part 503 regulation, also known as the "503 rule" was promulgated in 1993 and sets forth standards for the following three general use and disposal practices:

- Beneficial use through land application, distribution, or marketing.
- Disposal at dedicated sites or in biosolids-only landfills.
- Incineration in biosolids-only incinerators.

With respect to land application, the existing rule sets forth risk-assessment-based standards for metals, defines pathogen limitations in land applied materials and establishes management standards to ensure that land application is protective of human health and the environment. The content of the rule has remained largely unchanged since its inception, including three specific criteria that all land applied biosolids must meet: pollutant limits, pathogen reduction requirements, and vector attraction reduction (VAR) requirements. Figure 5-12 highlights key elements of the rule, excluding recordkeeping and monitoring.

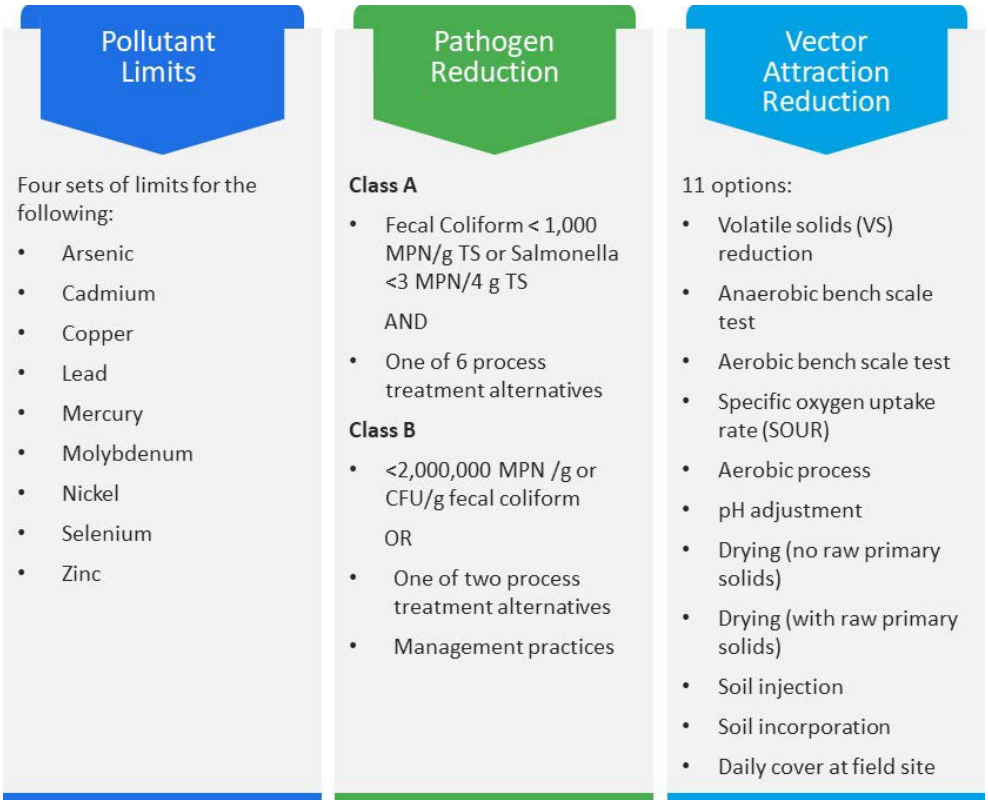


Figure 5-12 40 Code of Federal Regulations 503 Key Biosolids Quality Elements

5.6.2 Florida Regulations

The first regulations in Florida related to biosolids were adopted in 1984 as solid wastes rules. Chapter 62-640, Florida Administrative Code (FAC) has been in effect since 1991 and was revised in 1998 and 2010.

Similar to the Federal 503 rule, Florida's Chapter 62-640, FAC regulations address pathogen reduction and VAR methods along with a number of management practices that depend on the use or disposal alternative selected and the degree of stabilization that the solids have undergone.

Biosolids management programs in Florida are facing significant challenges because of issues related to increasingly stringent regulations. Recent changes to Chapter 62-640, FAC, resulted in more limitations being placed on biosolids practices. These changes could include more stringent requirements for biosolids management practices, including more limitations on land application and additional monitoring and inspection requirements.

5.6.3 Requirement for Land Application of Class AA, A, and B Biosolids

Land application of Class B and Class A biosolids is allowed in Florida on permitted sites that comply with the state's regulations, including nutrient management plans (NMP). In Florida, the land application companies that support these programs are typically the site permittees rather than the landowners or utilities.

Class AA biosolids can be distributed and marketed as fertilizers because of their high level of treatment related to pathogens and stringent pollutant limits. When distributed as a fertilizer, Class AA biosolids are exempt from FDEP nutrient restrictions associated with land application programs. However, while exempt from the FDEP restrictions, all fertilizers are regulated in a number of counties and communities. These regulations can impact the use of fertilizers during the summer months, June through September. Brevard County currently has a ban on the application of fertilizer containing nitrogen or phosphorous from June 1 to September 30 annually.

FDEP estimates that there are currently 39 distribution and marketing programs in the state. The FDEP estimated that in 2020 approximately 45 percent of the 350,000 dry tons per year (dt/yr) of biosolids produced in Florida become Class AA and are marketed as a soil amendment or fertilizer, 157,500 dt/yr.

A number of Class AA entities appear on the Florida Department of Agriculture's annual fertilizer tonnage report. In addition, several fertilizer companies blend Class AA biosolids into custom fertilizer blends to add organic material to the inorganic fertilizer for increased value. These blended products are not reported in the annual fertilizer tonnage report.

Distribution and marketing of Class AA biosolids require a fertilizer license, or Class AA biosolids must be sold or given to someone with a fertilizer license as required by the regulation. It is anticipated that the majority of Class A biosolids produced in Florida can meet stringent Class AA metals requirements. This is because of pretreatment programs and the limited amount of discharge to the wastewater collection systems. Therefore, all Class AA biosolids are distributed and marketed as fertilizer. There were no substantive changes to Section 850 of Chapter 62-640. The changes made are updates to references.

5.6.4 Biosolids Management Strategy

This subsection presents discussions and evaluations to develop a biosolids management strategy that aligns with the EDC's goals and provides a sustainable approach for meeting current and anticipated future regulatory requirements.

All six wastewater treatment facilities produce only WAS from the liquid treatment as they do not have primary treatment. Table 5-5 summarizes the biosolids treatment and disposal methods used by the six facilities. All six facilities landfill dewatered solids at the Brevard County Landfill. The Cape Canaveral AFS Regional WWTF and BCUSD Port St. John WWTF use aerobic digestion and sludge drying beds while the other four facilities utilize mechanical dewatering technology before landfilling biosolids.

Table 5-5 Summary of Existing WWTF/WRF Biosolids Treatment and Disposal Methods

WWTF	Biosolids Treatment	Biosolids Disposal
Cape Canaveral AFS Regional	Aerobic digestion followed by sludge drying beds.	Brevard County Landfill.
BCUSD North Regional	Dewatered by a rotary fan press.	Brevard County Landfill.
BDUSD Port St. John	Aerobic digestion of biosolids with drying bed dewatering.	Biosolids are disposed in the landfill. During wet weather, liquid biosolids are trucked to BCUSD Sykes Creek Regional and blended with BCUSD Sykes Creeks Regional biosolids before landfilling.
BCUSD Sykes Creek Regional	Biosolids are stored in sludge holding tanks and dewatered with a centrifuge.	Brevard County Landfill.
Titusville Osprey	Solids are thickened with dissolved air flotation thickener and dewatered with a belt filter press. The facility does not have a sludge holding tank.	Brevard County Landfill.
Titusville Blue Heron	WAS is directly sent to a screw press for dewatering. The facility does not have a sludge holding tank.	Brevard County Landfill.

Several factors must be considered in the selection of a biosolids management strategy, such as cost, long-term sustainability, the number and variety of distribution outlets, ability to react to future changes in environmental regulation, public perception of treatment processes and solids products. A comprehensive list of technologies currently used in the industry for stabilizing wastewater sludge to meet Class AA/A or Class B pathogen removal and vector attraction reduction requirements is provided on Figure 5-13.

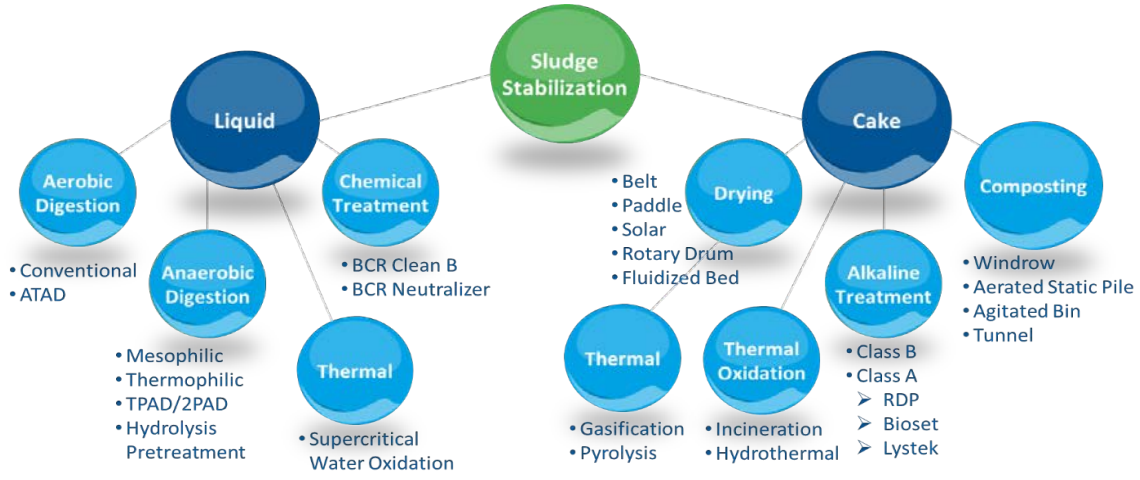


Figure 5-13 Possible Wastewater Sludge Stabilization Technologies and Enhancement Processes

Because landfilling biosolids may have regulatory risks in the future, the following biosolids treatment/disposal alternatives in this conceptual evaluation are proposed:

- For facilities with a design flow rate of 2.5 mgd AADF or lower (Cape Canaveral AFS Regional WWTF, BCUSD North Regional WRF, and Titusville Osprey WRF), biosolids management will consist of storing sludge in sludge holding tanks with diffused aeration, and dewatering using a centrifuge. These facilities would have a contract with a biosolids treatment company (such as Synagro, Shelleys, Anuvia, or equal). Synagro has Class AA treatment facilities and land application sites in Osceola County, about 70 miles from Brevard County. Synagro also has a composting facility in Highlands County which is about 100 miles from Brevard County. Biosolids are mixed with green waste and Class AA compost is generated. Compost is used for citrus groves and landscaping. Shelleys has a lime stabilization and composting facility near Apopka. Shelleys lime stabilizes the sludge first and then mixes with wood fines from a sawmill then composts to produce Class AA solids.
- For facilities larger than 2.5 mgd (BCUSD Sykes Creek Regional WWTF, BCUSD Port St John WWTF, Titusville Blue Heron WRF, and the proposed new regional consolidated facility on the mainland), biosolids management will consist of storing sludge in sludge holding tanks with diffused aeration, solids drying using a belt dryer, and dewatering using a centrifuge. This process will produce Class AA biosolids.

Figure 5-14 shows a process flow diagram of the proposed biosolids treatment.

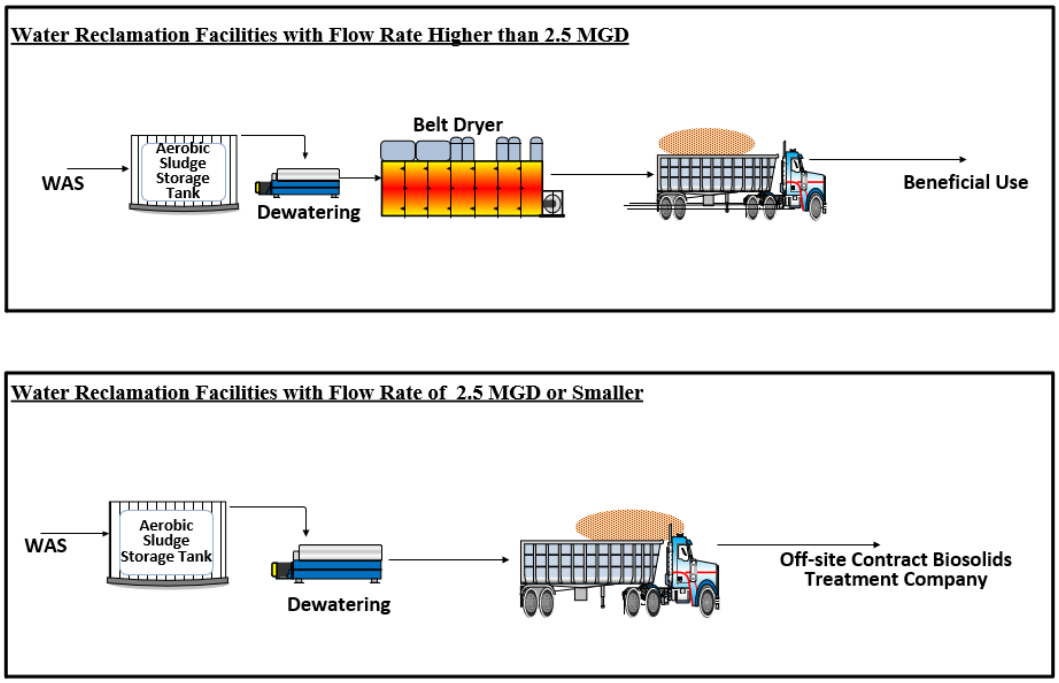


Figure 5-14 Proposed Biosolids Treatment and Disposal for Six WWTFs

5.7 Cost Estimates

An NPV life-cycle cost analysis for each alternative was performed. NPV is how much an investment is worth throughout its lifetime, discounted to today's value. A 20 year life-cycle was used in this analysis. NPV allows for the costs of alternatives to be considered on an equal basis. The life-cycle costs include capital costs, R&R costs, and the annual O&M costs, as described in this section. All the costs were discounted to today's value and presented as NPV life-cycle cost analysis.

5.7.1 General Assumption

Table 5-6 is a list of parameters and assumptions followed in developing the capital costs for this evaluation.

Table 5-6 Capital Costs Parameters and Assumptions

Parameter	Value	Notes
Planning Horizon	Through 2043	
Cost Estimate Level	Class 5	Association for the Advancement of Cost Engineering International Class 5 estimate classification is used for conceptual, basis of design, and preliminary design phases with opinion of probable construction costs accuracy ranges of -50 percent to +50 percent.
Cost Estimates Basis	2023 US Dollars	NPV.
Escalation Rate	8 percent	Escalation Rate = The rate of change in price.
Discount Rate	4.75 percent	Discount rate = the interest rate used to determine the present value of future cash flows.
Contingencies	40 percent	Engineering services, design services and construction management services.
Consolidation Construction End Year	2029	It was assumed that consolidation would take place in six years, which is Planning Year 2029. 2030 would be the first year of the fully implemented alternative.
Funding Mechanism Structures or Loan Payment Schedules	Not included	The analysis does not include funding mechanism structures or loan payment schedules.
Treatment Technologies	Status Quo	The WWTF/WRF improvements were evaluated based on conventional treatment technologies that are replacement "in-kind."
Land Acquisition	Only required for new regional WRF, BCUSD Sykes Creek Regional WWTF, and new BCUSD Port St. John WWTF	Sufficient space is not available at BCUSD Sykes Creek Regional WWTF site to expand the facility to accommodate additional flows from BCUSD Port St. John WWTF and Cape Canaveral AFS Regional WWTF including future projected flows.

5.7.2 Capital Costs and Land Acquisition Costs

The methodology followed to develop the capital costs for each alternative was as follows:

- Information regarding capital improvements required for the collection and treatment systems was gathered.
- This information was used by the wastewater process specialists with input from cost estimators to estimate the Class 5 estimates.
- The capital cost estimates were included in the life-cycle costs analysis and spread over the six-year planning and capital improvements timeline window from 2024 until 2029 and applying yearly escalation factors to the costs spread.
- Capital cost estimates for the improvements associated with each alternative were developed using a combination of several of the following estimating sources:
  - Costs from past projects; professional judgment and experience.
  - Cost estimates provided from equipment manufacturers and vendors cost proposals.
  - Current market values using Timberline software and library of standard components (e.g., linear feet of pipe of certain material).

Table 5-7 summarizes the capital cost components included in each of the three consolidation alternatives.

Table 5-7 Capital Cost Components

Alternative No.	1	2	3
Alternative Name	Maintain Existing WWTFs/WRFs	BCUSD Port St. John + Cape Canaveral AFS Regional to BCUSD Sykes Creek	New Regional WWTF/WRF
Total No. of WWTFs/WRFs	6	4	1
Expansion/New	X	X	X
Decommissioning	X	X	X
Wastewater Transmission System	-	X	X
Effluent/Reclaimed Water Handling	X	X	X
Biosolids Handling	X	X	X
Land Acquisition	X	X	X

Note: X means included.

5.7.3 Annual Operations and Maintenance Costs

The methodology followed to develop the annual O&M costs for each alternative was as follows:

- Estimated annual costs O&M costs consisting of personnel, energy, chemicals, maintenance, and professional services for the six existing WWTFs/WRFs using data gathered from previous studies Black & Veatch performed for wastewater treatment facilities with similar treatment capacity and process.
- Used estimated O&M costs as the basis for all future annual operating costs. O&M cost for the period prior to the end of construction/expansion was not included in the cost estimate.

5.7.4 Life-Cycle Costs

The NPV of the capital, land acquisition, annual O&M and R&R costs were calculated and then combined to calculate the life-cycle costs for each alternative. The total NPV cost for each scenario by category is shown on Figure . The life-cycle costs for the three alternatives are presented in Table 5-8 , in 2023 dollars. For new facilities, R&R costs were estimated to be 1 percent of the plant capital cost for the first 6 years after the end of construction, then 4 percent thereafter. For plants that only needed upgrade/expansion, the assumption was that R&R will be 2 percent of the capital cost for the 6 years after the expansion/upgrade then 4 percent thereafter. For this conceptual evaluation, the Titusville Blue Heron WRF does not require expansion or upgrade so 4 percent of the plant total capital cost each year was assumed. This is a fair assumption for a conceptual evaluation. O&M costs for biosolid handling were assumed to be $270 per dry ton for plants with flow capacity larger than 2.5 mgd, where a belt dryer is recommended. For facilities with flow capacity of 2.5 mgd or lower, it was assumed that biosolids handling would be contracted to a biosolids treatment company (such as Synagro, Shelleys, Anuvia, or others). Upon inquiry, Synagro provided a planning level cost of $75 per wet ton for Class AA including hauling, which equates to $375 per dry ton, assuming the solids are dewatered to 20 percent.

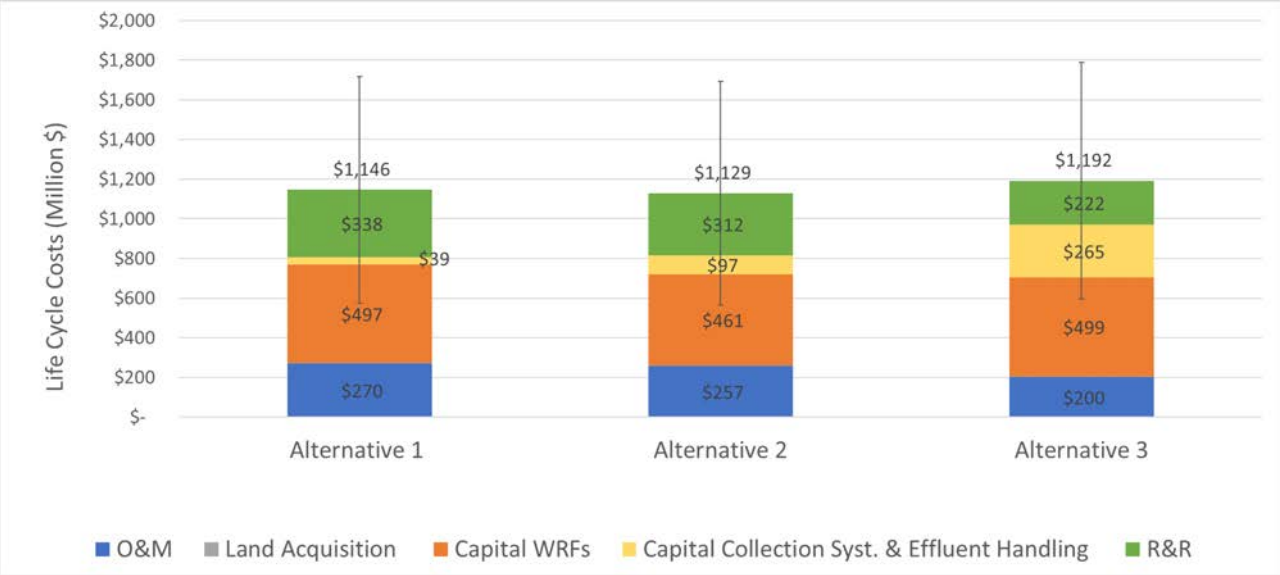


Figure 5-15 Total NPV Life-Cycle Costs for Alternatives 1 through 3

Table 5-8 NPV Life-Cycle Costs by Type and Alternative ($M)

Alternative No.	Alternative 1	Alternative 2	Alternative 3
Total No. of WWTFs/WRFs	6	4	1
O&M	$270	$257	$200
Land Acquisition	$2	$3	$5
Capital Transmission System and Effluent/Reclaimed Water Handling	$39	$97	$265
Capital WWTFs/WRFs	$497	$461	$499
R&R	$338	$312	$222
Total	$1,146	$1,129	$1,192

All costs expressed in April 2023 $M.
Costs are -50 percent to +50 percent.

Figure 5-16 displays the relative life-cycle cost for the three alternatives, normalizing to the average cost of all alternatives. As illustrated, Alternative 3 has the highest costs; however, all the alternatives are all within 3.9 percent of the average costs. Considering that these are Class 5 cost estimates suitable for a conceptual evaluation, all three alternatives should be considered as having similar total life-cycle costs.

Figure 5-17 displays the relative life-cycle cost for the three alternatives, as percent of the highest alternative cost. Alternative 3 has the highest cost while Alternatives 1 and 2 are 96.1 percent and 94.7 percent of Alternative 3 in cost, respectively.

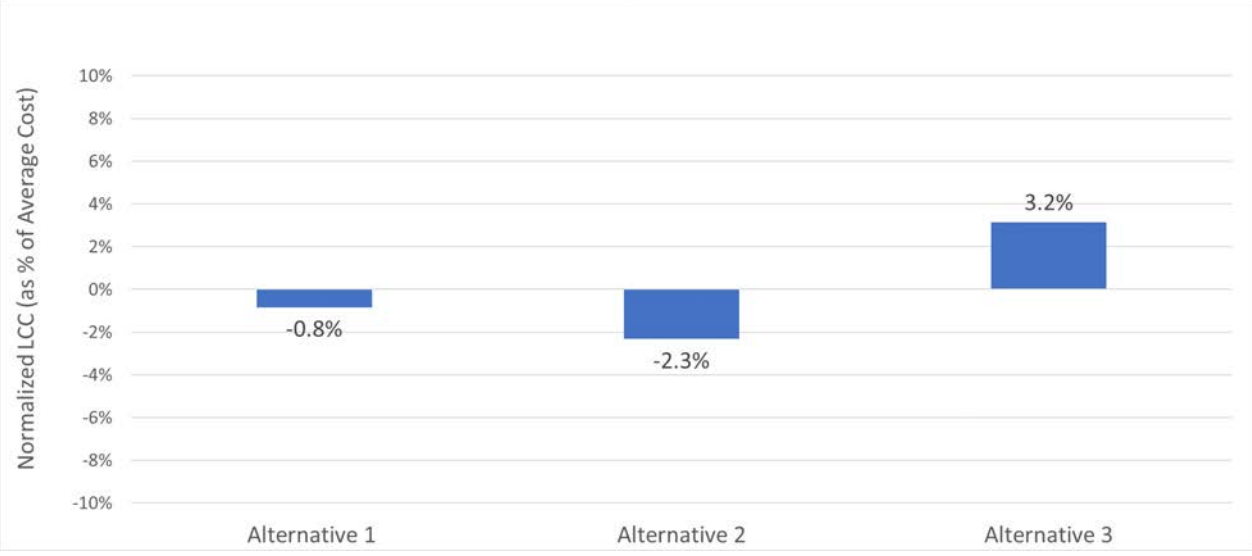


Figure 5-16 Total Life-Cycle Costs for Alternative 1 through 3 (Normalized to Average Cost)

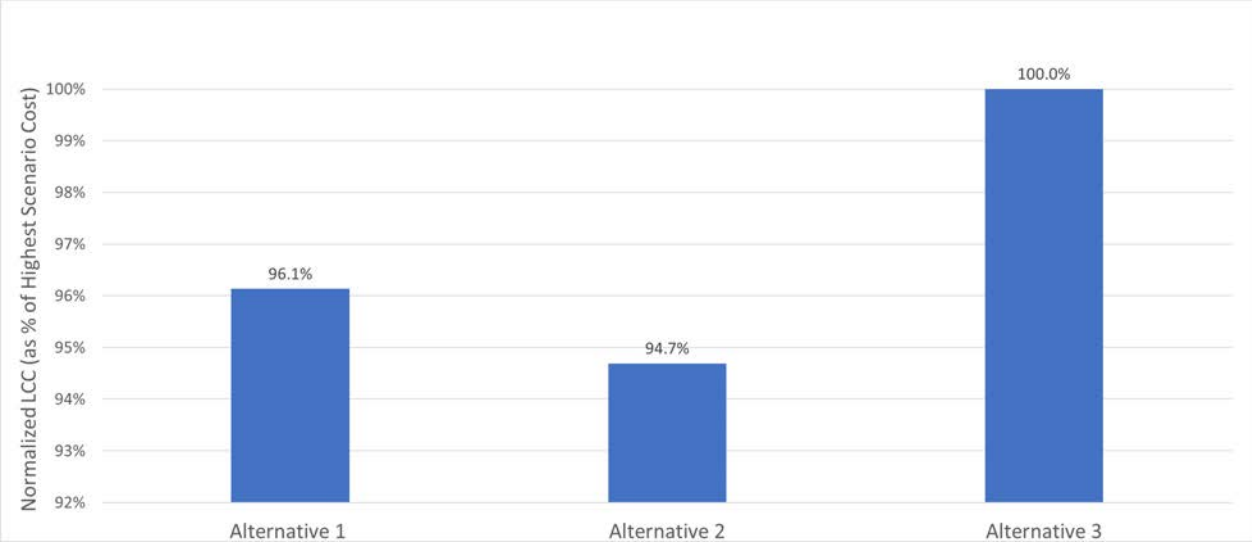


Figure 5-17 Total Life-Cycle Costs for Alternatives 1 through 3 (Percent of Highest Alternative Cost)

Details of capital cost estimates and NPV/life-cycle costs can be found in Appendices A and B, respectively.

5.8 Evaluation of Alternatives

As shown in Table 5-9, the following criteria were developed to evaluate the identified three alternatives:

- System reliability and resilience.
- Maintenance reliability.
- Ease of operations.
- Climate and environmental vulnerability.
- Sustainability.
- NPV/life-cycle cost.
- Public perception.

Financial responsibility is evaluated as the life-cycle cost estimated for 20-year planning period. Financial responsibility is evaluated as the life-cycle cost estimated for 20-year planning period.

Table 5-9 Evaluation Criteria

Criteria	Score 1 (Least Favorable)	Score 2 (Average)	Score 3 (Most Favorable)
System Reliability and Resilience	Low reliability or resilience of the collection and treatment systems. Consider items such as the following: • Single point of failure • Sanitary Sewer Overflow (SSO) elimination • St. Johns River Water Management District (SJRWMD) environmental resource permitting • Minimum design standards	Medium reliability and resilience of treatment system. Consider items such as the following: • Single point of failure • SSO elimination • SJRWMD environmental resource and groundwater replenishment permitting • Minimum design standards	High reliability and resilience of the treatment system. Consider items such as the following: • Single point of failure • SSO elimination • SJRWMD environmental resource and groundwater replenishment permitting • Minimum design standards
Maintenance Reliability	Low maintenance reliability or resilience of the treatment systems. Consider items such as the following: • Useful life and condition of equipment • Spare part requirements/costs • Ability to secure skilled labor/staffing • Size of equipment and safety • Automation - requires a lot of maintenance skill and attention	Medium maintenance reliability or resilience of the treatment systems. Consider items such as the following: • Useful life and condition of equipment • Spare part requirements/costs • Ability to secure skilled labor/staffing • Size of equipment and safety • Automation - requires intermediate maintenance skill and attention	High maintenance reliability or resilience of the treatment systems. Consider items such as the following: • Useful life and condition of equipment • Spare part requirements/costs • Ability to secure skilled labor/staffing • Size of equipment and safety • Automation - requires minimal maintenance skill and attention
Ease of Operations	Highly complex system configuration. Consider the following: • Low capacity to manage resources • Increased risk of safety and quality incidents • Number and locations of WWTFs/WRFs and lift stations • Number of pieces of equipment • Automation - requires a lot of training and human input	Intermediate system configuration. Consider the following: • Medium capacity to manage resources • Risk of safety and quality incidents remains the same • Number and locations of WWTFs/WRFs and lift stations • Number of pieces of equipment • Automation - intermediate training and input	Simple system configuration. Consider the following: • High capacity to manage resources • Reduced risk of safety and quality incidents • Number and locations of WWTFs/WRFs and lift stations • Number of pieces of equipment • Automation – user friendly; requires minimal training and human input

Criteria	Score 1 (Least Favorable)	Score 2 (Average)	Score 3 (Most Favorable)
Climate and Environmental Vulnerability	Potential for significant impacts by climate hazards: flood events, sea level rise, storm surge	Potential for some impacts by climate hazards: flood events, sea level rise, storm surge	Low potential for impacts by climate hazards: flood events, sea level rise, storm surge
Sustainability	High energy consumption. Consider the following: • WW processes and general quantities produced • Ability to reuse byproducts • End product disposal (e.g., Senate Bill 64, biosolids)	Medium energy consumption. Consider the following: • WW processes and general quantities produced • Ability to reuse byproducts • End product disposal (e.g., Senate Bill 64, biosolids)	Low energy consumption. Consider the following: • WW processes and general quantities produced • Ability to reuse byproducts • End product disposal (e.g., Senate Bill 64, biosolids)
Net Present Value/Life-Cycle Cost	Highest life-cycle costs [Capital + O&M costs for 20 years]	Average life-cycle costs [Capital + O&M costs for 20 years]	Lowest life-cycle costs [Capital + O&M costs for 20 years]
Public Perception	Community concerns and lengthy planning and zoning approval process	Minor community concerns or minor planning and zoning approval requirements and/or positive community response	No community or planning and zoning challenges and/or highly positive community response

The evaluation criteria weighting was developed based on Black & Veatch's understanding of the project goals and priorities. The EDC has expressed that Climate and Environmental Vulnerability should be key factors in assessing the alternatives. The proposed weighting criteria is presented in Table 5-10.

Table 5-10 Evaluation Criteria Weights

Evaluation Criteria	Weight
System Reliability and Resilience	15%
Maintenance Reliability	10%
Ease of Operations	10%
Climate and Environmental Vulnerability	20%
Sustainability	15%
NPV/Life-Cycle Cost	20%
Public Perception	10%
Total	**100%**

The results summarized in Table 5-11 are scores proposed by the Black & Veatch team. Each alternative was ranked on a scale of 1 to 3 with 3 being the most desirable/highest ranked and 1 representing the least desirable/lowest ranking. The highest ranked/most desirable scenario is Alternative 3 -- New Regional Facility. Additional justification and discussion supporting the scoring results are summarized in Table 5-12.

Table 5-11 Consolidation Scoring Results

Scoring Criteria	Weight	Alternative 1 Maintain/Upgrade Existing WRFs	Alternative 2 Partial Consolidation	Alternative 3 New Regional Facility
System Reliability and Resilience	15%	1.5	2.0	2.0
Maintenance Reliability	10%	1.0	2.0	3.0
Ease of Operations	10%	1.5	2.0	2.5
Climate and Environmental Vulnerability	20%	1.0	1.5	2.5
Sustainability	15%	1.5	2.0	3.0
Net Present Value/Life-Cycle Cost	20%	2.0	2.0	2.0
Public Perception	10%	1.5	1.5	2.5
Final Score		**1.5**	**1.9**	**2.5**

Table 5-12 Consolidation Scoring Results Justification

	Alternative 1	Alternative 2	Alternative 3
System Reliability and Resilience	Six WWTFs/WRFs: • BCUSD Sykes Creek Regional WWTF and Cape Canaveral AFS Regional WWTF are located on the barrier island reduces the system resiliency. • Higher susceptibility of SSOs.	Four WWTFs/WRFs: • BCUSD Sykes Creek Regional WWTF is located on the barrier island reduces the system resiliency. • Higher susceptibility of SSOs. • Pumping raw wastewater from BCUSD Port St. John WWTF and Cape Canaveral AFS Regional WWTF to BCUSD Sykes Regional Creek WWTF opens up the potential for pipe breaks along major roadways and potential SSOs. • Reduced pumping of wastewater with respect to Alternative 3. • WWTFs/WRFs decommissioning and consolidation permitting through FDEP.	One New WWTF/WRF: • Minimizes the chances of SSOs. • Maximizes risk of single point of failure1. • Centralized plant on the mainland will be more resilient to hurricanes and storms. • Pumping raw wastewater across long distance opens up the potential for pipe breaks along major roadways. • Long-distance of construction needed in an urban area for the transfer pipeline. • Existing WWTFs/WRFs decommissioning and consolidation permitting through FDEP.
Maintenance Reliability	• Six WWTFs/WRFs: • Most equipment to be maintained and spare parts to be stored. • Requires the highest amount of skilled labor/staffing. • Utilizes more of the existing systems which increases the need for R&R. Utilizes more of the existing systems which increases the need for R&R. • More effort and cost to operate six facilities. Continue to invest R&R funds to maintain these facilities operational, regulatory compliant, and safety may pose to be one of the largest issues. • BCUSD St. Port John WWTF improvements would be constructed at a new site as the existing site is in FPL easement.	Four WWTFs/WRFs: • Moderate amount of equipment to maintain and store (less than Alternative 1) • Moderate amount of skilled labor/staffing (less than Alternative 1)	One New WWTF/WRF: • Least amount of equipment to maintain and spare parts to be stored, creating efficiencies with O&M. • All equipment will be new, have the longest remaining life, and be in the best condition. • Requires the lowest amount of skilled labor/staffing. • It will have lower cost to operate and maintain in terms of labor, energy, chemicals, and R&R.

	Alternative 1	Alternative 2	Alternative 3
Ease of Operations	Six WWTFs/WRFs: • Maximum operational complexity. • Most difficult to manage during emergency operations. • Most equipment to operate. • If resources are limited, could be challenging and inconvenient to operate at 6 WWTF/WRF locations but lift stations will still remain throughout entire service area. If resources are limited, could be challenging and inconvenient to operate at six WWTF/WRF locations but lift stations will still remain throughout entire service area. • No need for flow conveyance to other facilities; all six facilities will continue to serve existing reuse customers. • From a permitting perspective, all six WWTFs/WRFs would continue to undergo their typical 5-year FDEP Facility Operation Permit renewals.	Four WWTFs/WRFs: • Medium degree of operational complexity. • Fewer staff to manage than Option 1 (which may be limited) at 4 WRFs instead of 6. • Fewer staff to manage than Option 1 (which may be limited) at four WRFs instead of six.	One New WWTF/WRF: • Minimizes operational complexity. • Most manageable during emergency operations. • Least equipment to operate. • Safety concerns reduced due to New WWTF/WRF. • Fewer staff to manage than Options 1 and 2.
Climate and Environmental Vulnerability	• WWTFs/WRFs on barrier island are most vulnerable to climate hazards.	• BCUSD Sykes Creek Regional WWTF is the most vulnerable.	• New WWTF/WRF location would be selected at least-vulnerable location. • Reduces flood concerns.
Sustainability	• High CO_2 emissions.	• Lower CO2 emissions than Alternative 1 but higher than Alternative 3.	Lower CO2 emissions.
Net Present Value/Life-Cycle Cost	All three alternatives are comparable. Refer to Subsection 5.7.4 for details.	All three alternatives are comparable. Refer to Subsection 5.7.4 for details.	All three alternatives are comparable. Refer to Subsection 5.7.4 for details.
Public Perception	• Most of the public may be ok with how things are and would not want to change where the plants are. Most of the public accepts how things are and would not want to change where the plants are. • No traffic impacts; status quo.	• Collection system improvements required with temporary impacts to traffic.	New WWTF/WRF: • Large collection system improvements with temporary impacts to traffic. • Public would support a new centralized WWTF/WRF in terms of resiliency.

6.0 Evaluation of Funding Opportunities

An evaluation of funding opportunities for a new regional WWTF was conducted by Black & Veatch. The evaluation identified the programs most suitable and available for supporting projects to upgrade and consolidate WWTFs/WRFs in the study area is presented in a TM in Appendix C, "Funding and Financing Alternatives Evaluation." It includes an evaluation of potential federal, state, and partnership funding programs. Available funding program descriptions include details of funding cycles, match requirements, and administrative and application burdens. In preparing this TM, numerous funding programs were canvassed. Many were excluded from the evaluation, as they may not be applicable to the project or available when the applicant is prepared to apply.

Various potential federal, state, and partnership funding sources include the following:

- FDEP Clean Water State Revolving Fund (SRF).
- United States Environmental Protection Agency (USEPA) Water Infrastructure Finance and Innovation Act (WIFIA).
- SJRWMD Cost-Share Funding.
- FDEP Resilient Florida Grant Program.
- Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC).
- FEMA Hazard Mitigation Grant Program (HMGP).
- FEMA Regional Catastrophic Preparedness Grant.
- United States Economic Development Administration (EDA) Public Works and Economic Adjustment Assistance.
- FDEP Division of Water Restoration Assistance (DWRA) Wastewater Grant Program.
- Florida Local Government Finance Program.
- Florida Department of Economic Opportunity Job Growth Grant Funds.
- US Army Corps of Engineers (USACE) Section 7001.
- Partnership Funding Opportunities.
- Department of Defense or Space Force Funding.
- National Oceanic and Atmospheric Administration (NOAA) Climate-Ready Coasts.

The TM provides strategy recommendations for the EDC as summarized below.

The short-term action items are as follows:

- Engage the FDEP SRF for planning phase activity support.
- Determine the intended future ownership of the proposed new regional WWTF.
- Engage with FDEP DWRA Wastewater Grant Program grant managers following the conclusion of the 2022-23 legislative session, likely after May 2023.
- Identify partnership opportunities.

Long-term action items are as follows:

- Pursue state and federal legislative funding.
- To receive WIFIA funding for the construction phase of the project, the intended future owner should begin the pre-application process in early to mid-2025 to receive funding in time to start construction in 2027.

7.0 Conclusions

This evaluation presented conceptual alternatives that provide a range of protection from climate stress factors. Alternative 1 provides the least protection by keeping all existing facilities remaining in place with some additional hardening and protection from stressors, but with Cape Canaveral AFS WWTF and BCUSD Sykes Creek Regional WWTF remaining in vulnerable locations on the barrier islands. Alternative 2 moves the flows from the most vulnerable facility, the Cape Canaveral AFS Regional WWTF, to a slightly less vulnerable location at the BCUSD Sykes Creek Regional WWTF on Merritt Island, along with flows from the BCUSD Port St. John Facility. Alternative 3 moves all facilities off the barrier islands and consolidates flows from all six facilities included in the study in one regional facility in a much less vulnerable location on the mainland. With NPV/life-cycle costs being nearly equal for each alternative, reducing climate and environmental vulnerability made the Alternative 3 the highest ranked option.

The next phase of this study could further develop stakeholders for the selected Alternative including establishing a project sponsor or owner of the regional facility, determining which WWTFs/WRFs will participate in a regional facility, developing project phasing, and applying for grant funding.

A possible phasing plan is presented on Figure 7-1 which can allow for the region to manage the wastewater flows more rapidly from the most vulnerable areas while developing the new mainland regional facility. The phasing plan can be summarized as follows:

- Phase I – Allows for the immediate needs of the Space Florida/NASA KSC area to be served via a pipeline to the BCUSD Sykes Creek Regional WWTF.
- Phase II – Includes phased construction of a new facility on the mainland that receives flows from the Cape Canaveral AFS WWTF, BCUSD Sykes Creek WWTF, and BCUSD Port St. John WWTF. Flows from the barrier islands to the mainland can go through a northern pipeline route or through a southern route (shown as alternate route on Figure 7-1).
- Phase III – The new regional facility will be expanded in the future to accept flows from the BCUSD North Regional WRF, Titusville Osprey WRF, and Titusville Blue Heron WRF to the new mainland facility.

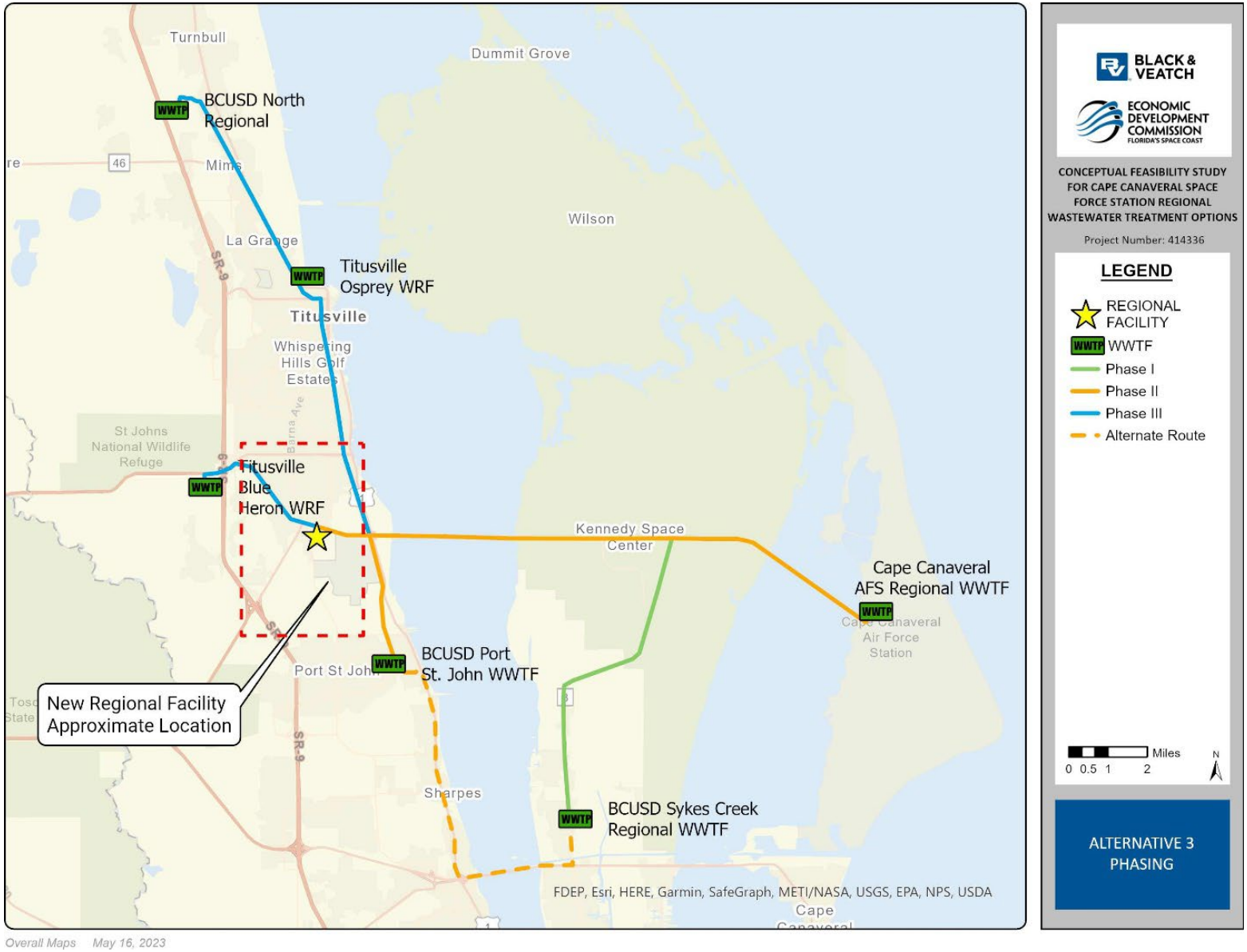


Figure 7-1 Potential Phasing Plan for Alternative 3

Appendix A. Capital Cost Estimate Breakdowns

The following tables present the capital cost estimate breakdown of the three alternatives:

Item	Cost Estimate for a BCUSD New Port St John WRF	Cost Estimate for a New Cape Canaveral SFS Regional WWTF	Cost Estimate for a New BCUSD North Regional WRF	Cost Estimate for a New BCUSD Sykes Creek WRF	Cost Estimate for Expanding and Upgrading Osprey WRF	Cost Estimate for Biosolid Treatment at Blue Heron	Alternative 1 Total Capital Cost
Treatment Process	$31,700,000	$11,900,000	$15,400,000	$68,000,000	$3,900,000		
Electrical, I&C, Yard Piping, Sitework	$16,900,000	$6,400,000	$8,200,000	$36,400,000	$2,100,000		
Contingency, Escalation & Market Factors, General Conditions, Requirements, Contractor Fee & Overhead, Bond & Insurances	$36,900,000	$13,800,000	$17,900,000	$79,300,000	$4,500,000		
Total	**$85,500,000**	**$32,100,000**	**$41,500,000**	**$183,700,000**	**$10,500,000**	**$12,000,000**	**$365,300,000**

Item	Cost Estimate for a New BCUSD North Regional WRF	Cost Estimate a New Regional Facility of the barrier island (Sykes Creek WRF + Port St John WRF + New Cape Canaveral SFS Regional WWTF)	Cost Estimate for Expanding and Upgrading Osprey WRF	Cost Estimate for Biosolid Treatment at Blue Heron	Alternative 2 Total Capital Cost
Treatment Process	$15,400,000	$102,600,000	$3,900,000		
Electrical, I&C, Yard Piping, Sitework	$8,200,000	$54,900,000	$2,100,000		
Contingency, Escalation & Market Factors, General Conditions, Requirements, Contractor Fee & Overhead, Bond & Insurances	$17,900,000	$119,600,000	$4,500,000		
Total	**$41,500,000**	**$277,100,000**	**$10,500,000**	**$12,000,000**	**$341,100,000**

Item	Alternative 3: New Regional Facility on the Mainland
Treatment Process	$134,500,000
Electrical, I&C, Yard Piping, Sitework	$72,000,000
Contingency, Escalation & Market Factors, General Conditions, Requirements, Contractor Fee & Overhead, Bond & Insurances	$156,800,000
Total	**$363,300,000**

Appendix B. Net Present Cost Estimate Breakdown

The following tables present the net present cost estimate breakdown of the three alternatives:

Alternative 1 - Keep all 6 WRFs	Cost (in Millions)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total Escalated Costs (2023 through 2043)	NPV
Osprey WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$2.42	$2.61	$2.82	$3.05	$3.29	$3.55	$3.84	$4.14	$4.47	$4.83	$5.22	$5.64	$6.09	$6.57	$58.54	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.32	$0.35	$0.38	$0.41	$0.44	$0.48	$0.51	$0.56	$0.60	$0.65	$0.70	$0.76	$0.82	$0.88	$7.86	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.34	$0.37	$0.40	$0.43	$0.47	$0.51	$0.55	$0.59	$0.64	$0.69	$0.74	$0.80	$0.87	$0.94	$8.33	
	Biosolids treatment O&M cost (contracting to Synagro)	$-	$-	$-	$-	$-	$-	$-	$0.73	$0.79	$0.86	$0.92	$1.00	$1.08	$1.16	$1.26	$1.36	$1.47	$1.58	$1.71	$1.85	$2.00	$17.77	
	R&R	$-	$-	$-	$-	$-	$-	$-	$1.71	$1.85	$2.00	$2.16	$2.33	$2.52	$5.44	$5.87	$6.34	$6.85	$7.40	$7.99	$8.63	$9.32	$70.43	
Blue Heron WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$2.70	$2.92	$3.15	$3.40	$3.67	$3.97	$4.28	$4.63	$5.00	$5.40	$5.83	$6.30	$6.80	$7.34	$65.38	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.73	$0.78	$0.85	$0.91	$0.99	$1.07	$1.15	$1.24	$1.34	$1.45	$1.57	$1.69	$1.83	$1.97	$17.58	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.62	$0.67	$0.72	$0.78	$0.84	$0.91	$0.98	$1.06	$1.14	$1.23	$1.33	$1.44	$1.55	$1.68	$14.92	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$0.74	$0.80	$0.86	$0.93	$1.00	$1.08	$1.17	$1.26	$1.36	$1.47	$1.59	$1.72	$1.86	$2.01	$17.86	
	R&R	$-	$-	$-	$-	$-	$-	$-	$5.48	$5.92	$6.40	$6.91	$7.46	$8.06	$8.70	$9.40	$10.15	$10.96	$11.84	$12.79	$13.81	$14.92	$132.80	
Sykes Creek WWTF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$3.68	$3.98	$4.30	$4.64	$5.01	$5.41	$5.85	$6.31	$6.82	$7.36	$7.95	$8.59	$9.28	$10.02	$89.20	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$1.14	$1.24	$1.33	$1.44	$1.56	$1.68	$1.82	$1.96	$2.12	$2.29	$2.47	$2.67	$2.88	$3.11	$27.70	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.97	$1.05	$1.13	$1.22	$1.32	$1.43	$1.54	$1.66	$1.80	$1.94	$2.10	$2.26	$2.44	$2.64	$23.51	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$1.16	$1.26	$1.36	$1.46	$1.58	$1.71	$1.84	$1.99	$2.15	$2.32	$2.51	$2.71	$2.93	$3.16	$28.14	
	R&R	$-	$-	$-	$-	$-	$-	$-	$6.86	$7.40	$8.00	$8.64	$9.33	$10.07	$21.76	$23.50	$25.38	$27.41	$29.60	$31.97	$34.53	$37.29	$281.71	
Port St Johns WWTF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$1.54	$1.66	$1.79	$1.94	$2.09	$2.26	$1.64	$1.77	$1.91	$1.77	$3.32	$3.58	$3.87	$4.18	$33.31	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.35	$0.38	$0.41	$0.44	$0.48	$0.51	$0.08	$0.09	$0.10	$0.09	$0.75	$0.81	$0.88	$0.95	$6.32	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.30	$0.32	$0.35	$0.37	$0.40	$0.44	$0.47	$0.51	$0.11	$0.36	$0.64	$0.69	$0.75	$0.81	$6.51	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$0.35	$0.38	$0.41	$0.45	$0.48	$0.52	$0.56	$0.61	$0.66	$0.71	$0.77	$0.83	$0.89	$0.97	$8.60	
	R&R	$-	$-	$-	$-	$-	$-	$-	$1.47	$1.58	$1.71	$1.85	$1.99	$2.15	$9.31	$10.05	$10.86	$11.72	$12.66	$13.67	$14.77	$15.95	$109.75	
North Regional WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$1.54	$1.66	$1.79	$1.66	$1.67	$1.81	$1.95	$2.11	$2.28	$2.46	$2.66	$3.58	$3.87	$4.18	$33.22	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.35	$0.38	$0.41	$0.38	$0.26	$0.28	$0.30	$0.33	$0.35	$0.38	$0.41	$0.81	$0.88	$0.95	$6.47	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.30	$0.32	$0.35	$0.32	$0.22	$0.24	$0.26	$0.28	$0.30	$0.32	$0.35	$0.69	$0.75	$0.81	$5.49	
	Biosolids treatment O&M cost (contracting to Synagro)	$-	$-	$-	$-	$-	$-	$-	$0.27	$0.29	$0.31	$0.34	$0.37	$0.39	$0.43	$0.46	$0.50	$0.54	$0.58	$0.63	$0.68	$0.73	$6.51	
	R&R	$-	$-	$-	$-	$-	$-	$-	$0.71	$0.77	$0.83	$0.90	$0.97	$1.04	$4.51	$4.87	$5.26	$5.68	$6.14	$6.63	$7.16	$7.73	$53.21	
Cape Canaveral SFS Regional WWTF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$1.20	$1.30	$1.40	$1.51	$1.64	$1.77	$1.91	$2.06	$2.23	$2.40	$2.60	$2.80	$3.03	$3.27	$29.12	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.18	$0.20	$0.21	$0.23	$0.25	$0.27	$0.29	$0.31	$0.34	$0.37	$0.40	$0.43	$0.46	$0.50	$4.43	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.16	$0.17	$0.18	$0.20	$0.21	$0.23	$0.25	$0.27	$0.29	$0.31	$0.34	$0.36	$0.39	$0.42	$3.76	
	Biosolids treatment O&M cost (contracting to Synagro)	$-	$-	$-	$-	$-	$-	$-	$0.26	$0.28	$0.30	$0.33	$0.35	$0.38	$0.41	$0.44	$0.48	$0.52	$0.56	$0.60	$0.65	$0.70	$6.25	
	R&R	$-	$-	$-	$-	$-	$-	$-	$0.55	$0.59	$0.64	$0.69	$0.75	$0.81	$3.49	$3.77	$4.07	$4.39	$4.75	$5.13	$5.54	$5.98	$41.13	
	Total Escalated Costs - Excluding R&R	$10.64	$11.49	$12.41	$13.40	$14.47	$15.63	$16.88	$18.83	$20.34	$21.97	$23.34	$24.80	$26.79	$27.66	$29.87	$31.83	$34.31	$39.36	$43.91	$47.42	$51.22		
	NPV of O&M Costs, 2022	$10.64	$10.97	$11.31	$11.66	$12.02	$12.39	$12.78	$13.61	$14.03	$14.47	$14.67	$14.89	$15.35	$15.13	$15.60	$15.87	$16.33	$17.88	$19.05	$19.64	$20.25		$270
	NPV R&R, 2022	$19.56	$20.17	$20.80	$21.44	$22.11	$22.79	$21.70	$22.37	$23.07	$23.78	$24.52	$25.28	$28.23	$29.10	$30.01	$30.94	$31.90	$32.89	$33.91	$34.96	$36.04		$338

Alternative 1 - Keep all 6 WRFs	Cost (in Millions)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total Escalated Costs (2023 through 2043)	NPV
		Estimated Cost 2023	Cost Spread Over 6 years																					
Capital Impr. WRFs	Capital Improvement Costs (at WRFS)	365.37	$65.77	$71.03	$76.71	$82.85	$89.47	$96.63																
	Engineering Fees	73241852.01	$13.18	$14.24	$15.38	$16.61	$17.94	$19.37																
	Decommissioning Costs of Treatment Systems (Port St John, Cape Canaveral AF, and North Brevard)	7.02	$1.26	$1.36	$1.47	$1.59	$1.72	$1.86																
	Total Escalated Costs		$80.21	$86.63	$93.56	$101.05	$109.13	$117.86																
	NPV of Capital Costs, 2023		$76.58	$78.95	$81.40	$83.93	$86.53	$89.22																$497
Land Acquisition (Port St John WWTF)		0.70																						$0.70
Land Acquisition (Sykes Creek WWTF)		0.88																						$0.88
		Estimated Cost 2023	Cost Spread Over 6 years																					
Capital Impr. Collection & Effluent	Capital Improvement Costs (Collection System)	$-																						
	Capital Improvement Costs (Effluent Handling)	$34.80	$6.26	$6.77	$7.31	$7.89	$8.52	$9.20																
	Total Escalated Costs		$6.26	$6.77	$7.31	$7.89	$8.52	$9.20																
	NPV of Capital Collection & Effluent Syst. Costs, 2023		$5.98	$6.17	$6.36	$6.55	$6.76	$6.97																$38.8
	NPV Alternative 1																							$1,146

Alternative 2	Cost (in Millions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total Escalated Costs (2022 through 2043)	NPV
New Regional WRF on barrier island (Sykes Creek + Port St John + Cape Canaveral SFS)	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$6.34	$6.85	$7.40	$7.99	$8.63	$9.32	$10.07	$10.87	$11.74	$12.68	$13.70	$14.79	$15.98	$17.26	$ 153.64	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$1.68	$1.81	$1.96	$2.11	$2.28	$2.46	$2.66	$2.87	$3.10	$3.35	$3.62	$3.91	$4.22	$4.56	$40.59	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$1.01	$1.09	$1.17	$1.27	$1.37	$1.48	$1.60	$1.72	$1.86	$2.01	$2.17	$2.35	$2.53	$2.74	$24.36	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$1.70	$1.84	$1.99	$2.15	$2.32	$2.50	$2.70	$2.92	$3.15	$3.40	$3.68	$3.97	$4.29	$4.63	$41.24	
	R&R	$-	$-	$-	$-	$-	$-	$-	$5.14	$5.55	$6.00	$6.48	$6.99	$7.55	$32.64	$35.25	$38.07	$41.11	$44.40	$47.95	$51.79	$55.93	$ 384.85	
North Regional WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$1.54	$1.66	$1.79	$1.66	$1.67	$1.81	$1.95	$2.11	$2.28	$2.46	$2.66	$3.58	$3.87	$4.18	$33.22	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.35	$0.38	$0.41	$0.38	$0.26	$0.28	$0.30	$0.33	$0.35	$0.38	$0.41	$0.81	$0.88	$0.95	$6.47	
	Maintenance/Internal Service	$-	$-	$-	$-	$-	$-	$-	$0.30	$0.32	$0.35	$0.32	$0.22	$0.24	$0.26	$0.28	$0.30	$0.32	$0.35	$0.69	$0.75	$0.81	$5.49	
	Biosolids treatment O&M cost (contracting to Synagro)	$-	$-	$-	$-	$-	$-	$-	$0.27	$0.29	$0.31	$0.34	$0.37	$0.39	$0.43	$0.46	$0.50	$0.54	$0.58	$0.63	$0.68	$0.73	$6.51	
	R&R	$-	$-	$-	$-	$-	$-	$-	$0.71	$0.77	$0.83	$0.90	$0.97	$1.04	$4.51	$4.87	$5.26	$5.68	$6.14	$6.63	$7.16	$7.73	$53.21	
Osprey WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$2.42	$2.61	$2.82	$3.05	$3.29	$3.55	$3.84	$4.14	$4.47	$4.83	$5.22	$5.64	$6.09	$6.57	$58.54	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.32	$0.35	$0.38	$0.41	$0.44	$0.48	$0.51	$0.56	$0.60	$0.65	$0.70	$0.76	$0.82	$0.88	$7.86	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.34	$0.37	$0.40	$0.43	$0.47	$0.51	$0.55	$0.59	$0.64	$0.69	$0.74	$0.80	$0.87	$0.94	$8.33	
	Biosolids treatment O&M cost (contracting to Synagro)	$-	$-	$-	$-	$-	$-	$-	$0.73	$0.79	$0.86	$0.92	$1.00	$1.08	$1.16	$1.26	$1.36	$1.47	$1.58	$1.71	$1.85	$2.00	$17.77	
	R&R	$-	$-	$-	$-	$-	$-	$-	$1.71	$1.85	$2.00	$2.16	$2.33	$2.52	$5.44	$5.87	$6.34	$6.85	$7.40	$7.99	$8.63	$9.32	$70.43	
Blue Heron WRF	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$2.70	$2.92	$3.15	$3.40	$3.67	$3.97	$4.28	$4.63	$5.00	$5.40	$5.83	$6.30	$6.80	$7.34	$65.38	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$0.73	$0.78	$0.85	$0.91	$0.99	$1.07	$1.15	$1.24	$1.34	$1.45	$1.57	$1.69	$1.83	$1.97	$17.58	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$0.62	$0.67	$0.72	$0.78	$0.84	$0.91	$0.98	$1.06	$1.14	$1.23	$1.33	$1.44	$1.55	$1.68	$14.92	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$0.74	$0.80	$0.86	$0.93	$1.00	$1.08	$1.17	$1.26	$1.36	$1.47	$1.59	$1.72	$1.86	$2.01	$17.86	
	R&R	$-	$-	$-	$-	$-	$-	$-	$5.48	$5.92	$6.40	$6.91	$7.46	$8.06	$8.70	$9.40	$10.15	$10.96	$11.84	$12.79	$13.81	$14.92	$132.80	
	Total Escalated Costs - Excluding R&R	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$20.2**	**$21.8**	**$23.6**	**$24.9**	**$28.8**	**$31.1**	**$33.6**	**$36.3**	**$39.2**	**$42.3**	**$45.7**	**$47.1**	**$50.9**	**$55.0**		
	NPV of O&M Costs, 2022	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$14.6**	**$15.1**	**$15.5**	**$15.7**	**$17.3**	**$17.8**	**$18.4**	**$19.0**	**$19.5**	**$20.2**	**$20.8**	**$20.5**	**$21.1**	**$21.7**		**$257**
	NPV R&R, 2022	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$9.4**	**$9.7**	**$10.0**	**$10.3**	**$10.7**	**$11.0**	**$28.1**	**$28.9**	**$29.8**	**$30.7**	**$31.7**	**$32.7**	**$33.7**	**$34.7**		**$312**
		Estimated Cost 2023	Cost Spread Over 6 years																					
Capital Impr. WRFs	Capital Improvement Costs (at WRFS)	341.17	61.41	66.32	71.63	77.36	83.55	90.23																
	Engineering Fees	65.25	11.75	12.68	13.70	14.80	15.98	17.26																
	Decommissioning Costs of Treatment Systems (Port St John, Cape Canaveral AF, and North Brevard)	7.02	1.26	1.36	1.47	1.59	1.72	1.86																

Alternative 2	Cost (in Millions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total Escalated Costs (2022 through 2043)	NPV
	Total Escalated Costs		74.42	80.37	86.80	93.75	101.25	109.34																
	NPV of Capital Costs, 2023		71.04	73.25	75.52	77.86	80.28	82.77																**$461**
Land Acquisition (Sykes Creek WWTF)		2.63																						**$2.63**
		Cost Spread Over 6 years																						
Capital Impr. Collection & Effluent	Capital Improvement Costs (Collection System)	60.2	$11	$12	$13	$14	$15	$16																
	Capital Improvement Costs (Effluent Handling)	26.5	$5	$5	$6	$6	$6	$7																
	Total Escalated Costs		$16	$17	$18	$20	$21	$23																
	NPV of Capital Collection & Effluent Syst. Costs, 2023		$15	$15	$16	$16	$17	$17																**$97**
	NPV Alternative 2																							**$1,129**

Alternative 3	Cost (in Millions)	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	Total Escalated Costs (2022 through 2043)	NPV
New Regional Facility of the Mainland	Services, Maintenance, and Miscellaneous	$-	$-	$-	$-	$-	$-	$-	$8.44	$9.12	$9.85	$10.64	$11.49	$12.41	$13.40	$14.47	$15.63	$16.88	$18.23	$19.69	$21.26	$22.96	$204.45	
	Energy Cost	$-	$-	$-	$-	$-	$-	$-	$2.97	$3.20	$3.46	$3.74	$4.04	$4.36	$4.71	$5.09	$5.49	$5.93	$6.41	$6.92	$7.47	$8.07	$71.86	
	Process Chemical	$-	$-	$-	$-	$-	$-	$-	$1.75	$1.89	$2.04	$2.21	$2.38	$2.57	$2.78	$3.00	$3.24	$3.50	$3.78	$4.08	$4.41	$4.76	$42.39	
	Biosolids treatment O&M cost (dryer)	$-	$-	$-	$-	$-	$-	$-	$2.96	$3.20	$3.46	$3.73	$4.03	$4.35	$4.70	$5.08	$5.48	$5.92	$6.40	$6.91	$7.46	$8.06	$71.73	
	R&R	$-	$-	$-	$-	$-	$-	$-	$6.23	$6.72	$7.26	$7.84	$8.47	$9.15	$39.52	$42.68	$46.10	$49.78	$53.77	$58.07	$62.71	$67.73	$466.04	
	Total Escalated Costs - Excluding R&R	$-	$-	$-	$-	$-	$-	$-	$16.12	$17.41	$18.81	$20.31	$21.94	$23.69	$25.59	$27.63	$29.84	$32.23	$34.81	$37.59	$40.60	$43.85		
	NPV of O&M Costs, 2023	$-	$-	$-	$-	$-	$-	$-	$11.65	$12.01	$12.39	$12.77	$13.17	$13.57	$14.00	$14.43	$14.88	$15.34	$15.82	$16.31	$16.81	$17.33		**$200**
	NPV R&R, 2023	$-	$-	$-	$-	$-	$-	$-	$4.50	$4.64	$4.78	$4.93	$5.08	$5.24	$21.62	$22.29	$22.98	$23.69	$24.43	$25.19	$25.97	$26.77		**$222**
		Estimated Cost 2023	Cost Spread Over 6 years																					
Capital Impr. WRFs	Capital Improvement Costs (at WRFS)	363.29	$65.39	$70.62	$76.27	$82.37	$88.96	$96.08																
	Engineering Fees	65.39	$11.77	$12.71	$13.73	$14.83	$16.01	$17.29																
	Decommissioning Costs of Treatment Systems (all six WRFs)	19.15	$3.45	$3.72	$4.02	$4.34	$4.69	$5.07																
	Total Escalated Costs		$80.61	$87.06	$94.02	$101.55	$109.67	$118.44																
	NPV of Capital Costs, 2023		$76.95	$79.34	$81.80	$84.34	$86.96	$89.66																**$499**
Land Acquisition		$5.25																						**$5**
		Estimated Cost 2023	Cost Spread Over 6 years																					
Capital Impr. Collection & Effluent	Capital Improvement Costs (Collection System)	$156.60	$28.19	$30.44	$32.88	$35.51	$38.35	$41.42																
	Capital Improvement Costs (Effluent Handling)	$81.20	$14.62	$15.79	$17.05	$18.41	$19.88	$21.48																
	Total Escalated Costs		$42.80	$46.23	$49.93	$53.92	$58.23	$62.89																
	NPV of Capital Collection & Effluent Syst. Costs, 2023		$40.86	$42.13	$43.44	$44.79	$46.18	$47.61																**$265**
	NPV Option 3																							**$1,192**

Appendix C. Funding and Financing Alternatives Evaluation Technical Evaluation

DRAFT TECHNICAL MEMORANDUM (TM)

FUNDING AND FINANCING ALTERNATIVES EVALUATION

Conceptual Alternatives Evaluation for Cape Canaveral Space Force Station Regional Wastewater Treatment Options

B&V PROJECT NO. 414336
SPECIFICATION NO.

PREPARED FOR

Economic Development Commission of Florida's Space Coast

8 APRIL 2023

BLACK & VEATCH

Table of Contents

Acronyms and Abbreviations

AFS	Alternative Funding Services
AWT	Advanced Wastewater Treatment
BRIC	Building Resilient Infrastructure and Communities
DEO	Department of Economic Opportunity
DWRA	Division of Water Restoration Assistance
EDA	United States Economic Development Administration
EDC	Economic Development Commission of Florida's Space Coast
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
HMGP	Hazard Mitigation Grant Program
IRL	Indian River Lagoon
KSC	Kennedy Space Center
LOI	Letter of Interest
NEP	National Estuary Program
SRF	State Revolving Fund
TM	Technical Memorandum
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WMD	Water Management District
WIFIA	Water Infrastructure Finance and Innovation Act
WRDA	Water Resources Development Act
WWGP	Wastewater Grant Program
WWTP	Wastewater Treatment Plant

Executive Summary

Black & Veatch was engaged by the Economic Development Commission (EDC) of Florida's Space Coast and the Indian River Lagoon (IRL) National Estuary Program (NEP) Council to analyze potential funding opportunities and provide strategy recommendations for the Conceptual Alternatives Evaluation for Cape Canaveral Space Force Station (SFS) Regional Wastewater Treatment Options and resulting construction project. This Technical Memorandum (TM) identifies the programs most suitable and available for supporting the project's funding needs. It includes an evaluation of potential federal, state, and partnership funding programs. Recommended funding program descriptions include details of funding cycles, match requirements, and administrative and application burdens. In preparing this TM, Black & Veatch canvassed numerous funding programs. Many were excluded from this TM, as they may not be applicable to the project or available when the applicant is prepared to apply. These programs are found in Section 0, and brief descriptions of program applications are included.

Section 1 includes a description of the project and details the purpose and need.

Section 2 discusses leveraging funds, viability versus costs, and the methodology used in examining funding sources. This section includes a brief technical scope and project schedule used to develop a parallel funding plan. An understanding of these elements will support the decision-making process when funding sources are pursued and the best opportunities with minimal out-of-pocket costs are examined.

Section 3 introduces a Funding Key Facts Legend, which is used to summarize highlights of programs and help the reader compare key details of each recommended program. The section also explores various potential federal, state, and partnership funding sources and details how these programs may apply to the project. These programs include the following:

- Florida Department of Environmental Protection (FDEP) Clean Water State Revolving Fund (SRF).
- United States Environmental Protection Agency (USEPA) Water Infrastructure Finance and Innovation Act (WIFIA).
- St. Johns River Water Management District (WMD) District Cost-Share Funding.
- FDEP Resilient Florida Grant Program.
- Federal Emergency Management Agency (FEMA) Building Resilient Infrastructure and Communities (BRIC).
- FEMA Hazard Mitigation Grant Program (HMGP).
- FEMA Regional Catastrophic Preparedness Grant.
- United States Economic Development Administration (EDA) Public Works and Economic Adjustment Assistance.
- FDEP Division of Water Restoration Assistance (DWRA) Wastewater Grant Program.
- Florida Local Government Finance Program.
- Florida Department of Economic Opportunity Job Growth Grant Funds.
- US Army Corps of Engineers (USACE) Section 7001.

- National Oceanic and Atmospheric Administration (NOAA) Climate-Ready Coasts
- Partnership Funding Opportunities.

Section 4 provides conclusions that were drawn from Black & Veatch's evaluation and provides strategy recommendations for the EDC.

The short-term action items are as follows:

- Engage the FDEP SRF for planning phase activity support.
- Determine the intended future ownership of the Cape Canaveral AFS Regional WWTF and the proposed new regional advanced wastewater treatment (AWT) facility on the mainland.
- Engage with FDEP DWRA Wastewater Grant Program grant managers following the conclusion of the 2022-23 legislative session, likely after May 2023.
- Identify partnership opportunities.

Long-term action items are as follows:

- Pursue state and federal legislative funding.
- To receive WIFIA funding for the construction phase of the project, Black & Veatch recommends the intended future owner begin the pre-application process in early to mid-2025 to receive funding by the start of construction in 2027.

1. Introduction

The Cape Canaveral Space Force Station (SFS) and National Aeronautics and Space Administration's (NASA's) Kennedy Space Center (KSC) contribute wastewater to a joint collection and treatment system located at Cape Canaveral SFS on a barrier island. The aging Cape Canaveral SFS wastewater infrastructure will not be able to meet future demands or state water quality standards. New state water quality standards require a minimum of advanced wastewater treatment (AWT) by 2025. All collected wastewater in this joint system is treated by the Cape Canaveral Air Force Station (AFS) Regional Wastewater Treatment Facility (WWTF). The Economic Development Commission (EDC) of Florida's Space Coast, Cape Canaveral SFS, and NASA's KSC recognize the need to expand and improve the Cape Canaveral AFS Regional WWTF or take a regional approach and construct a new WWTF with AWT capabilities on the mainland to serve Cape Canaveral SFS, KSC, and the adjacent communities. Cape Canaveral SFS is interested in a regional approach because wastewater collection and management services are not part of the core mission and the Cape Canaveral AFS Regional WWTF location on a barrier island makes it more susceptible to damage caused by coastal storms or sea level rise. In addition, the regional approach offers opportunities to pool resources and provide much needed regional solutions to ever increasing challenges to nutrient reduction in ultrasensitive environmental regions of Florida.

1.1 Project Description and Status

Black & Veatch is performing a conceptual feasibility evaluation for the Cape Canaveral AFS Regional WWTF; the evaluation will identify and evaluate upgrade expansions to the existing Cape Coral AFS Regional WWTF and the construction of a new regional AWT WWTF on the mainland. Cape Coral SFS and KSC intend to meet or exceed state water quality standards through the project. Over the next several months, Cape Canaveral SFS, KSC, and EDC will be working through the Conceptual Alternatives Evaluation for Cape Canaveral SFS Regional Wastewater Treatment Options to identify technical alternatives that will produce an optimum (life-cycle cost) facility for the county and other regional partners.

It is anticipated that Cape Canaveral SFS will not intend to continue managing the Cape Canaveral AFS Regional WWTF and that a utility would assume ownership of the new regional WWTF option. This owner would, therefore, be the applicant and recipient of a grant or loan. The number of stakeholders in this project may warrant a consortium ownership. Once the project has determined its ownership structure, funding options can be broken out for specific applicants.

1.2 Purpose and Need

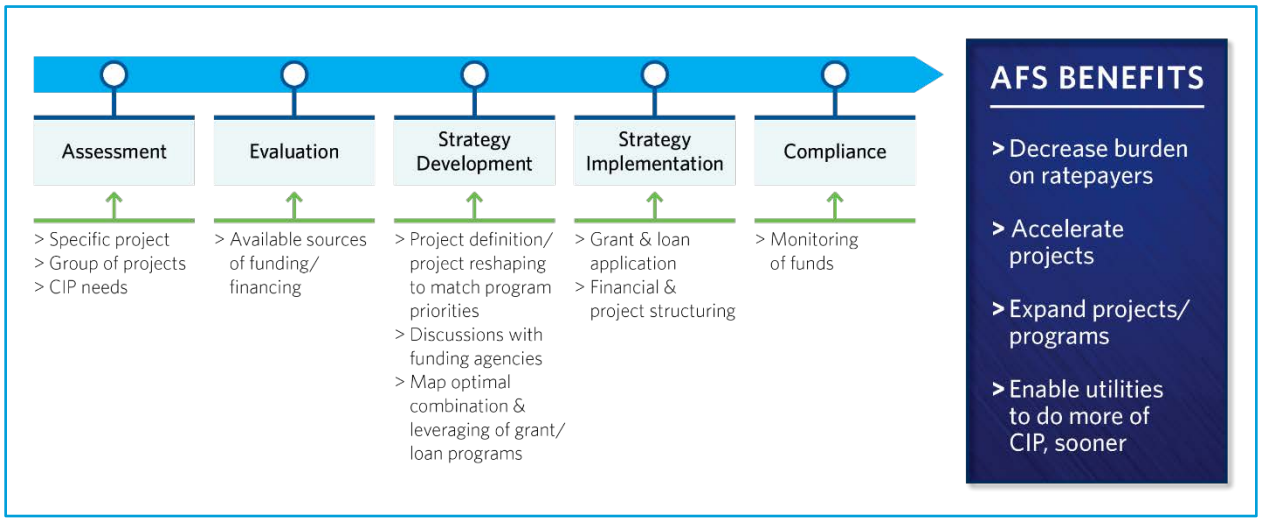
This Funding and Financing Alternatives Evaluation Technical Memorandum (TM) consolidates state and federal sources of low interest loans, grants, and partnership opportunities and summarizes application requirements and strategy recommendations. This TM identifies the programs most likely to support the funding needs for the project. It should be noted that the applicant/borrower has not yet been determined. This determination will be critical for pursuing grant and loan funding.

2. Aligning Funding with Project Elements

2.1 Methodology

Black & Veatch's Alternative Funding Services (Black & Veatch's AFS) team evaluates funding and financing options, assists with grant and loan applications, and supports in the compliance monitoring of funds. Each funding opportunity has program goals, objectives, and eligibility requirements. The Black & Veatch's AFS team looks to match specific elements of a project to align with the objectives of various funding programs. In addition to evaluating federal, state, and local programs, the team also looks at private financing, public-private partnerships, or a combination of multiple sources, where appropriate.

As described below, Black & Veatch's AFS team also investigates both leveraging and viability versus cost. The team then develops a strategy to best leverage the various state and federal programs and matching funds with the goal of optimizing funding opportunities to decrease the burden and cost to the owners. Black & Veatch's methodology for alternative funding is shown on the following figure.



**Black & Veatch does not serve as a financial, legal, insurance, or tax advisor and does not provide financial, legal, insurance, or tax advice and nothing herein should be construed as such advice. Black & Veatch has provided options and recommendations based on commercial experience; however, any action taken by the Economic Development Commission related to the recommendations and funding/financing options should be reviewed and guided by the utility's financial, legal, insurance, and/or tax advisor(s). Black & Veatch's services do not include serving as a "municipal advisor" for purposes of the registration requirements of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010) or the municipal advisor registration rules issued by the Securities and Exchange Commission.*

2.2 Leveraging

Leveraging typically refers to using funds from one source, internal or external, as a match for another funding source, thereby increasing the total available funding for a project. The ideal combination of state and federal programs would maximize leveraging and reduce the total cost of project development to the owner.

2.3 Viability Versus Costs

Many programs are available to fund projects, and while it would seem potentially appealing to apply for all opportunities that are identified, this is not always the case. Sometimes, the cost of an application and the required funding administration, either by a consultant or project staff, is too onerous to justify the amount of money that is being awarded. Smaller funding opportunities should not be ignored, but the application process and the administration requirements should be evaluated before moving forward. This TM includes notes on the application and administrative burdens of the programs, as well as the special application and administrative considerations of each program. Weighing these factors will help ensure that the associated costs of applying for and administering the funding do not outweigh the financial benefit.

2.4 Technical Scope

Technical project elements under review by Black & Veatch include various alternatives for six existing wastewater treatment facilities, one new regional AWT plant, approximately 54 miles of interconnected forcemains, and consolidation of effluent disposal via reclaimed water services. The project is proposed to be developed over 8 years from planning to design to construcuction to closeout and activation (refer to Secton 2.5, Project Design Build Implementation Schedule). The Funding Team will use this technical scope and schedule to develop a parallel funding plan. Figure 1 depicts a project alternative under consideration.

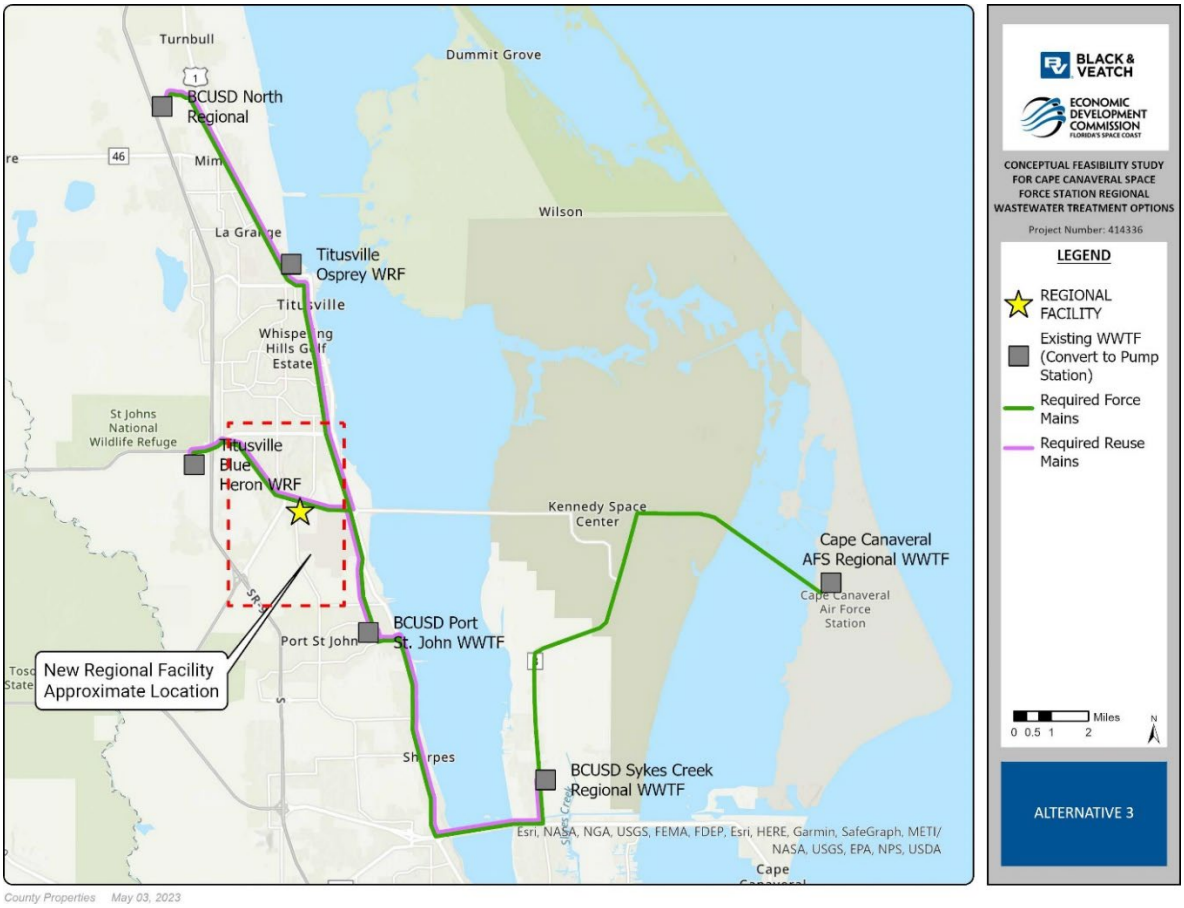


Figure 1 Project Alternative

3. Funding Opportunities and Application Requirements

This section describes potential funding opportunities, including a summary description, details on the funding cycle, and the requirements and key facts associated with each. The requirements for each funding opportunity are summarized in a table below the description. Funding opportunities that were deemed less viable because of application or administrative burden, project relevancy, or funding timeline have been described, but requirements were not summarized.

3.1 Funding Key Facts Legend

Table 3-1 describes the Key Facts section included for each funding source identified in this TM. The second column explains the potential values in each cell.

Table 3-1 Funding Key Facts Legend

Key Facts	
Grant and/or Loan	Identifies the funding source as a grant and/or a loan.
Terms	N/A for a grant. If a loan, terms will include an estimate of the interest rate and the maximum length of the loan repayment.
Maximum Funding per Cycle	Identifies the maximum funding available per funding cycle.
Match Requirement	Identifies the required match percentage and any special match conditions or exclusions.
Application Burden	Low – Can be completed in-house or with minimal outside support. Moderate – Typically completed by an in-house trained grant writer or outside consultant. High – Typically completed by a consultant and may include special technical reports or studies and planning documents.
Special Application Considerations	Identifies important factors related to schedule and effort such as partnerships, public involvement, and special timetables.
Administrative Burden	Low – Can be completed in-house or with minimal outside support. Moderate – Typically completed by an in-house trained grant administrator or outside consultant. High – Typically completed by a consultant and may include special reports or compliance requirements such as Davis-Bacon and Equal Employment Opportunity.
Special Administrative Considerations	Identifies important factors related to schedule and effort such as Davis Bacon, Equal Employment Opportunity monitoring, and others.

3.2 Loan and Grant Funding Sources

This section contains information on the potential federal and state funding sources that the utility could utilize to fund the project. Table 3-2 summarizes funding sources that are explained in further detail in this section. As presented earlier, not all funding sources are viable for the project; these sources are listed in some detail in Section 3.4

Table 3-2 Loan and Grant Funding Sources

Funding Agency	Funding Program	Grant/ Loan	Match Required	Notes
Florida Department of Environmental Protection (FDEP)	Clean Water State Revolving Fund (SRF)	Loan/ Grant	N/A	Wastewater and stormwater management.
United States Environmental Protection Agency (USEPA)	Water Infrastructure Finance and Innovation Act (WIFIA)	Loan	51%	$6 billion program budget for improving water infrastructure.
St. Johns River Water Management District (WMD)	District Cost-Share Funding	Loan/ Grant	50-75%	$3 million per project or applicant. Exclusive use for construction-related costs.
FDEP	Resilient Florida	Grant	50% or match waiver	Dependent on project type. Drivers are flooding and seal level rise risk.
Federal Emergency Management Agency (FEMA)	Building Resilient Infrastructure and Communities (BRIC)	Grant	25% Match	$50 million (national competition). Mitigate risk, enhance resilience.
FEMA	Hazard Mitigation Grant Program (HMGP)	Grant	25% Minimum	Typically, 15% of projected disaster recovery expenditures awarded to mitigate the risk of disaster damage.
FEMA	Regional Catastrophic Preparedness Grant	Grant	0-10%	$12 million program budget subdivided by region. Maximum award amount $1 million
United States Economic Development Administration (EDA)	Public works and economic adjustment assistance programs	Grant	20-50%	$30 million program budget. Driver is economic development.
FDEP Division of Water Restoration Assistance (DWRA)	Wastewater Grant Program (WWGP)	Grant	50% or waiver	Program budget varies, approximately $240 million in 2022. Drivers are excess nutrient pollution.
Florida Association of Counties	Florida Local Government Finance Program	Loan	N/A	$5 million minimum per project. Drivers are infrastructure and capital needs.
Florida Department of Economic Opportunity (DEO)	Florida Job Growth Grant Funds	Grant	N/A	Funding varies per cycle.
United States Army Corps of Engineers (USACE)	Water Resources Development Act (WRDA) Section 7001	Grant	Varies	Up to $30 billion for single project.

3.2.1 FDEP Clean Water State Revolving Fund

The Clean Water State Revolving Fund (SRF) loan program is a federal-state partnership administered by the FDEP. The FDEP SRF is part of the revolving fund that requires money repaid to be put back into the program to fund future projects. The Clean Water SRF program in Florida addresses wastewater, reclaimed water, and stormwater projects. Wastewater and stormwater loans are allocated to approved applicants through the FDEP SRF on a quarterly basis. The funds may be used for planning, design, and construction activities. Financing rates vary based on the median household income and the proposed service area affordability index.

The program accepts funding request via a Request for Inclusion submittal. The program would result in low interest funding with terms of 20 years fixed interest rate equal to 50 percent of the market interest rate, approximately 2.5 percent at the time of this draft. Projects may be eligible for an environmental impact discount. When at least 50 percent of the eligible project costs fund any of the following components, the loan applicant shall receive a 0.2 percent discount from the rates established:

1. New projects for the collection or treatment of unsewered communities.
2. Projects involving nutrient removal or nutrient loss reduction.
3. Green infrastructure projects.
4. Projects lowering water demand.
5. Projects reducing energy demands at a wastewater treatment facility.

Funding Cycle

Cycle Frequency:	Ongoing
Begin Application Planning:	Ongoing
Funding Cycle Open:	Ongoing
Applications Due:	45 Days Prior to Quarterly Public Hearings

Key Facts	
Grant and/or Loan	Low interest loans for all qualified projects, principal forgiveness based on a score table.
Terms	Up to 20 years. Below-market fixed interest rate (basis points off borrower's underlying credit rating).
Maximum Funding per Cycle	Subject to annual segment cap - 2023 anticipated 15 million.
Match Requirement	Principle forgiveness is determined at time of application.
Application Burden	Medium- engineering feasibility report and finance support required. Requires public participation meeting and resolution adopting facilities plan.
Special Application Considerations	Planning/environmental documents.
Administrative Burden	Medium- preconstruction and construction activities.
Special Administrative Considerations	Build America, Buy America Act, American Iron and Steel, Davis-Bacon, alternative analysis, environmental review, financial review, public meetings for comment.

3.2.2 USEPA Water Infrastructure Finance and Innovation Act

The WIFIA is a USEPA financing program approved by Congress in 2014 and funded in 2017. Year 2023 is WIFIA's seventh year of financing water, wastewater, and stormwater projects in the United States. For 2022, WIFIA had approximately $6 billion in financing capacity, and the same amount is anticipated for 2023 and future years.

One of the most compelling aspects of the WIFIA program, as it applies to the project, is that the program can support large loan amounts, much larger than SRF or FEMA grants, for example. WIFIA can close and has closed loans in the $700 million range for projects of more than $1.4 billion.

Eligible borrowers include local, state, tribal, and federal government entities. The WIFIA selection criteria are divided into three categories: project impact, project readiness, and borrower creditworthiness. Projects are scored according to the selection criteria. Size and geographic diversity also factor into the project selection.

Borrowers must comply with federal requirements such as Davis Bacon Wage Rates and the American Iron and Steel Act. The Build America, Buy America Act also applies, although a program waiver exists for eligible projects that initiated project design planning before May 14, 2022.

WIFIA has a two-step application process: (1) the pre-application, called the Letter of Interest (LOI) and (2) the full application, which is due within 1 year of notification of invitation to apply. In 2022, WIFIA changed from a deadline to a rolling application. The 2022 round began in September 2022 and will continue until 2022 funds are allocated to projects. The 2023 round may follow a timeline similar to the one for 2022; regardless, there is now no firm LOI deadline. It is, however, important to note that selection is made at the LOI stage and that development of a competitive LOI requires resources and time.

The WIFIA Program has several distinct advantages. A single, fixed rate is established at closing. The rate is equivalent to the 30-year treasury rate. WIFIA allows for a flexible repayment structure. The repayments can be sculpted to match project revenue streams (up to a 35 year repayment). Payments may be deferred 5 years after substantial completion of the project. All borrowers receive an AAA Treasury rate, regardless of credit and loan structure. WIFIA financing can be combined with other funding sources, including private equity, revenue bonds, corporate debt, grants, and SRF loans. The program is still relatively new, and the WIFIA team works closely with applicants. Funds dispersal can be based on disbursement requests by the borrower and can be synchronized with funding needs, which would reduce the amount of accrued interest. WIFIA financing can also be subordinated to other debt.

Eligible development and implementation activities include planning, preliminary engineering, design, other preconstruction activities, construction, acquisition of real property or property interests, capitalized interest, and other related development and implementation activities.

Borrowers applying for WIFIA loans must be creditworthy and demonstrate a reasonable assurance of repayment of the loan over the term of the loan. Payments must commence no later than 5 years following substantial completion of the project. The WIFIA loan must be repaid using a dedicated source of repayment or security pledge. WIFIA can finance up to 49 percent of project costs. The remaining 51 percent must come from other sources; 80 percent of the total project costs can be federally financed.

There is no fee for the initial LOI. The LOI is extensive and is the basis for selection. The cost of the application is $100,000. Credit processing fees are assessed at financial close to reimburse the USEPA for

the cost of engineering, financial, and legal experts. Application and credit processing fees can be rolled into the loan. Other development phase costs can also be included in the loan.

Funding Cycle

Cycle Frequency:	Annual
Begin Application Planning:	Ongoing
Funding Cycle Open:	TBD 2023 (anticipated fall) Note – 2022 funding cycle is still open
Letters of Interest Due:	Rolling, following the Notice of Funding Availability for 2023
Applications Due:	Within 365 days of the invitation to apply

Key Facts	
Grant and/or Loan	Loan
Terms	30 years with 5 year deferral option. Rate equal to 30 year treasury rate at time of loan close.
Maximum Funding per Cycle	Minimum $20 million per project.
Match Requirement	51%
Application Burden	Medium
Special Application Considerations	No fee for LOI. Selection is made from LOI. Application fee of $100,000, which can be rolled into the loan.
Administrative Burden	Medium-High
Special Administrative Considerations	National Environmental Policy Act, Davis-Bacon, American Iron and Steel, Build America, Buy America Act, other federal cross-cutter provisions.

3.2.3 St. Johns River Water Management District Cost-Share Funding

Projects that benefit the core mission areas of St. Johns River WMD are eligible for district cost-share funding programs. St. Johns River WMD core mission areas are water supply, natural systems restoration, water quality, and flood protection. The district will fund up to 25 percent of the construction cost, or up to 50 percent for water conservation projects, up to $3 million per project or applicant. Funding is limited to construction-related costs and must be completed within 2 years of receiving funds (SJMWRD, n.d.).

3.2.4 FDEP Resilient Florida Grant Program

The Resilient Florida Program was created in 2021 by the Florida legislature to address challenges associated with flooding, sea level rise, and storm severity. This program provides grants to assist communities adapt critical and significant assets. Applications for planning projects within the 2022-2023 fiscal year were accepted between May 1 and September 1, 2022. Applications for implementation projects to be funded between fiscal year 2022-23 and 2023-24 were accepted between July 1 and September 1, 2022. The department will develop an annual statewide flooding and sea level rise

resilience plan that prioritizes submitted projects based on a vulnerability assessment (FDEP, 2023-24 Statewide Flood and Sea Level Rise Resilience Plan).

3.2.5 FEMA Building Resilient Infrastructure and Communities

The BRIC program is an annual program with two allocation types: (1) direct state, tribal, and territorial funding and (2) a national mitigation project competition. This new program is intended to encourage proactive investment in infrastructure and build resilience nationwide; it replaces FEMA's Pre-Disaster Mitigation program. With its first funding cycle in 2020, the stated priorities of this program were to incentivize the following:

- Public infrastructure projects.
- Projects that mitigate risk to community lifelines (i.e., the most fundamental services in the community that, when stabilized, enable all other aspects of society to function).
- Nature-based solutions.
- Adoption and enforcement of modern building codes.

The purpose of the BRIC program is to increase national preparedness and public safety. The BRIC program promotes investments in resilience and mitigation capabilities that protect infrastructure and communities. Applicants to the program must demonstrate cost-effectiveness through a benefit cost ratio of 1.0 or greater. Applicants are additionally required to provide a historical calculation of damage loss estimates. These requirements contribute to the high application and administrative burden of this program. The BRIC program cost share is 75 percent federal and 25 percent nonfederal.

Funding Cycle

Cycle Frequency:	Annual
Funding Cycle Open:	Open
Applications Due:	Last week in January

Key Facts	
Grant and/or Loan	Grant
Terms	N/A
Maximum Funding per Cycle	$50 million (federal competition), $1 million (total state allocation)
Match Requirement	25% match
Application Burden	High
Special Application Considerations	None
Administrative Burden	High
Special Administrative Considerations	National Environmental Policy Act, Davis-Bacon, American Iron and Steel, Build America, Buy America Act, and other federal cross-cutter provisions.

3.2.6 FEMA Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) makes mitigation funds available within a state after a federally declared disaster. Projects submitted under this program can address hazards unrelated to the disaster and are not limited to the area of the state impacted by the disaster. To illustrate - under HMGP, a flood mitigation project could be funded for a declared tornado disaster that is completely outside the area damaged by the tornado. HMGP budgets are set at a percentage (typically 15 percent) of disaster recovery expenditures.

Funding Cycle

Cycle Frequency:	Annual
Funding Cycle Open:	Open
Applications Due:	Within 12 months of presidential major disaster declaration

Key Facts	
Grant and/or Loan	Grant
Terms	N/A
Maximum Funding per Cycle	Depends on allocation
Match Requirement	25% match
Application Burden	High
Special Application Considerations	None
Administrative Burden	High
Special Administrative Considerations	National Environmental Policy Act, Davis-Bacon, American Iron and Steel, and other federal cross-cutter provisions.

3.2.7 FEMA Regional Catastrophic Preparedness Grant

The Regional Catastrophic Preparedness Grant Program authorized by the Department of Homeland Security has provided $10-$12 million in funding to states and local governments during financial years 2019 through 2022. Notice of Funding Opportunity typically occurs in June, with application submittals typically required in early August. The maximum award amount is $1 million, with no cost share requirements. Funding selection criteria is based on need for grant funds, project design, impact, ability to benefit national preparedness, and budget. Additional points will be added to project scores for applications that include cost share commitments of 10 percent or more, address climate resilience with a focus on equity, support socially vulnerable populations, benefit multiple states or more than one of the top one hundred most populous metropolitan statistical areas (FEMA, n.d.).

3.2.8 US EDA Public Works and Economic Adjustment Assistance

The Public Works and Economic Adjustment Assistance program provides grant funding to communities and regions to meet economic development needs. As these needs are specific to each community and region, grants may be used to fund a wide range of projects from technical assistance, planning, and construction. Applications will be accepted on a rolling basis with a maximum award amount of $30 million. Award match requirements are typically 50 percent; however, depending on the needs of the

region, EDA may fund up to 80 percent of total project costs (EDA, Fiscal Year 2023 PWEAA Application Submission and Program Requirements, n.d.).

3.2.9 FDEP DWRA Wastewater Grant Program

The FDEP DWRA administers the WWGP to governmental entities for projects to retrofit on-site sewage treatment and disposal systems to enhanced nutrient-reducing on-site sewage treatment and disposal systems, construct, upgrade, or expand facilities to provide AWT, and to connect these systems to central sewer facilities. Funding available through this program varies and reached nearly $250 million for fiscal year 2022-23. The WWGP requires a 50 percent match of local funds unless waived by FDEP for project location designated in a rural area of opportunity. Application considerations include nutrient reductions, project readiness, cost effectiveness, overall environmental benefit, project location, local matching of funds, water savings, and water quality improvement. The program anticipates opening to applicants for the 2023-34 fiscal year after the legislative session concludes, likely in May (FDEP, Wastewater Grant Program, n.d.).

3.2.10 Florida Local Government Finance Program

Florida Association of Counties

The Florida Local Government Finance Program is a flexible, low-interest, short to medium term loan program geared toward helping local governments meet their many infrastructure and capital needs. Funding acquired through the program has been used for water and sewer facilities.

Loans are for five years or less and for $5 million or more. With sufficient notice, there are no prepayment penalties or fees.

Funding Cycle	
Cycle Frequency:	Ongoing
Begin Application Planning:	Ongoing
Funding Cycle Open:	Ongoing
Applications Due:	Ongoing

Key Facts	
Grant and/or Loan	Loan
Terms	5 years/anticipated interest rate 2-4 percent
Maximum Funding per Cycle	Based on credit worthiness
Match Requirement	None
Application Burden	Medium
Special Application Considerations	None
Administrative Burden	Low
Special Administrative Considerations	Insurance costs

3.2.11 Florida Department of Economic Opportunity Job Growth Grant Funds

The Florida Department of Economic Opportunity (DEO) announced it is accepting economic development project proposals for more than $74 million in Florida Job Growth Grant Funds. The grants will assist communities in funding public infrastructure projects to support growth and employment in Florida.

The state budget has an additional $50 million that was included in the 2021-2022 General Appropriations Act. "Infrastructure projects and workforce training are vital to the state's economic growth and resiliency," said Governor Ron DeSantis. "These new funds are made available through the Florida Job Growth Grant Fund, will help Florida communities ensure they are resilient, prepared for all economic possibilities, and achieve their economic goals."

The Florida Job Growth Grant Fund is an economic development program designed to promote public infrastructure across the state. Proposals are reviewed by the Florida DEO and chosen by the governor to meet the demand for infrastructure needs in the community they are awarded to. Public infrastructure projects can include transportation and utilities needed to support economic development. DEO will provide funding for projects that focus on infrastructure initiatives that attract businesses, create jobs, and promote economic growth.

Funding Cycle	
Cycle Frequency:	Annual
Begin Application Planning:	TBD
Funding Cycle Open:	TBD
Applications Due:	TBD

Key Facts	
Grant and/or Loan	Grant
Terms	Agency review and approval
Maximum Funding per Cycle	Varies
Match Requirement	TBD
Application Burden	Medium
Special Application Considerations	Legislator support encouraged
Administrative Burden	Medium
Special Administrative Considerations	Reporting required

3.2.12 USACE Section 7001

Section 7001 of the Water Resources Reform and Development Act 2014 requires the Secretary of the Army to submit an annual report to congress on future water resources development projects. Proposals submitted for new USACE water resources development projects must meet the following criteria:

- Be related to the missions and authorities of the USACE; involve a proposed or existing USACE water resources project or effort whose primary purpose is flood and storm damage reduction, commercial navigation, or aquatic ecosystem restoration, or municipal or agricultural water supply. Proposals for recreation or hydropower are eligible for inclusion if undertaken in conjunction with a flood or coastal storm damage reduction, commercial navigation, aquatic ecosystem restoration, or municipal or agricultural water supply project or effort.
- Require specific congressional authorization.
- Have not been congressionally authorized.
- Have not been included in the main table of a previous annual report.
- If authorized, could be carried out by the USACE.

For a project to be implemented by the USACE, the project must be authorized by congress in law, the Secretary of the Army must provide a decision document to congress, and funds for construction of the project must be appropriated to the specific project by law as part of the in the WRDA. The last WRDA (WRDA 2022) was signed into law on December 22, 2022.

Funding Cycle	
Cycle Frequency:	Biannual (approved project must be included in the USACE's annual Report to Congress)
Begin Application Planning:	Ongoing
Funding Cycle Open:	TBD (typically in April of preceding year)
Applications Due:	TBD (typically in August of preceding year)

.

Key Facts	
Grant and/or Loan	Grant
Terms	N/A
Maximum Funding per Cycle	N/A. The 2022 Report to Congress on Future Water Resources Development included 43 non-federal project submittals with total funding ranging from $1.25 M to $30 B.
Match Requirement	Local matches, typically around 35%, are required for USACE projects as a percentage of the total project cost. Match magnitude depends on the USACE program used to implement allocated funding.
Application Burden	High
Special Application Considerations	USACE projects are not directly competed for as with other federal grant programs and must be coordinated directly with USACE staff and advocated for by legislative representatives.
Administrative Burden	High
Special Administrative Considerations	National Environmental Policy Act

A funding request through WRDA would require the project to be approved by the USACE and included in the USACE's Report to Congress in 2023 for consideration in the WRDA 2024. The local agency's or non-federal sponsor's cost share match under WRDA funds can include in-kind services as well as project-specific real estate, environmental, administrative, and utilities management costs to lower burden.

3.3 Partnership Funding Opportunities

In addition to funding programs, the EDC may want to consider partnership opportunities for funding. Significant project partners and funding sources may include Brevard County, adjacent utility partners, a public-private partnership, and other private or public sector partners. In addition, the EDC may want to explore both partnership and grant opportunities with the Department of Defense. Black & Veatch understands that such discussions are underway. The basis of this partnership may largely determine the funding structure and requirements for the project.

3.4 Other Funding Sources

Black & Veatch reviewed many funding sources. The programs described in this section are not a direct fit for the project and, hence, are not included in the recommendations; these sources could be revisited if other funding sources are deemed unavailable or inadequate.

FDEP Nonpoint Source Funds 319(h) Grant and State Water-Quality Assistance Grant

The Nonpoint Source Management Program administers grants from the Federal Clean Water Act Section 319(h) and State Water-Quality Assistance Grants. Available funding for these grant programs depends on federal and state appropriations and is typically around $11 million. No match is required for the state program, and a 40 percent match is required for the federal grant program. Applications are accepted on a rolling basis with applications historically reviewed in September and March of each year. Eligible projects utilize green stormwater infrastructure and groundwater protection from nonpoint pollution sources, demonstrate and evaluate best management practices, nonpoint pollution reduction, and septic to sewer projects (FDEP, Nonpoint Source Funds, n.d.).

FDEP Hurricane Stormwater and Wastewater Assistance Grant Program

FDEP Division of Water Resource Assistance announced $100 million in funding for counties, municipalities, and special taxing districts that operate a stormwater or wastewater management system in specific counties, including Brevard County. Applications were due on March 31, 2023. It is unknown if future application cycles will be made available. Eligible applicants must provide proof that the stormwater or wastewater system sustained damages as a result of Hurricane Ian or Hurricane Nicole and that the damage poses an immediate threat to the public or the environment (FDEP, Hurricane Stormwater and Wastewater Assistance Grant Program, n.d.).

Water Infrastructure Improvements for the Nation Act Section 2104

Section 2104 of the Water Infrastructure Improvements for the Nation Act provides grant funding to small, undeserved, and disadvantaged communities to assist in meeting Safe Drinking Water Act requirements. Priority for grant funding is given to water systems that serve tribal communities and communities of less than 10,000 individuals, or projects that would benefit underserved communities (USEPA, n.d.).

Community Development Block Grant Disaster Recovery

The US Department of Housing and Urban Development Community Development Block Grant Disaster Recovery program provides grants to help communities with rebuilding and recovery from presidential- or governor-declared disasters. These grants may fund a broad range of recovery initiatives, especially in low-income areas.

Florida Small Cities Community Development Block Grant Program

The Florida Small Cities Community Development Block Grant Program is a competitive grant program that awards funds to eligible cities, counties, towns, and villages. There are approximately 249 eligible communities in Florida. To be eligible for the Small Cities Block Grant Program, a city must have a population under 50,000, and a county's population must be under 200,000. An applicable program awards may include economic development, if the city can tie a public-private partnership initiative that requires an upgrade to the WWTP in support of documented new development (DEO, n.d.).

FEMA Section 406

Mitigation projects funded under Section 406 of the Stafford Act are restricted to projects that address facilities damaged by a federally declared disaster and mitigate that facility against future risk for similar disasters. Section 406 mitigation projects are funded under the Public Assistance program, which provides relief following a disaster, and budgets are dependent on the magnitude of the disaster.

The FEMA disaster declaration process should be implemented when the impacts of a disaster exceed the capabilities of state and local governments, and federal assistance may be necessary. Together, local, state, and federal officials will conduct a preliminary damage assessment to estimate the impacts and costs associated with an event. This information is compiled and included in a governor's request to FEMA for a disaster declaration. When a severe or catastrophic event occurs, a declaration can be issued prior to the completion of a damage assessment. Depending on the type and magnitude of impacts, and the declaration issued, federal funds may be available to restore damaged facilities, incorporate mitigation measures to prevent future impacts, and help communities recover from the disaster. Both emergency declarations and major disaster declarations can activate supplemental federal assistance; however, an emergency declaration may not exceed $5 million in assistance.

USACE Corps Water Infrastructure Financing and Innovation Act

This program is authorized by WIFIA and enables local investment in infrastructure. Current appropriation of $7.5 billion can be used only for maintenance, upgrade, and repair of dams. However, the future expansion of the program may include additional infrastructure (USACE, Corps Water Infrastructure Financing Program, 2022). At this time, the Corps Water Infrastructure Financing and Innovation Act financing is limited to 50 percent of total project cost. There is flexibility in the definition of project cost, which can be extended to include long-term maintenance and operations.

US Department of Transportation

Both the Infrastructure for Rebuilding America and Better Utilizing Investments to Leverage Development programs are, at the core, programs to help fund surface transportation. However, water, wastewater, and stormwater projects, in general, may be eligible when they have some impact on transportation. If a project alleviates the flooding of highways and streets and aids in transportation, it may be eligible and potentially competitive for US Department of Transportation grant funding. The

Infrastructure for Rebuilding America and Better Utilizing Investments to Leverage Development programs award approximately 10 percent of requests, and there is a high bar for award. It should be noted, however, that while there are distinct quantitative and qualitative criteria for both programs, for Infrastructure for Rebuilding America grants (the program for grants above $25 million), there is also a sizable element of political discretion in deciding which projects to award. If a water-related project has strong political support and the transportation impact of the project can be well articulated, the Infrastructure for Rebuilding America grant program may be a good consideration. Moreover, if the project (or the problem for which the project is a solution) has strong media attention, there is also a higher likelihood of award.

Tax Increment Reinvestment Zone

A Tax Increment Reinvestment Zone is a political subdivision of a municipality created to implement tax increment financing. Tax increment financing is a public financing method that can be used as a subsidy for redevelopment, infrastructure, and other community-improvement projects. A Tax Increment Reinvestment Zone may be initiated by a city or county or by petition of owners whose total ownings in the zone consist of a majority of the appraised property value. These zones help finance costs of redevelopment and promote growth in areas that would otherwise not attract sufficient market development in a timely manner. Taxes attributable to new improvements (tax increments) are set aside in a fund to finance public improvements within the boundaries of the zone.

Coronavirus Aid, Relief, and Economic Security Act US Economic Development Administration

The EDA American Rescue Plan (FY2021)/ Coronavirus Aid, Relief, and Economic Security Act funding opportunities are completely closed out. The American Rescue Plan programs awarded $3 billion in funds, through 780 grants, in a "once-in-a generation investment to dramatically transform America's communities." These programs included six innovative challenges: Build Back Better Regional Challenge; Good Jobs Challenge; Economic Adjustment Assistance; Indigenous Communities; Statewide Planning, Research and Networks; and Travel and Tourism (EDA, n.d.).

4. Conclusions and Strategy Recommendations

Cape Canaveral SFS, KSC, and the EDC are interested in grant and low-cost financing to invest in the upgrade or expansion of the Cape Canaveral AFS Regional WWTF or construction of a regional WWTF with AWT capabilities to meet or be better than state water quality standards. The funding strategies recommended offer the utility potential savings over traditional project funding sources such as bond financing and cash reserves. It is recommended that the utility choose a funding path that provides the best resources to the community at the lowest life-cycle costs with the least incremental burden on user fees or taxes.

As presented throughout this TM, each funding program has specific application and administrative considerations. Some funding programs have maximum funding limitations or requirements for the utility to provide matching funds. As part of the overall funding strategy, it is recommended that the utility combine various programs by considering program limitations and requirements, timing, and phasing to best leverage state and federal money and maximize the benefits of the various funding programs.

It is important to note that new funding opportunities may become available, and existing opportunities may not be reauthorized in subsequent cycles. Changes in policies, funding agency priorities, and perceived needs of the community are among the contributing factors to funding opportunity availability.

This TM has identified potential funding sources that are recommended but cannot be guaranteed by Black & Veatch to result in a successful outcome, including but not limited to, a funding award. During the research, Black & Veatch reviewed additional funding programs that were not included in this TM because they were deemed a "poor fit" for the size and characteristics of this project. Black & Veatch screened and recommended opportunities that have the highest chance of success with the least burden.

Recommended Short-Term Acton Items:

1) Engage the FDEP SRF for planning phase activity support. As described in Section 3.2.1, the program accepts funding request via a Request for Inclusion submittal. The program would result in low interest funding with terms of 20 years and approximately 2.5 percent at the time of this draft. The Facilities Plan will identify project scope, alternatives analysis, selected alternative, engineer's valuation, environmental effects, cost to the rate payer, capital finance plan, and public participation.

2) From the "*Conceptual Feasibility Evaluation for Cape Canaveral Space Force Station Regional Water Treatment Options*" study, determine the intended future ownership of the CCSFS Regional WWTP and the proposed new regional AWT facility. All funding programs require a qualified champion to receive grant funding and take ownership of any pledge revenue on debt service requirements. Makeup of the facility ownership is critical to the type of funding available to support a project. Maximum funding advantage is usually associated with a municipal or county ownership as opposed to a for-profit or a public-private-partnership.

3) Engage the FDEP DWRA WWGP for planning phase activity support. As described in Section 3.2.9, the program will begin to accept applications following the conclusion of the Florida legislative session. As program funding is established annually, Black & Veatch recommends engaging with grant managers early on.

4) Identify partnership opportunities to establish the existing demographics of the partnership service area, which is the basis of any grant funding determination and the terms for any low interest loan amount.

5) Refine the list of viable funding program/s once the "*Conceptual Feasibility Evaluation for Cape Canaveral Space Force Station Regional Water Treatment Options*" study is completed, which will include programs identified in the funding matrix in Table 3.2 and programs listed in Section 3.0 of this document and may include additional programs. Figure 4-1 is an example of a weighted strategy, utilizing multiple funding programs (this is not a recommendation for the EDC, but rather an example).

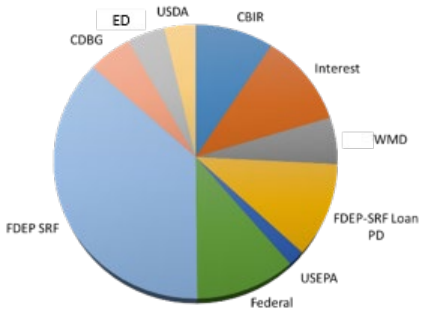
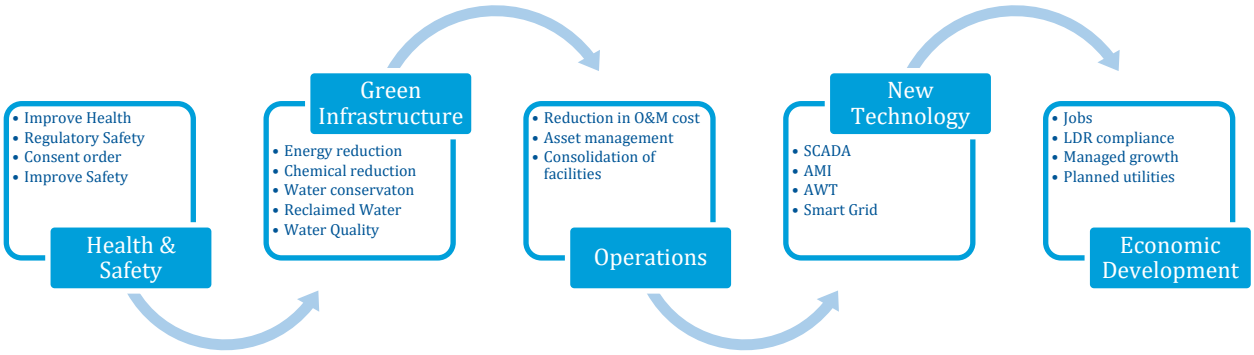


Figure 4-1 Weighted Strategy Example

6) Identify the desirable type of procurement process to be utilized (design-bid-build, design-build, construction manager at risk) because the type of process also affects the type of funding programs and terms available to support the effort.

7) Promptly identify technical elements of the project so that an evaluation can identify project scope against funding agency drivers. Example agency drivers may include the following:



Long-Term Action Items:

1) Pursue state and federal legislative funding in 2024 and 2025 for key elements of the program related to construction for a start date of 2027.

2) The WIFIA program has the capacity to fund projects on the scale of the Cape Canaveral SFS Project. A WIFIA loan could cover up to 49 percent of project costs with a 30 year low-interest loan. Black & Veatch recommends that the loan applicant utilize WIFIA funding for the construction phase of the project, anticipated to begin in 2027. Black & Veatch recommends beginning the LOI (pre-application process) in 2025. The WIFIA LOI is a formal, competitive, and relatively in-depth step toward selection and qualification. Projects are selected from the LOIs and invited to apply. There is no application fee for the LOI. Once invited to apply, borrowers have up to a year to submit the application. Additional materials may be requested following the application submittal until the application is deemed complete. After the application is complete, a process of negotiations, term sheet, and other document preparation begins, all of which leads to a subsequent loan closing. If the pre-application process is started in June of 2023, the earliest the loan closing would likely be Q3-Q4 2024. Following loan closing, borrowers

have 5 years to reach substantial completion of the project, which matches the anticipated construction timeline for the CCSFS Project. Black & Veatch recommends the loan applicant start this process in 2024 to close a loan within 18 to 30 months in preparation for construction to begin in 2027 (refer to the attached schedule in Section 2.0).

Black & Veatch recommends the utility engage in the WIFIA funding process in 2025 because of the long timeframe involved in project approvals, appropriations, and law making.

5. Bibliography

EDA. (n.d.). Retrieved from https://www.eda.gov/

House, T. W. (2022, November 15). *Fact Sheet: One Year into Implementation of Bipartisian Infrastructure Law, Biden-Harris Administration Celebrates Major Progress in Building a Better America*. Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2022/11/15/fact-sheet-one-year-into-implementation-of-bipartisan-infrastructure-law-biden-%e2%81%a0harris-administration-celebrates-major-progress-in-building-a-better-america/

House, T. W. (2022, November). *Illinois BIL State Fact Sheet Nov 22.* Retrieved from whitehouse.gov: https://www.whitehouse.gov/wp-content/uploads/2022/11/Illinois-BIL-State-Fact-Sheet-Nov-22.pdf

USACE. (2022, February). *2022 Report to Congress on Future Water Resources Development.* Retrieved from USACE: https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll5/id/35979

USACE. (2022). *Corps Water Infrastructure Financing Program*. Retrieved from https://www.usace.army.mil/Missions/Civil-Works/Infrastructure/revolutionize/CWIFP/#:~:text=By%20providing%20long-term%2C%20low%20cost%20loans%2C%20the%20U.S.,needs%2C%20promote%20economic%20prosperity%2C%20and%20improve%20environmental%20quality.