



Solid Waste Authority of
Palm Beach County

Replacement of Renewable Energy Facility 1 (REF1)

October 8, 2025



Agenda



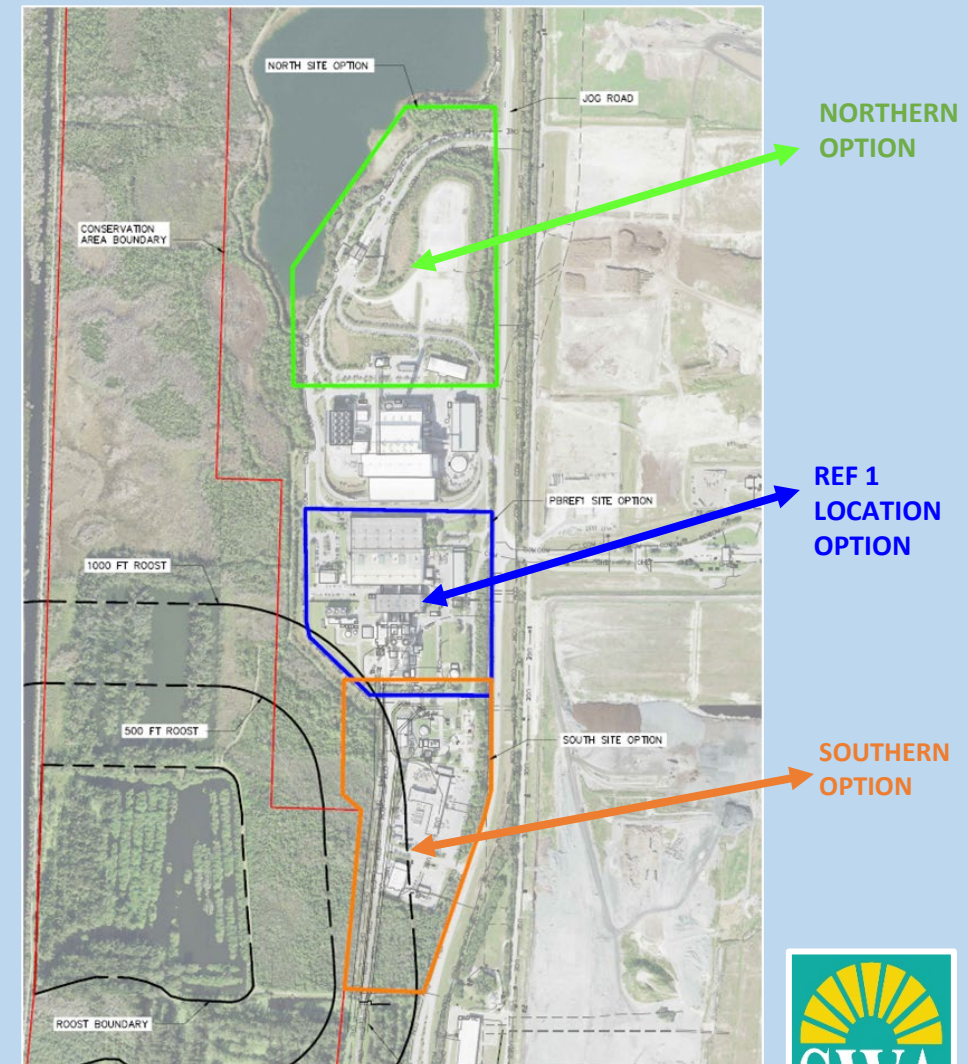
- **Recap of Board Workshop Decisions**
- **Activities Since Last Board Workshop**
- **Updated Site Considerations**
- **Costs and Schedule Summary**
- **Board Decision**

Recap of Board Decisions from October 2024 Workshop

Recap of Board Decisions from October 2024 Workshop

Board consensus was as follows:

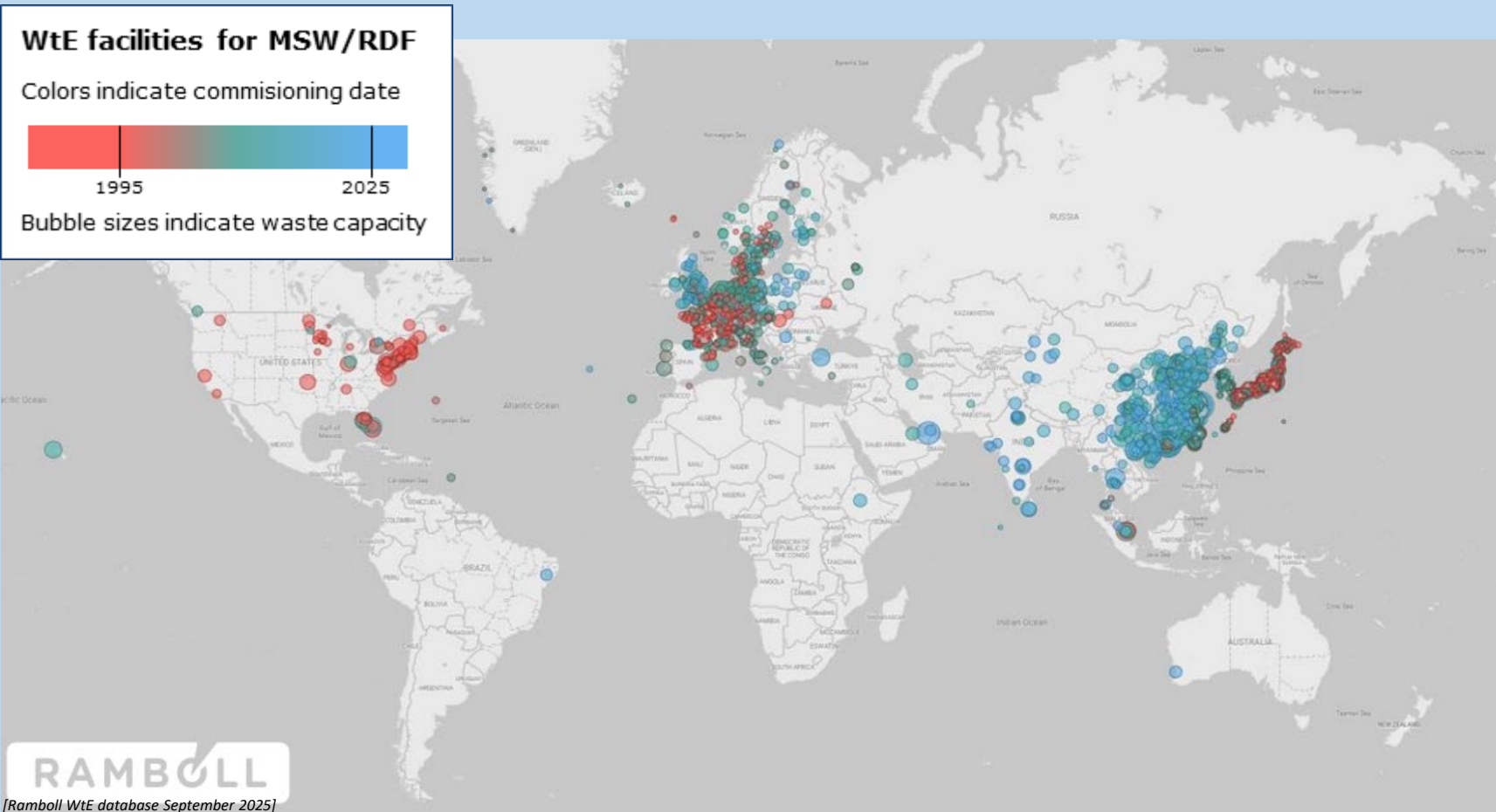
- Supported the Northern option (north of REF2)
- Extend REF1 life by five (5) years
- Not supportive of landfilling or exporting waste
- Smooth out the assessment rate increases
- Make the existing REF1 site available for future usage
- Not consider the site location south of REF1



Benefits of Waste-to-Energy (WTE)

- WTE facilities reduce the volume of waste by up to 90%
- WTE facilities preserve landfill capacity
- WTE facilities recover resources that would otherwise be entombed in landfills including metals and aggregates
- WTE facilities produce electricity from waste that would otherwise be generated from fossil fuels
- WTE facilities are net Greenhouse Gas reducers
- WTE facilities avoid the impacts of landfills, including methane emissions and potential groundwater impacts
- WTE facilities enable local responsibility by managing the waste generated by urban communities in those communities
- WTE facilities avoid the long-distance transportation of waste

WtE is the preferred method of managing post-recycled solid waste in the developed world as an alternative to landfilling



2,800 WtE facilities globally

- > 1,100 in Japan
- 500 +/- in Europe
- > 300 in China
- > 150 in Germany
- 70 +/- in the U.S.
- 53 in the U.K.

Dubai, UAE



Population: 4 million

Year: 2022/23

Capacity: 2,030,000 tpy (in 5 lines)

APC Tech: Dry+SNCR



Istanbul, Turkey



Population: 16 million

Year: 2021

Capacity: 1,000,000 tpy (in 3 lines)

APC Tech: Dry+SNCR

Ferrybridge, UK



Population: 1.5 million

Year: 2015

Capacity: 675,000 tpy

APC Tech: SNCR+Semi-Dry system

Vienna, Austria



Population: 2 million

Year: Built in the 1960s, redesigned in the 1980s

Capacity: 300,000 tons/year

APC Tech: Wet+SCR

North London, UK



Population: 9.8 million

Year: 2026 (expected)

Capacity: 770,000 tpy (in 2 lines)

APC Tech: Semi-Dry+SCR+wet

Abu Dhabi, UAE



Population: 1.6 million

Year: 2029 (expected)

Capacity: 990,000 tpy (in 2 lines)

APC Tech: Dry+SNCR

ARC, Copenhagen, Denmark



Population: 1.4 million

Year: 2018

Capacity: 660,000 tpy (in 2 lines)

APC Tech: Wet, frontend SCR

Singapore



Population: 5.9 million

Year: 2027 (expected)

Capacity: 1,320,000 tpy (in 4 lines)

APC Tech: Wet+SNCR

Renewable Energy Facility No. 1 (REF1)

- 795,000 tons/year Refuse Derived Fuel (RDF) Facility
- Commissioned 1989, Refurbished 2009
- O&M Agreement expires Sept 2029 (can be extended)
- Power Purchase Agreement (PPA) with FP&L expires April 2032
- New Maximum Achievable Control Technology (MACT) Standards proposed by the U.S. EPA may affect the Facility

Air Pollution Control Equipment (2009 refurbishment)

- **Selective Non-Catalytic Reduction (SNCR)** with urea to reduce nitrogen oxides (NO_x)
- **Powdered Activated Carbon (PAC)** to capture mercury (Hg)
- **Spray Dryer Absorbers (SDA)** with lime slurry to control acid gases (HCl, SO₂)
- **Baghouses** to remove particulates (PM)



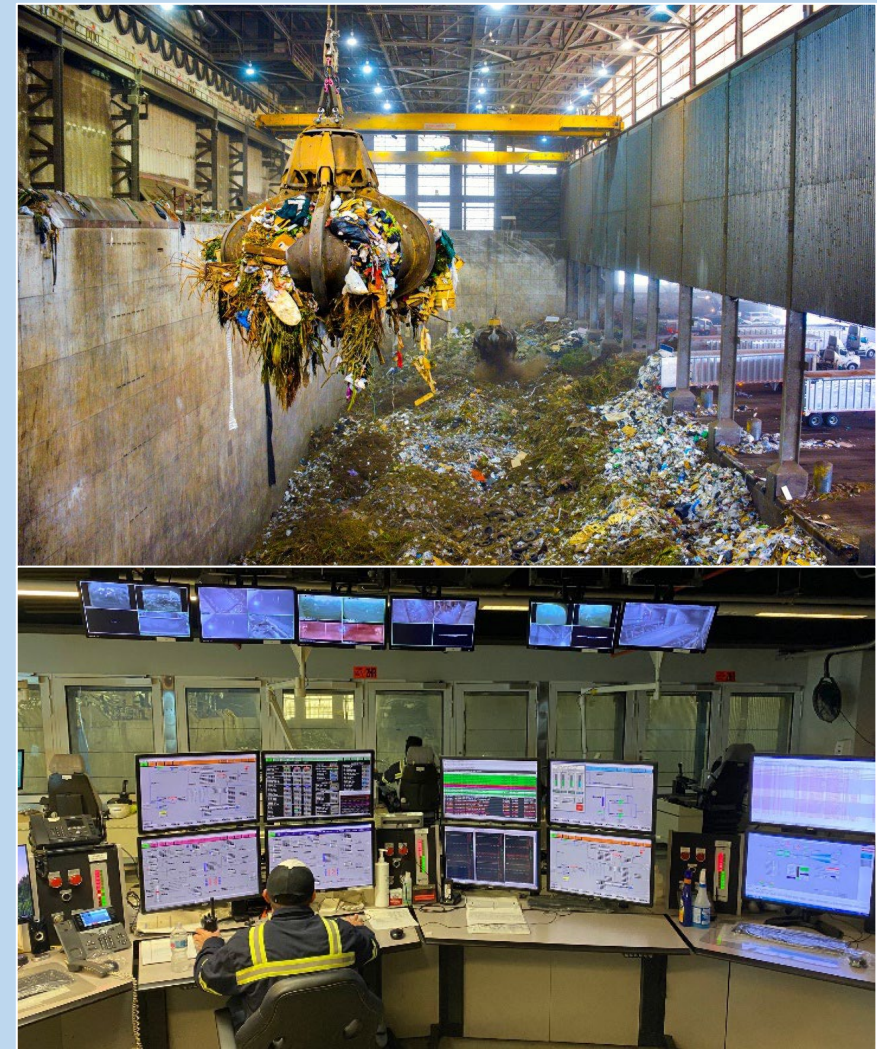
Renewable Energy Facility No. 2 (REF2)

- 1,000,000 tons/year Mass Burn Facility, commercial operation July 2015
- Recognized as the cleanest, greenest and most advanced WTE facility in North America
- O&M Agreement expires June 2035
- Power Purchase Agreement (PPA) with FP&L expires June 2034
- Anticipate operations through 2055

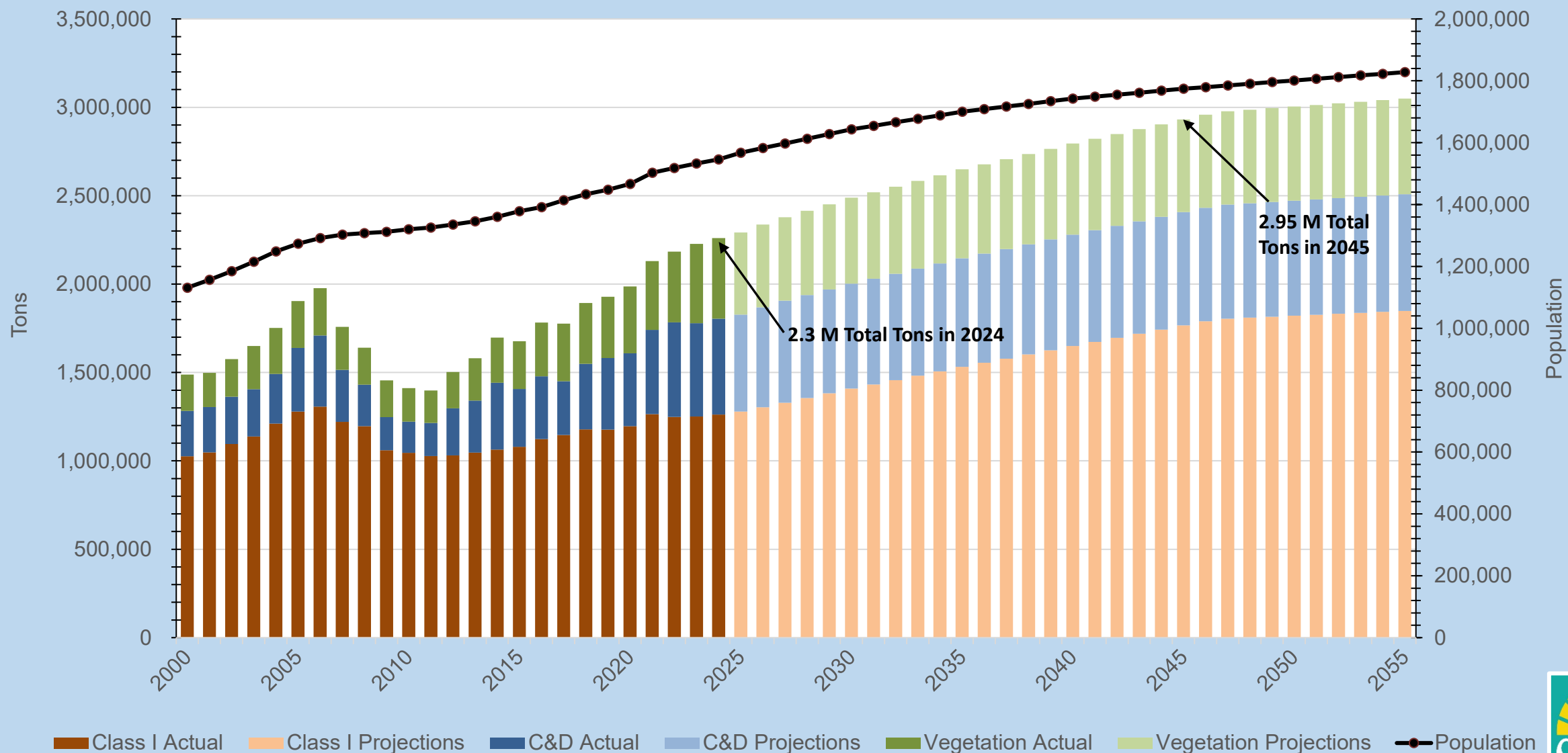


REF2 (cont'd)

- Cutting-edge air pollution control technologies to ensure exceptionally low air emissions
 - **Selective Catalytic Reduction (SCR)** system (first in U.S. WTE) reduces NO_x to nitrogen and water
 - **Powdered Activated Carbon (PAC)** to capture mercury (Hg)
 - **Spray Dryer Absorbers (SDA)** with lime slurry to control acid gases (HCl, SO₂)
 - **Baghouses** to remove particulates (PM)



Population & Waste Generation



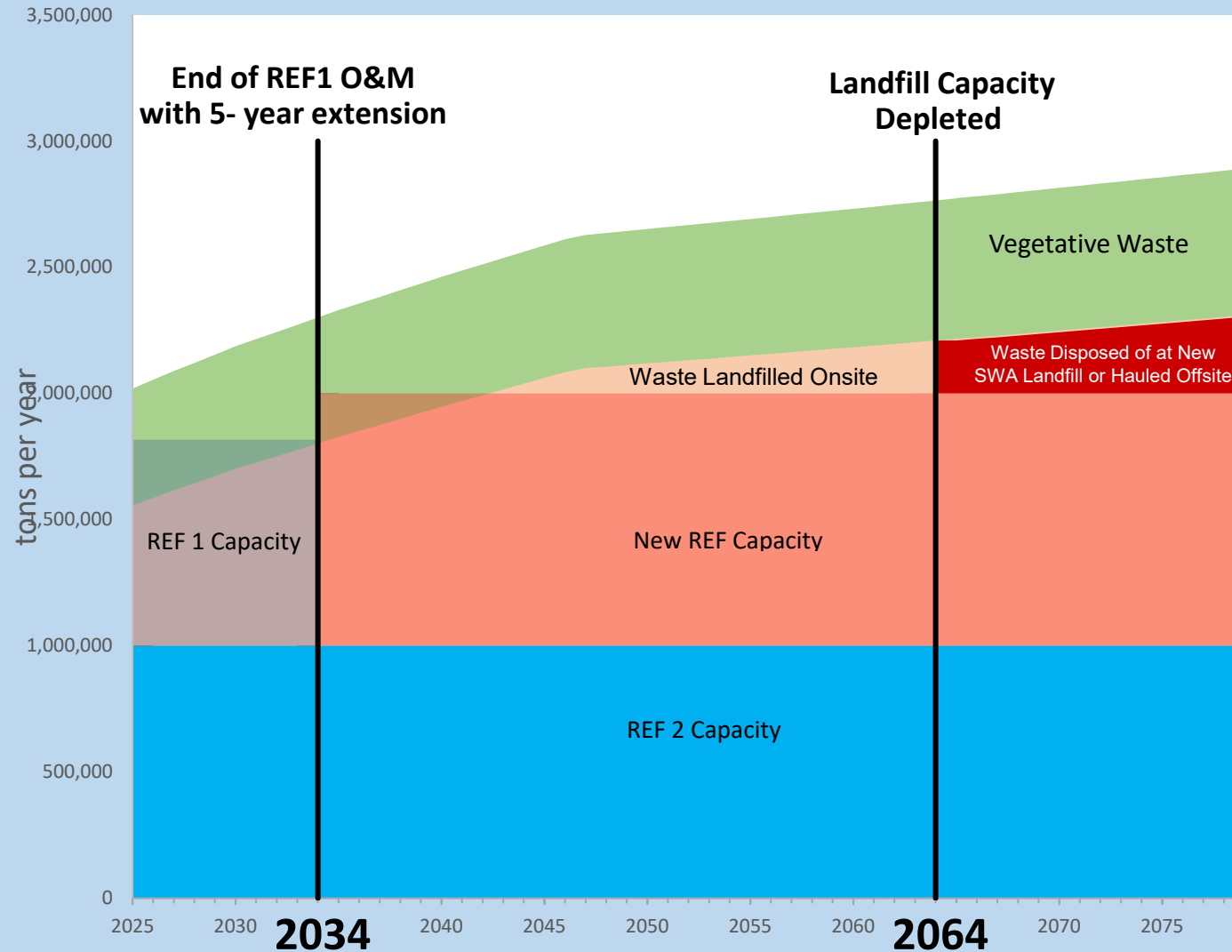
Replace REF 1 with a New Modern Facility (REF 1R)

- Operating for 40 years (2029) – End of useful life.
- Replacement of REF 1 is essential to keeping unprocessed garbage out of the landfill.
- Replace REF 1 at the Energy Park – all the critical infrastructure exists here.
- Replace REF 1 with a more modern WTE with more advanced, cleaner, greener technology.
- Replace the 2,000 ton/day facility with a 3,000 ton/day facility to accommodate future growth and keep unprocessed garbage out of the landfill.



What Replacing REF1 Does

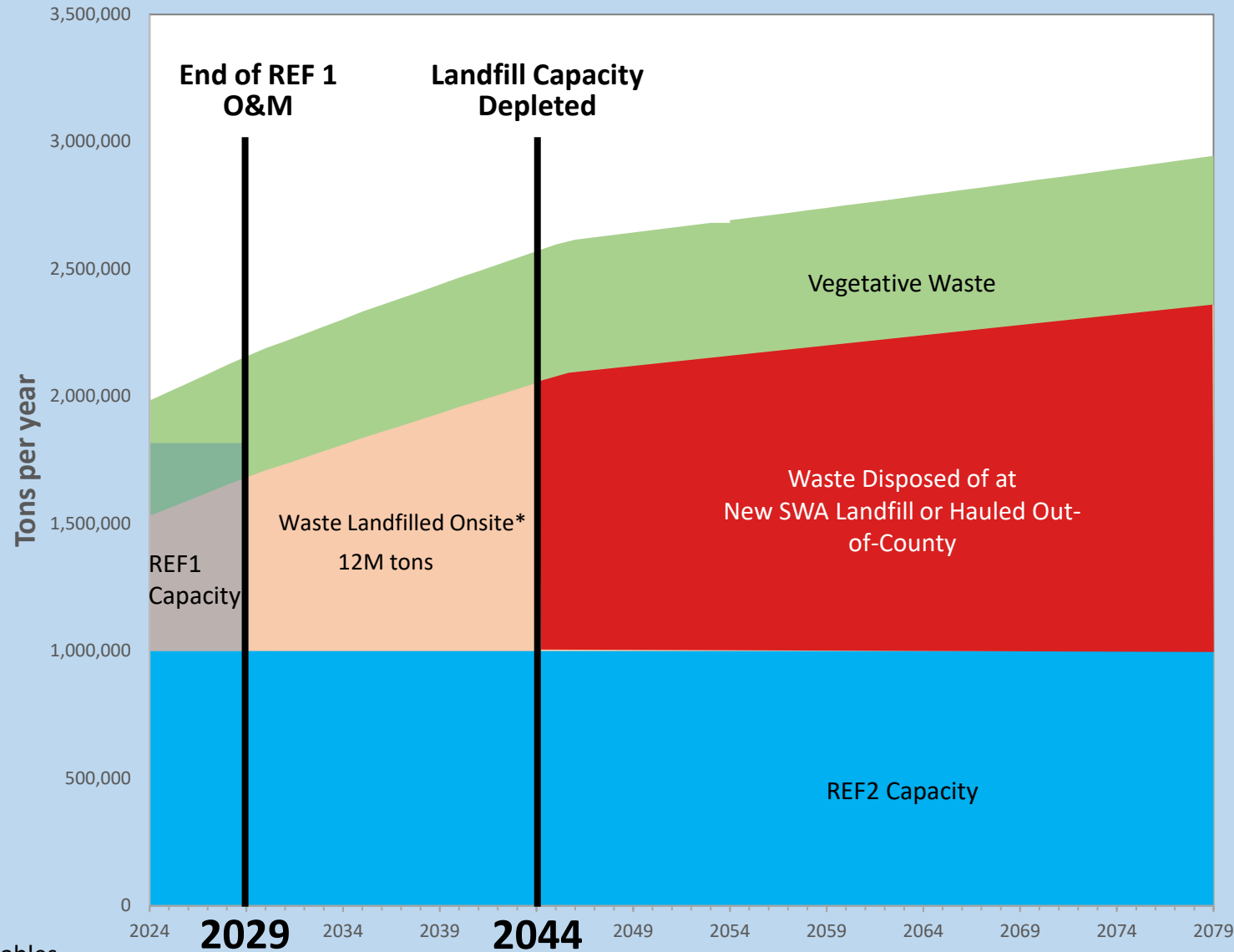
25 million cubic yards of landfill capacity remains (46%)



*waste values exclude recyclables

What Failing to Replace REF1 Does

25 million cubic yards of landfill capacity remains (46%)



*waste values exclude recyclables

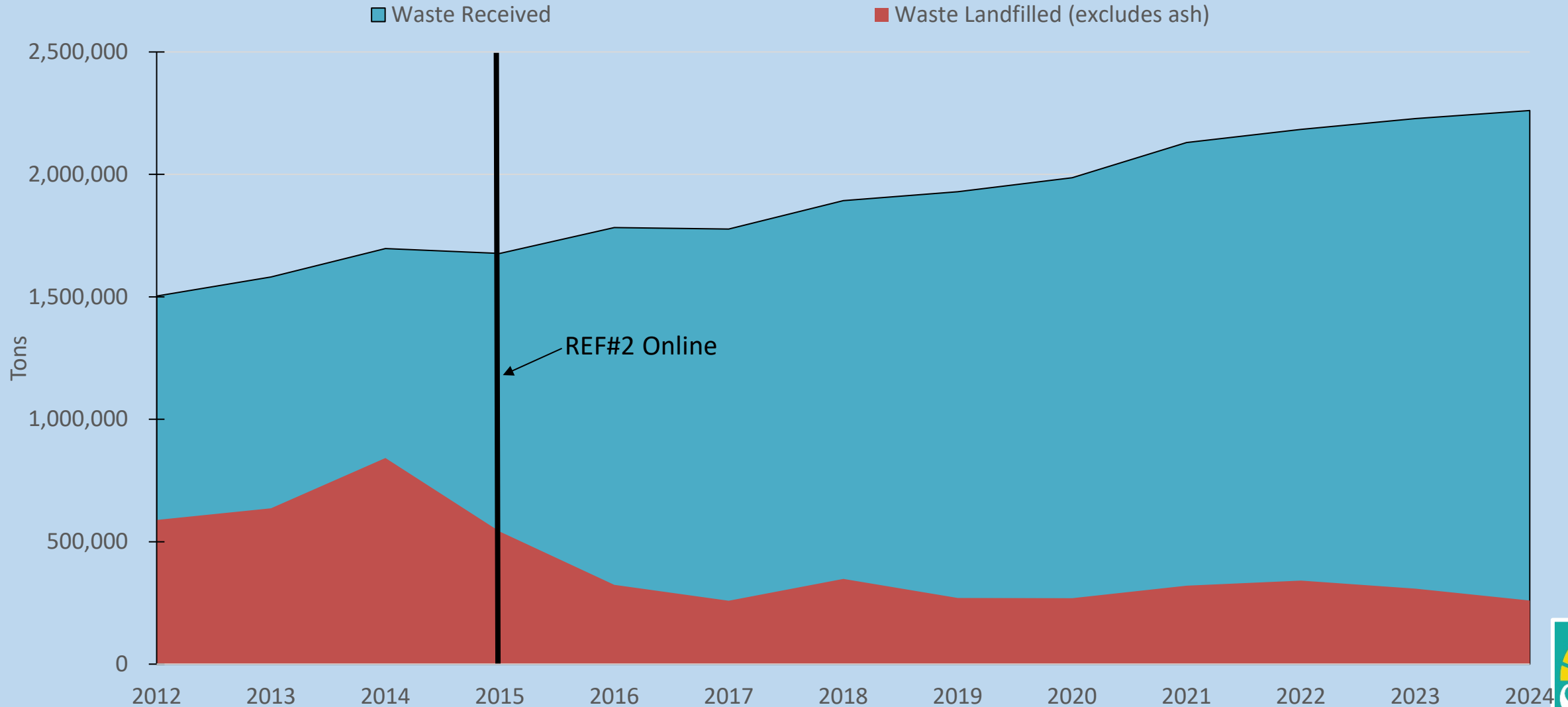
Consequences if REF1 is not replaced

- > 800,000 tons per year of unprocessed garbage will go to the landfill
- Increased odor potential
- Increased landfill gas generation
- Increased Greenhouse Gas emissions (methane)
- Waste of valuable resources:
 - Loss of energy
 - Reduction in recycling tonnages
 - Loss of metals recovery
 - Loss of aggregate recovery
 - Loss of valuable landfill capacity
 - Accelerated landfill depletion, reducing life of landfill from 2064 to 2044
 - Accelerated need to identify and develop future landfill capacity



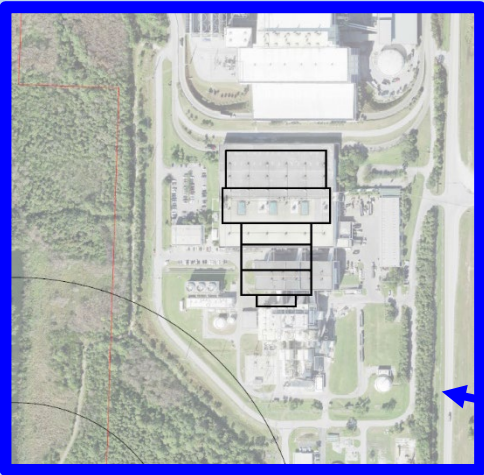
25 million cubic yards of landfill capacity remains (46%)

Waste Received/Landfilled





REF1R Options – Presented to Board in October 2024

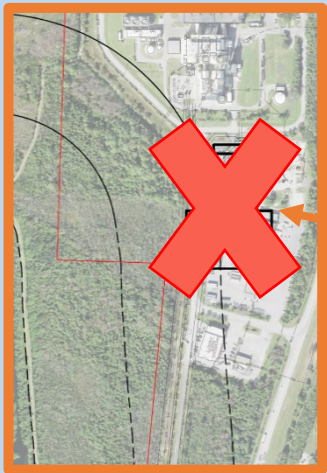


REF 1 LOCATION OPTION

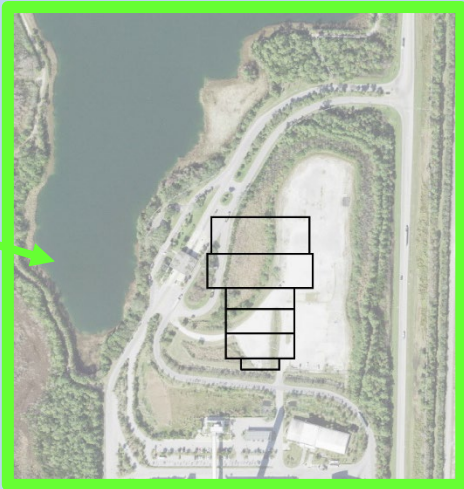
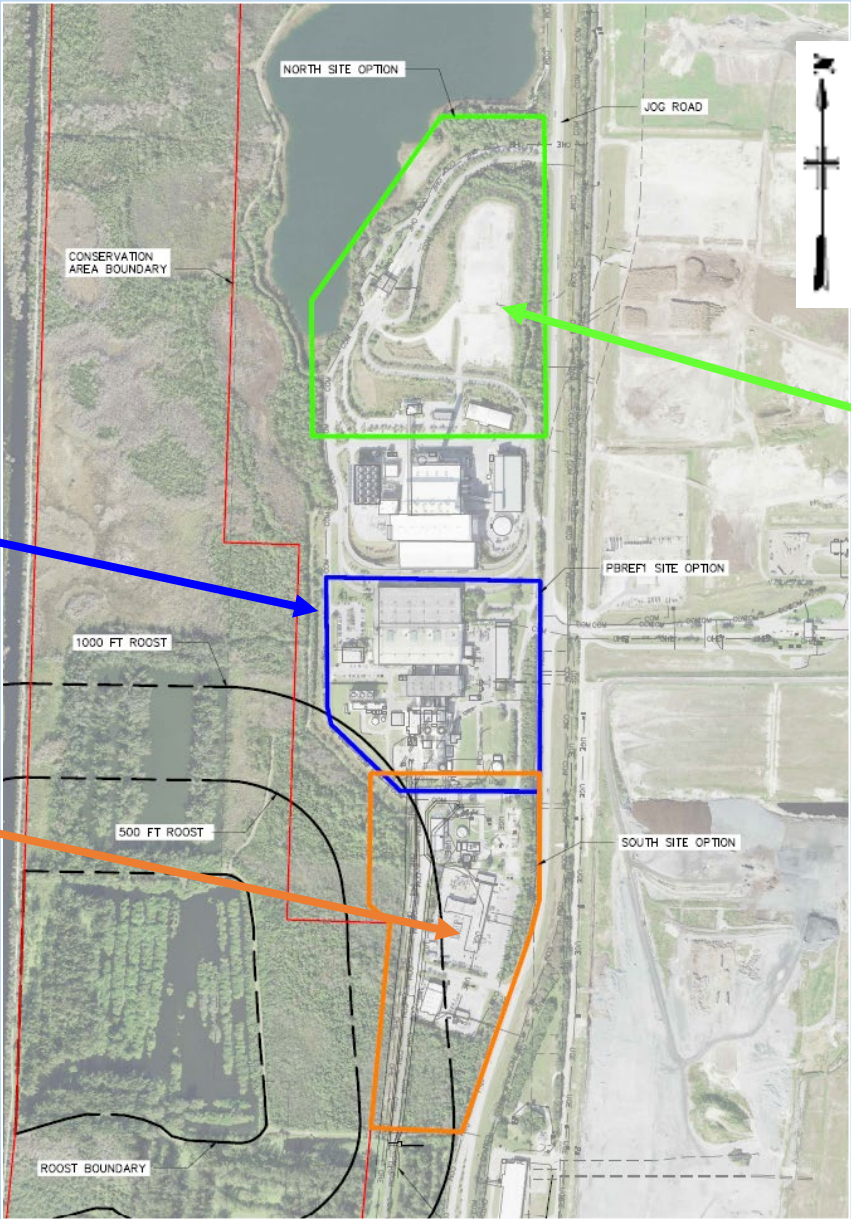
Construction of
Replacement REF
at REF1 Location

SOUTHERN OPTION

Construct New REF South
of REF1



Board rejected
construction of
Replacement REF
South of REF1 at
the Oct 2024
Board Meeting



NORTHERN OPTION

Construct Replacement
REF North of REF2

Activities Since Last Board Workshop

Activities Since October 2024 Board Workshop

North Site:

- Conceptual Site Layouts
- Geotechnical Assessment of Site
- Lake Backfill
- Wetlands / Habitat Assessment
- Air Dispersion Modeling
- Line of Sight Study

REF 1 Site:

- Conceptual Site Layouts
- Air Dispersion Modeling

Both Sites:

- Public Outreach
- Estimated Financial Costs
- Master Project Schedule

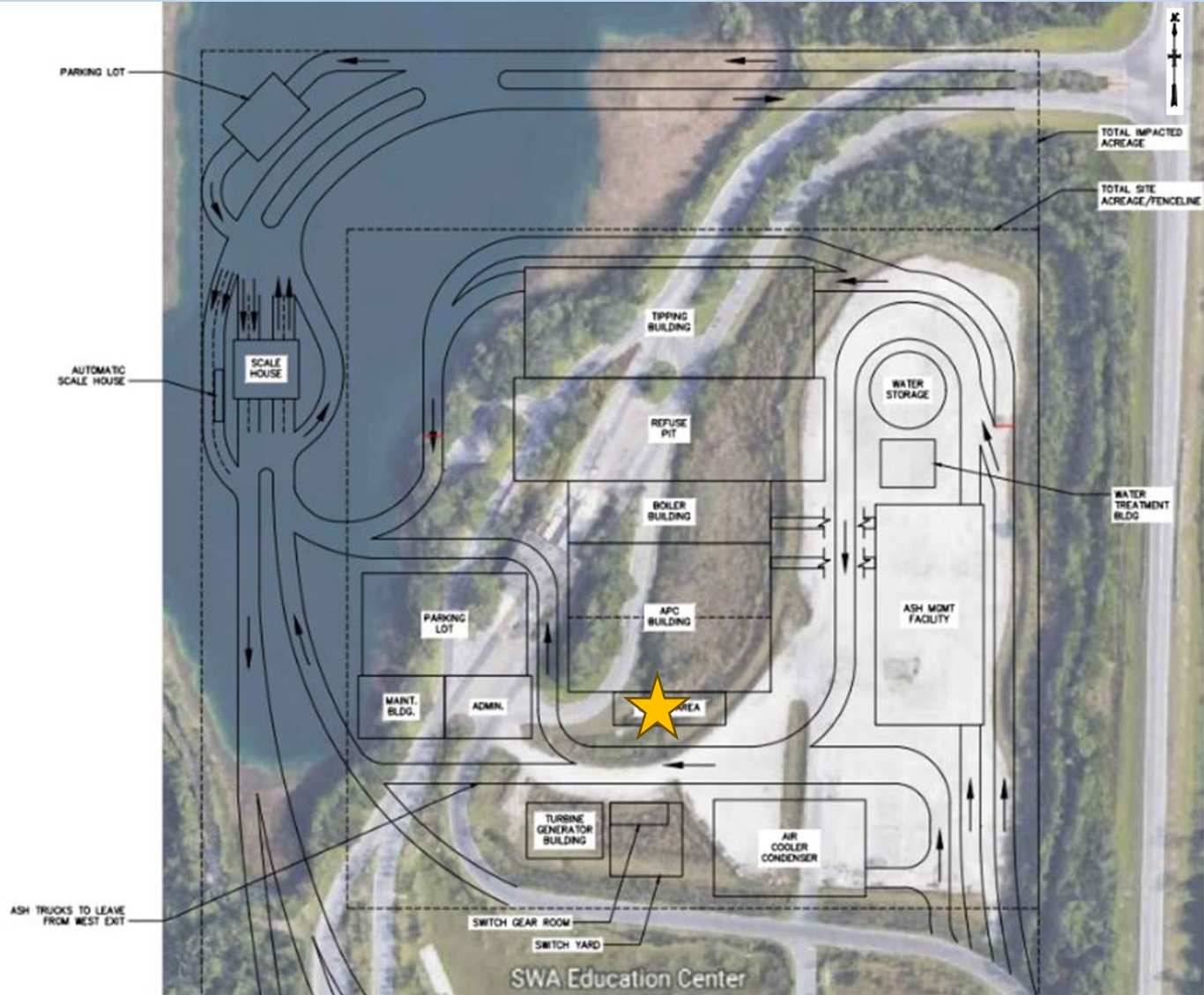
Conceptual Site Layouts

Northern Location Option, Northern Stack Orientation



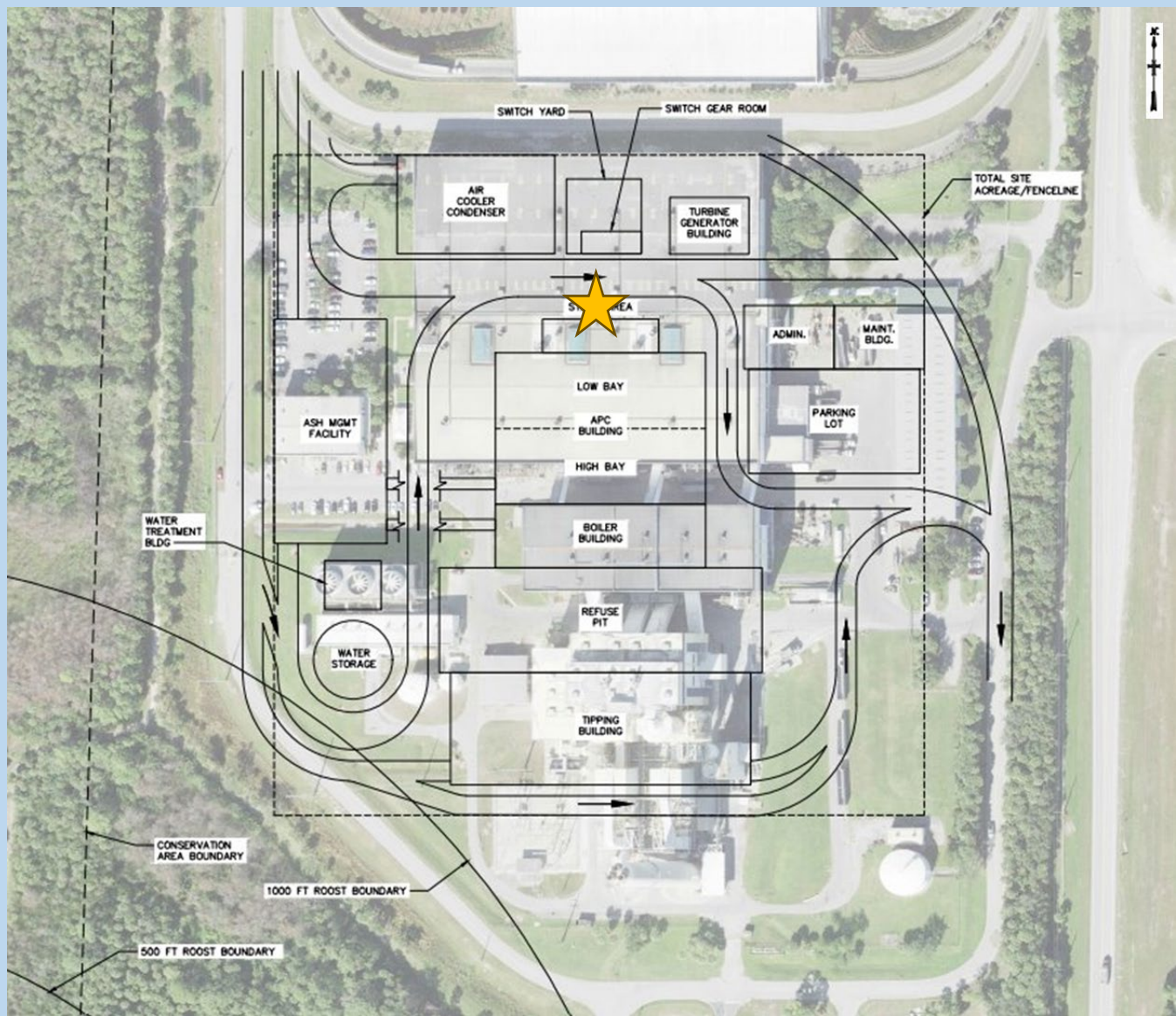
★ Proposed stack location

Northern Location Option, Southern Stack Orientation



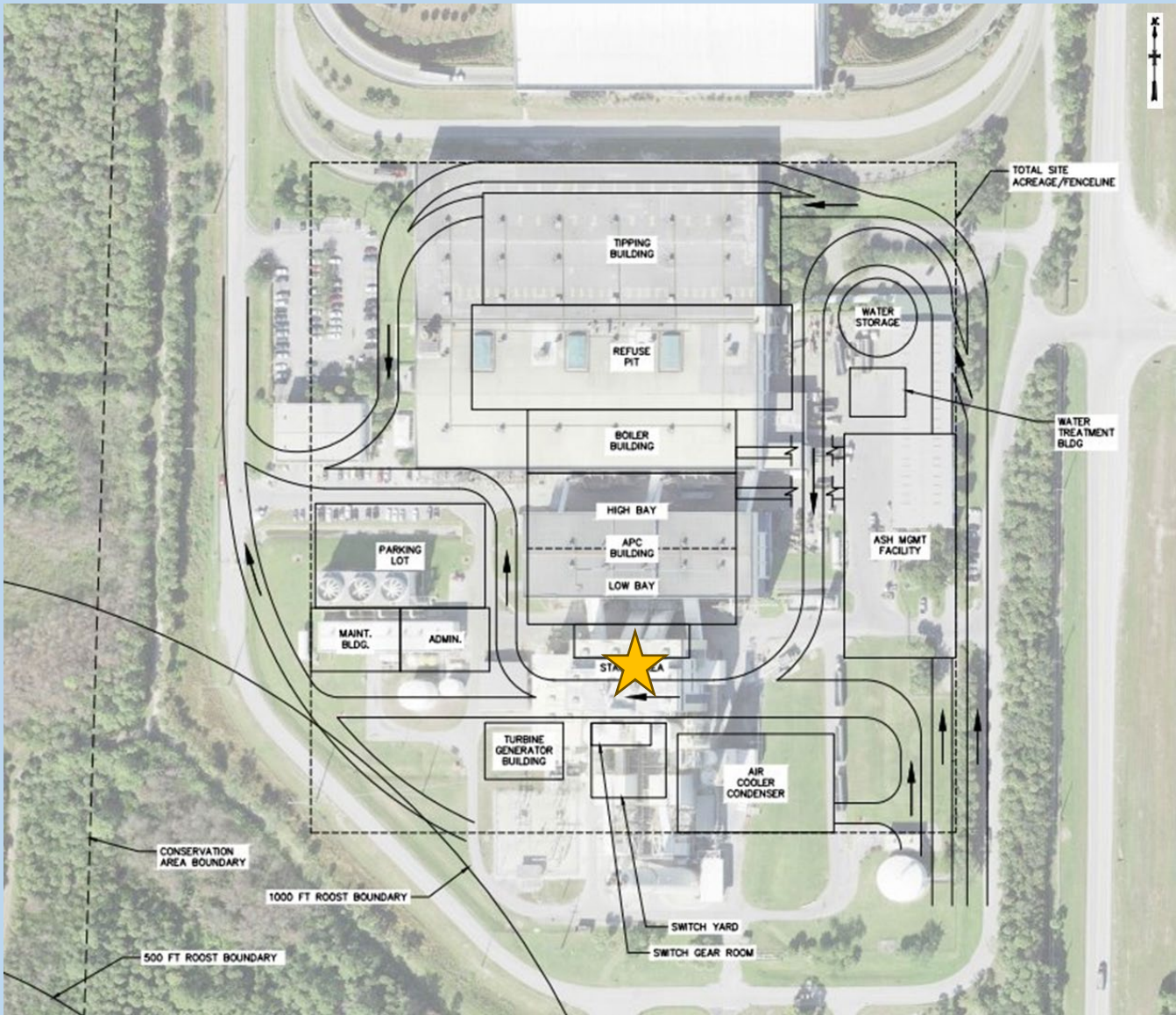
★ Proposed stack location

REF1 Site, Northern Stack Orientation



★ Proposed stack location

REF1 Site, Southern Stack Orientation



★ Proposed stack location

Geotechnical Assessment

Geotechnical Assessment

- Northern site includes backfilled Former South Borrow Lake
- 7 SPT borings to 100 ft depth
- Results from borings indicate little consolidation over the last 15 years
- Additional geotechnical improvements like vibro-compaction required
- Adds \$20 million to REF1R cost



Boring Locations at Former South Borrow Lake

Lake Backfill and Scalehouse Relocation

Middle Borrow Lake Backfill and Scalehouse Relocation

- Filling of portion of the Middle Borrow Lake and former South Borrow Lake remnant wetlands
- Requires ~850,000 cubic yards of fill material
- Relocate scalehouse and entrance roadway
- Adds \$60 million to REF1R cost



Fill Area for Middle Borrow Lake

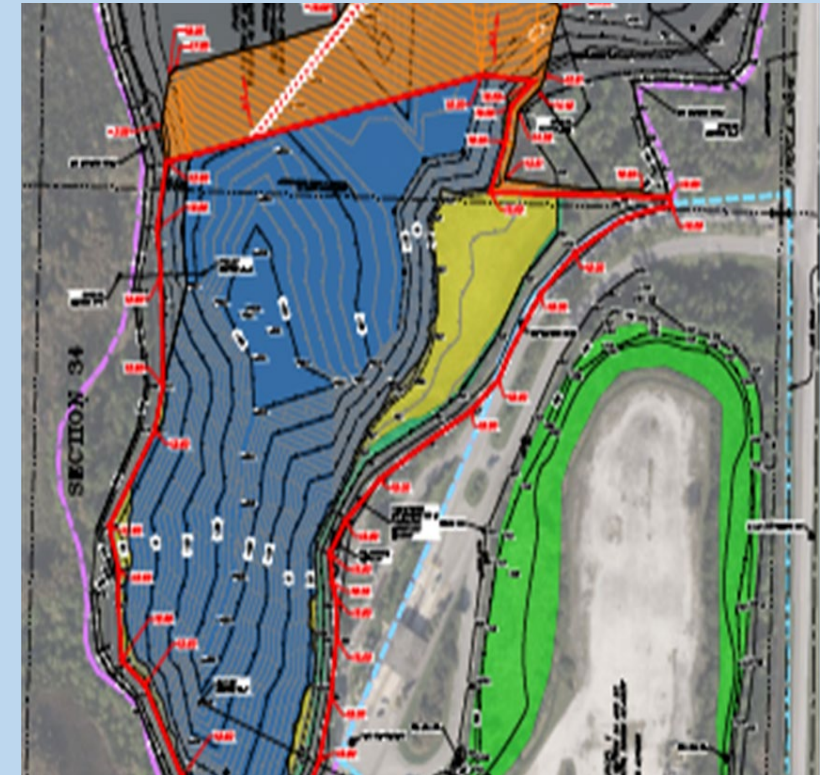
Wetland and Habitat Assessment

Wetlands and Habitat Impacts

- Conducted an aquatic resource delineation assessment and habitat assessment.
- No special-status species were observed.
- Extensive permitting effort may take 1-2 years.
- **Significant uncertainties remain regarding permitting outcome and duration.**

	Middle Borrow Lake	Former South Borrow Lake	Total
Wetland Habitat	13 acres	4 acres	17 acres
Impacted Wetlands	3 acres	4 acres	7 acres
Combined Wetland Mitigation Cost Estimate			\$3M

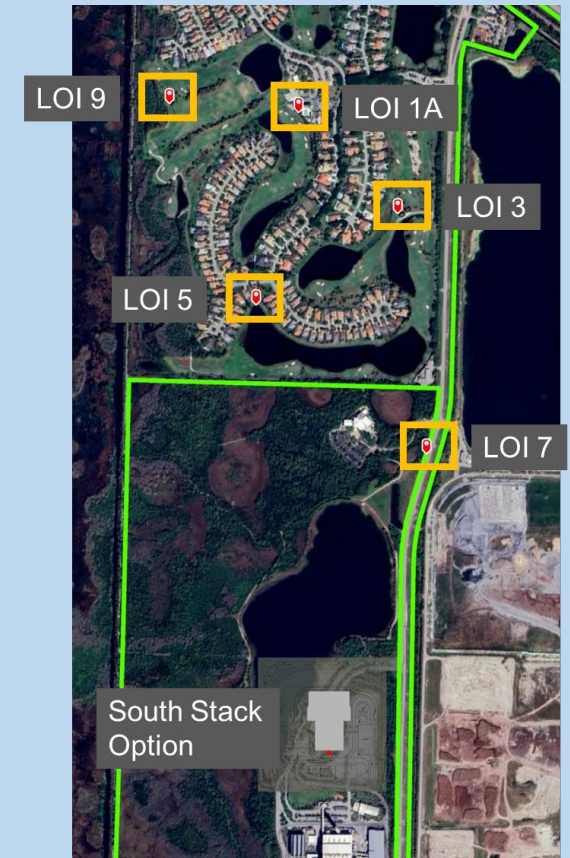
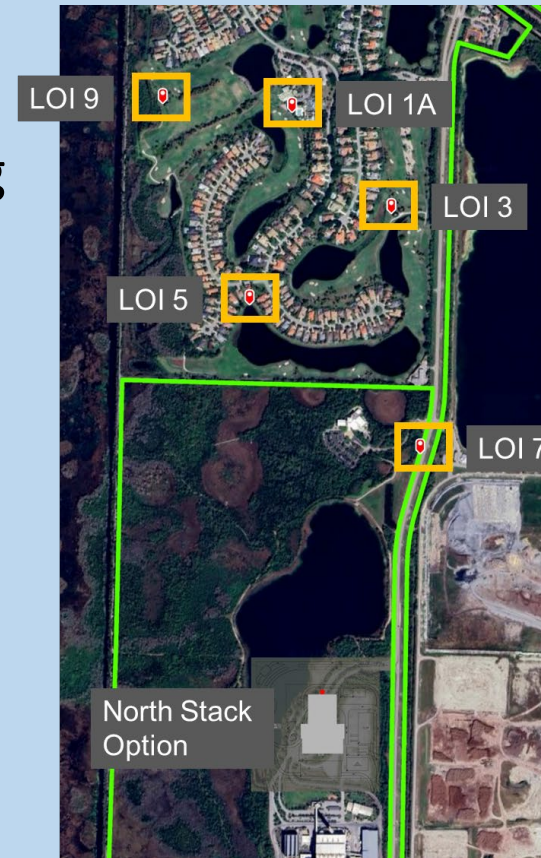
Both Borrow Lake Wetlands Locations



Line of Sight Study

Line of Sight Study

- Conducted line-of-sight study to determine potential visual impacts to Ironhorse.
- Drones flown to simulate stack and building heights.
- Perspective photographs taken from locations of interest (LOIs).
- Developed 3D massing views, depicting existing and proposed conditions for each configuration.





LOI 1A Existing



LOI 1A - North Stack Option – Rendering



LOI 1A - South Stack Option – Rendering (with roofline highlighted)



LOI 3 Existing



LOI 3 - North Stack Option – Rendering



LOI 3 - South Stack Option – Rendering (with roofline highlighted)



LOI 5 Existing



LOI 5 - North Stack Option – Rendering



LOI 5 - South Stack Option – Rendering (roof line highlighted)





LOI 9 - North Stack Option – Rendering



LOI 9 - South Stack Option – Rendering

Air Emissions & Dispersion Modeling

Environmental Regulations

- WTE is strictly regulated at Federal, State and local levels (EPA, FDEP, PBCHD)
- Clean Air Act
 - Strict environmental standards to safeguard human health and the environment
 - MACT
- Continuous Emission Monitoring Systems (CEMS) required
 - Emissions continuously monitored and kept well below limits
 - Real-time tracking of key pollutants to ensure ongoing compliance
- Extensive testing and monitoring requirements
- Extensive reporting requirements

REF1 & REF2 Permit Limits for Air Emissions

Pollutants	*Permit Emission Limits	
	<u>REF1</u>	<u>REF2</u>
Mercury (Hg)	0.05 mg/DSCM	0.025 mg/DSCM
Cadmium (Cd)	0.035 mg/DSCM	0.01 mg/DSCM
Lead (Pb)	0.4 mg/DSCM	0.125 mg/DSCM
Dioxins and Furans	30 ng/DSCM	4.2 ng/DSCM
Particulate Matter	25 mg/DSCM	12 mg/DSCM
HCl	25 ppmvd	20 ppmvd
NOx (24 hr)	250 ppmvd	50 ppmvd
CO (4 hr - block)	400 ppmvd	100 ppmvd
SO2 (24 hr)	29 ppmvd	24 ppm

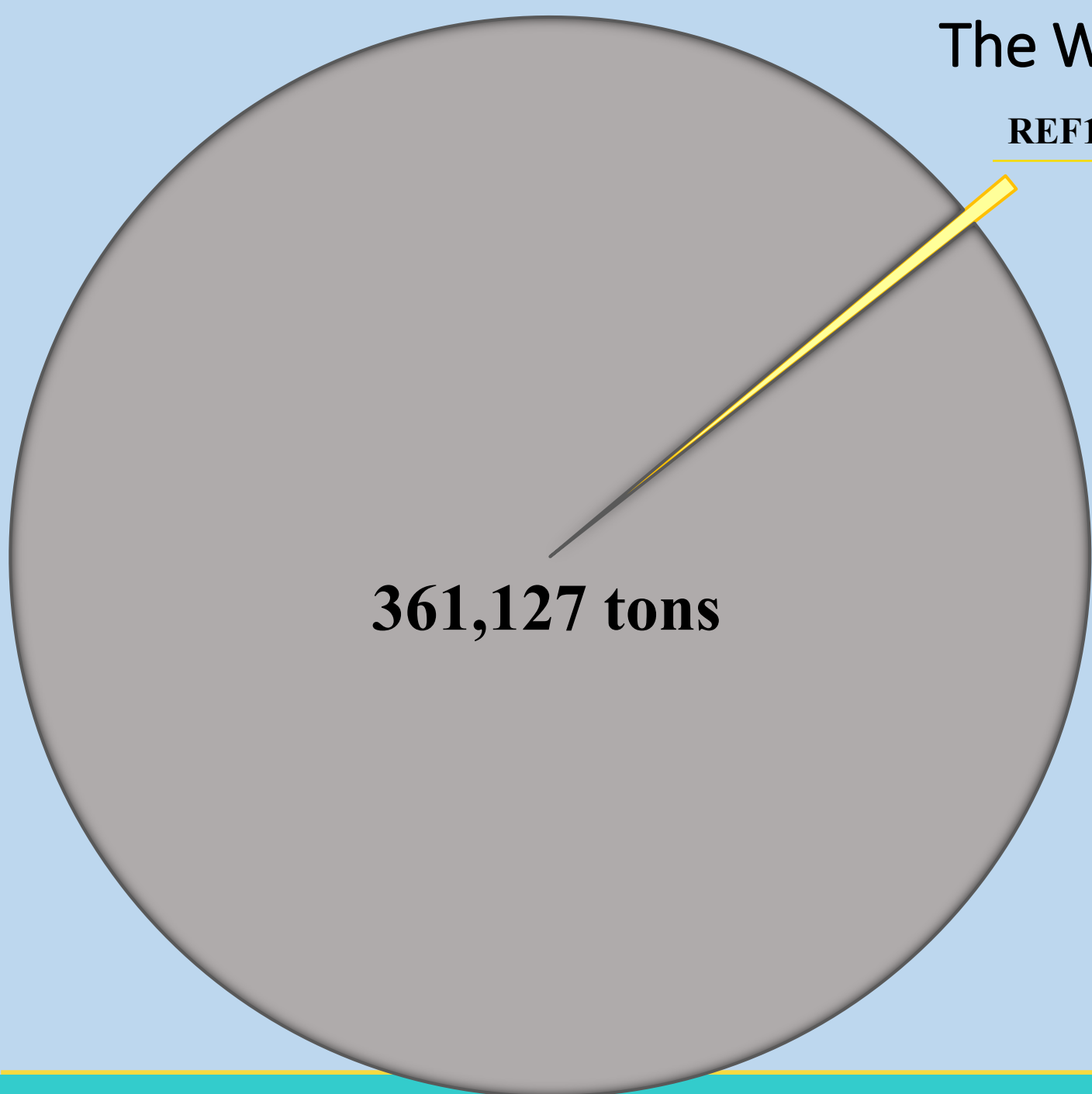
*Corrected to 7 % O₂

REF2 Air Permit Limits vs. Actual Emissions

POLLUTANT Corrected to 7% O ₂	USEPA MACT Limits	REF2 Permit Limits	REF2 Actual Avg. (2025)	% Below Permit
Particulate Matter (mg/dscm)	20	12	1.53	87%
Cadmium (mg/dscm)	0.01	0.01	0.00023	98%
Lead (mg/dscm)	0.14	0.125	0.0026	98%
Mercury (mg/dscm)	0.05	0.025	0.00037	99%
SO ₂ (ppmvd, 24-hr geometric mean)	30	24	18.0	25%
Carbon Monoxide (ppmvd, 4-hr block)	100	100	17.7	82%
NO _x (ppmvd, 24-hr)	150	50	35.6	29%
HCl (ppmvd)	25	20	2.50	88%
Dioxin/Furan (ng/dscm)	13	4.2	0.73	83%

The Whole Picture

REF1 & REF 2: 1,832 tons



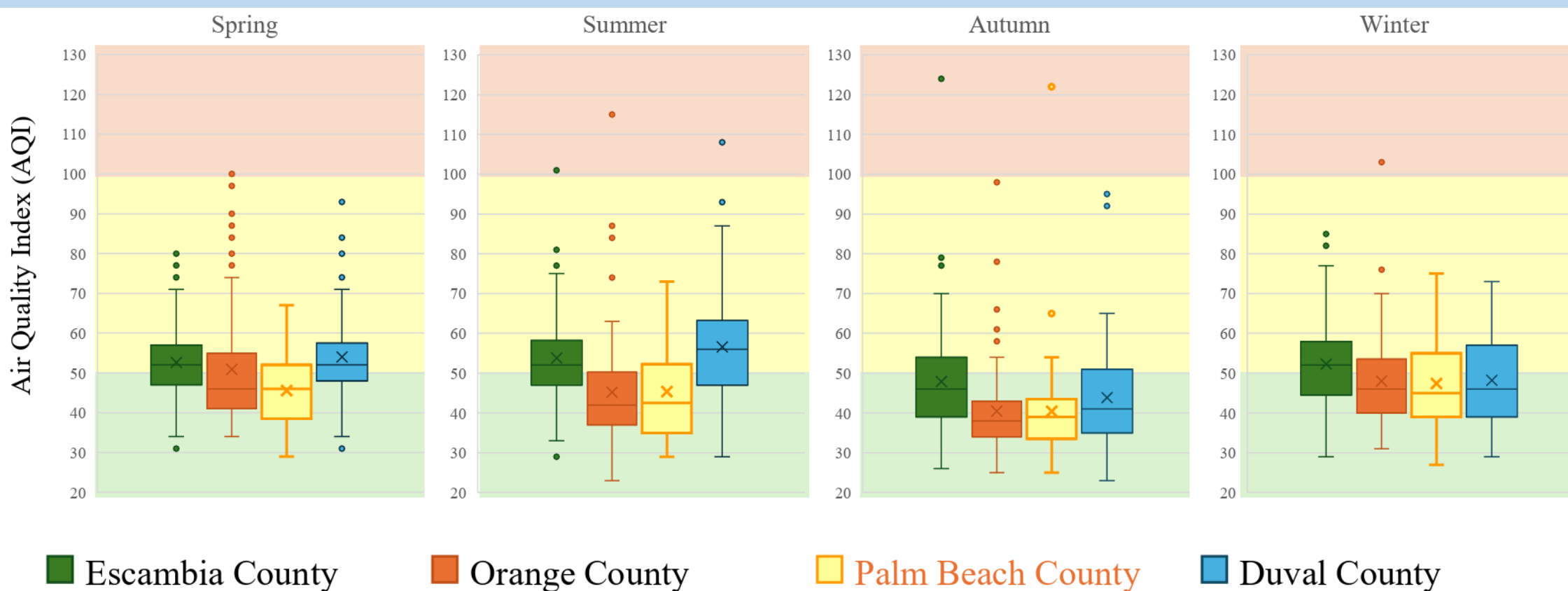
361,127 tons

SWA Waste-to-Energy facilities account for only **0.5%** of the total mass of air pollutants emitted from all sources in Palm Beach County

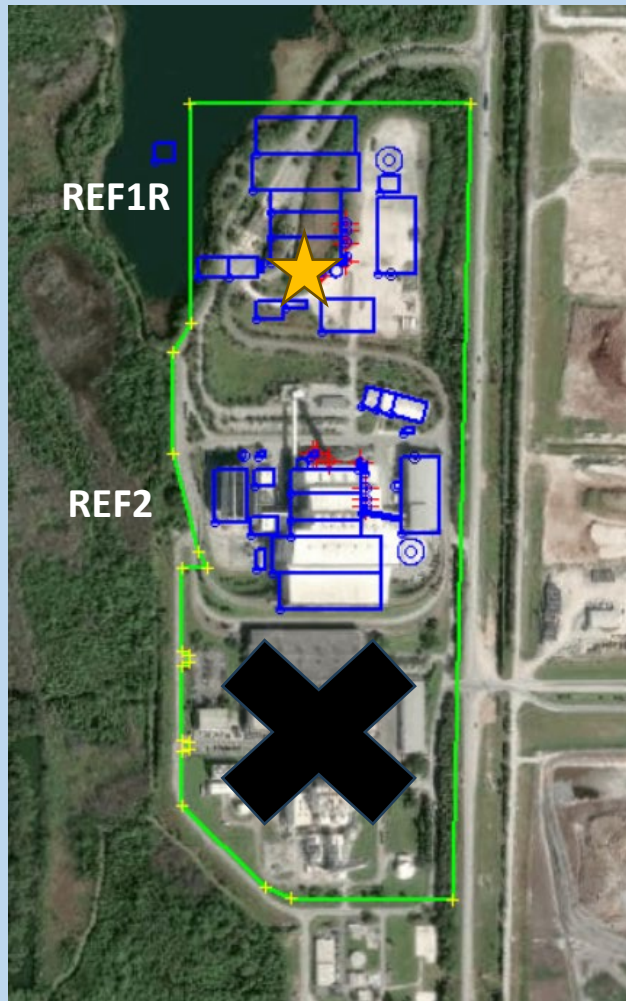
Data sourced from the EPA's 2022
Emissions Modeling Platform

National Ambient Air Quality Standards (NAAQS)

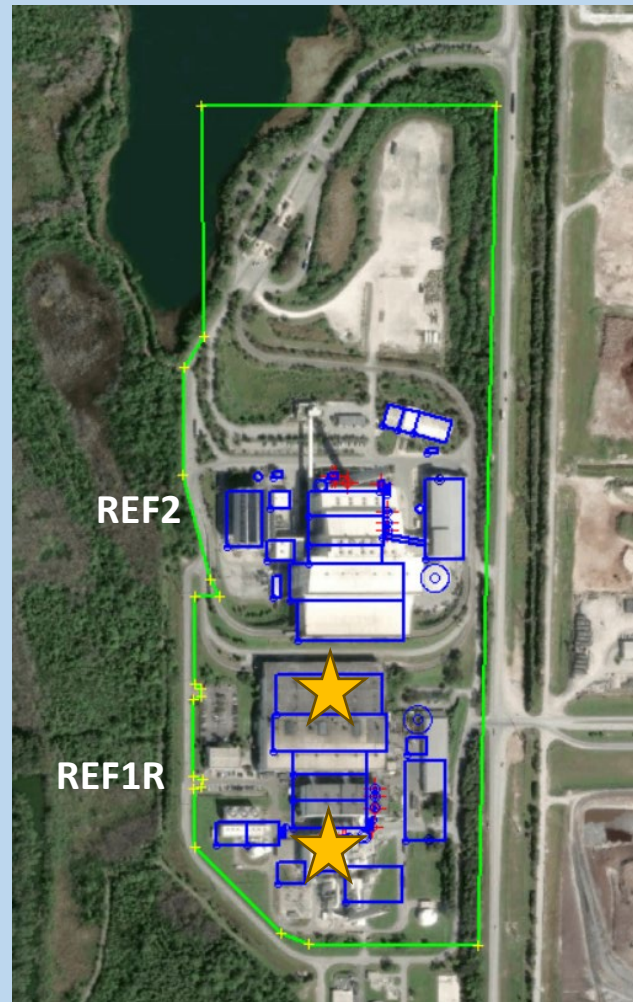
- Florida has met all federal air quality standards for the 5th consecutive year for CO, Lead, NO_x, PM, SO₂, and Ozone
- According to FDEP, Florida's industrial emissions have declined 78% since 2000
- County's Ambient Air Quality Index (AQI) is better than large counties that do not have WTE facilities



Modeling Analysis – Conceptual Design Layouts (REF1R)



Northern Site - South Stack

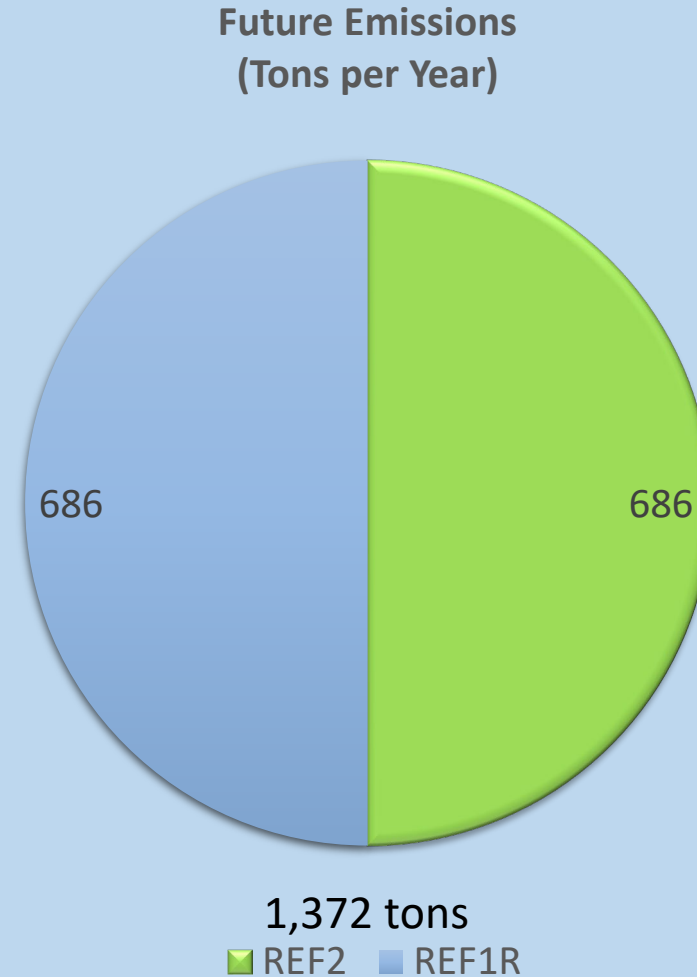
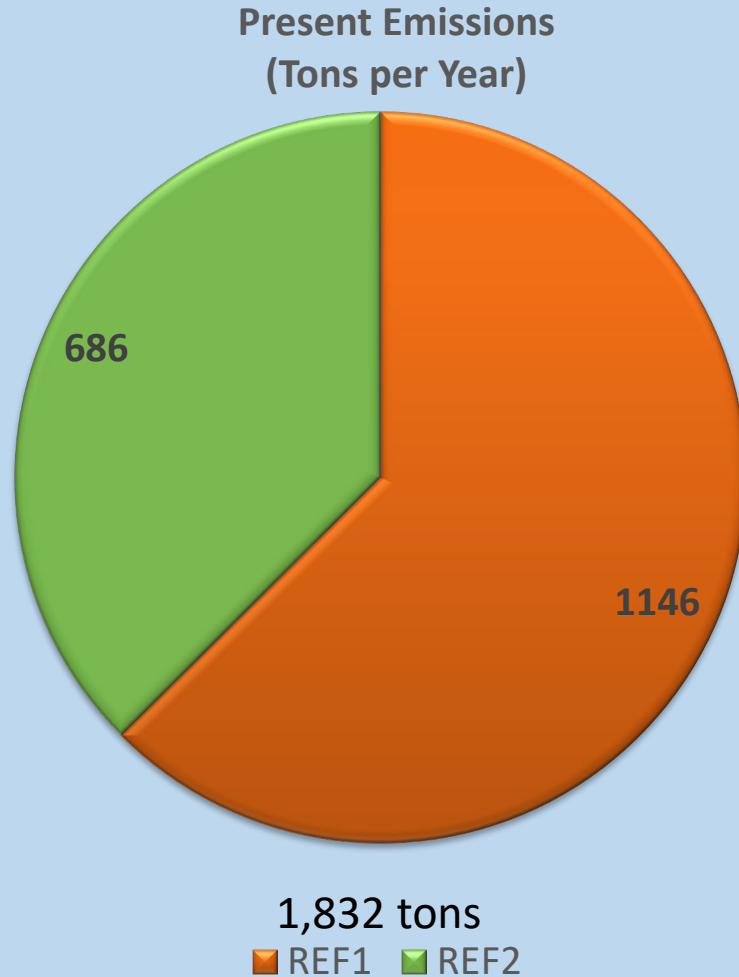


REF1 Site – North & South Stack

- Total emissions from REF1R will be less than REF1
- No fatal flaws found
- No significant differences between the options
- Preliminary modeling shows compliance with National Ambient Air Quality Standards (NAAQS)

★ Proposed stack location

The Future Looks Better



Even with an increased capacity, REF 1R emissions will be less than REF 1 emissions
Includes all pollutants – CO, NO_x, PM, SO₂, VOC, D/F Cd, HCl, Hg, Pb.

Other Factors

Other Factors

Traffic

- SWA will not import waste from outside the County.
- REF 1R will not increase traffic on Jog Road.

Human Health

- No evidence of health impacts from WTE facilities in PBC or elsewhere.
- 2010 Human Health and Ecological Impact Analysis concluded that REF 2 would not have an adverse impact on human health or the environment.
- Check out technical reports on SWA website swa.org/827/Technical-Reports

Noise

- Equipment location/design to minimize noise impacts
- Not anticipated to significantly contribute to noise for surrounding communities

Public Outreach

Public Outreach

- Ironhorse Residents
 - September 17, 2025
 - Presentation and Q&A (41 residents)
 - Tour of REF2 (29 residents)
- North County Neighborhood Coalition (NCNC)
 - September 29, 2025
 - Presentation and Q&A (13 residents)
- Ironhorse HOA Board
 - October 1, 2025
 - 5 Members of Board's delegated committee
 - Letter of support received

REF 1 Closure / Extension / Waste Diversion

REF 1 O&M Extension versus Waste Diversion Comparison

- REF 1 O&M Extension

- Extend operations through 2034
- \$80M in capital projects needed to continue operations.
- Operator provided no firm commitment.
- Electrical revenues decrease in 2032 at end of PPA.

- Waste Diversion

- Assumed equivalent landfilled tonnage to maintain depletion year of 2064.
- Municipal solid waste haul and disposal out of County.
- Increased cost of processing vegetation.

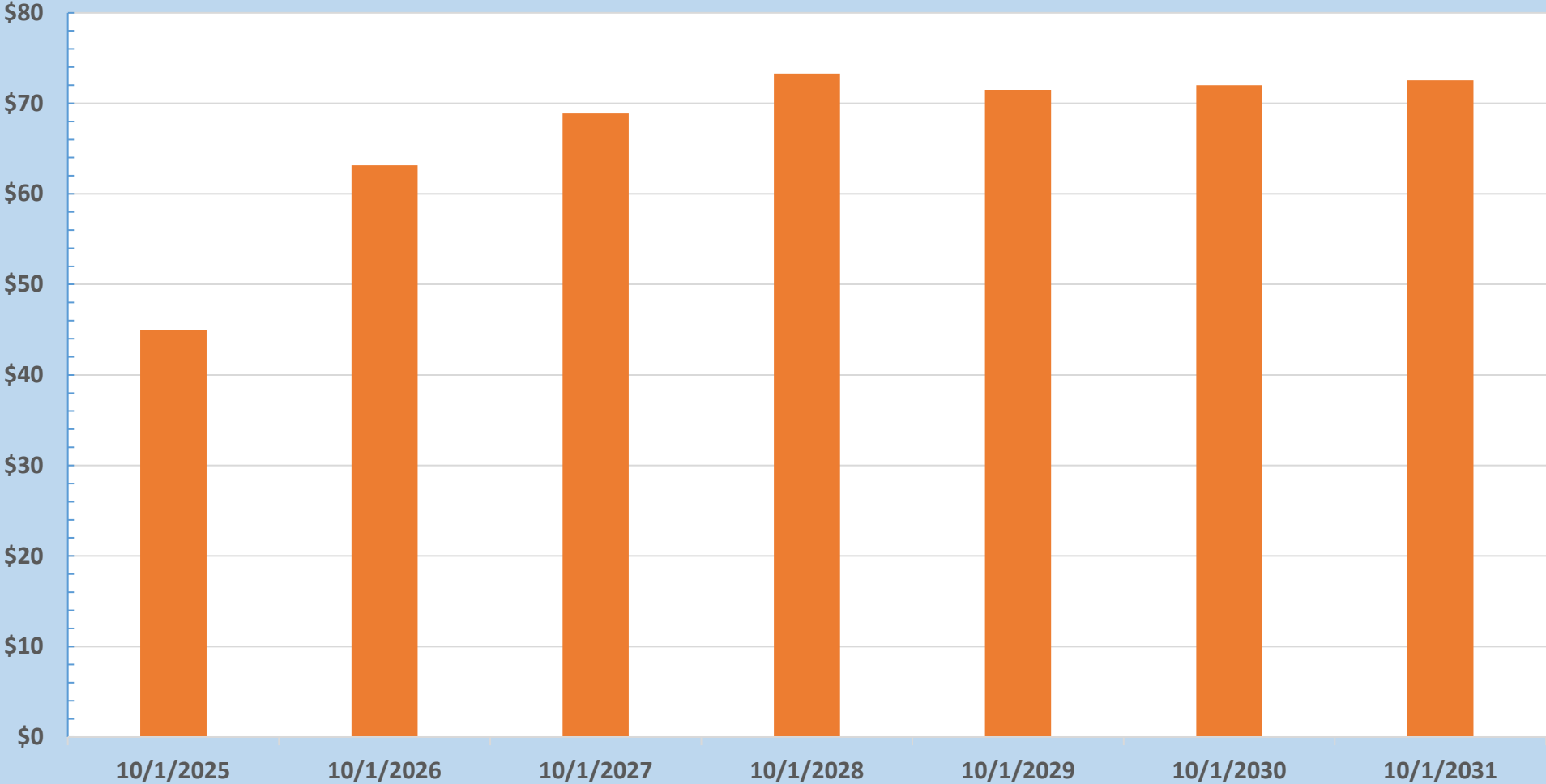
Updated Site Costs

Estimated Project Construction Costs

Costs During Construction	Northern Option	REF1 Site Option
Base Construction Cost	\$1.45B	\$1.45B
Additional Geotechnical Improvements	\$20M	\$0
Lake Backfill and Scalehouse Relocation	\$60M	\$0
Wetland Mitigation Considerations	\$3M	\$0
Additional Site Considerations Subtotal	\$83M	\$0
TOTAL ESTIMATED CONSTRUCTION COST	\$1.5B±	\$1.5B±
Waste Diversion Cost (5-years)	\$0	\$270M
REF 1 Operations Extension Net Cost (5-years) (Capital and O&M & all Revenues)	\$320M	\$0

Updated Financial Estimates and Rate Impacts

SWA Current Debt Service (in millions)



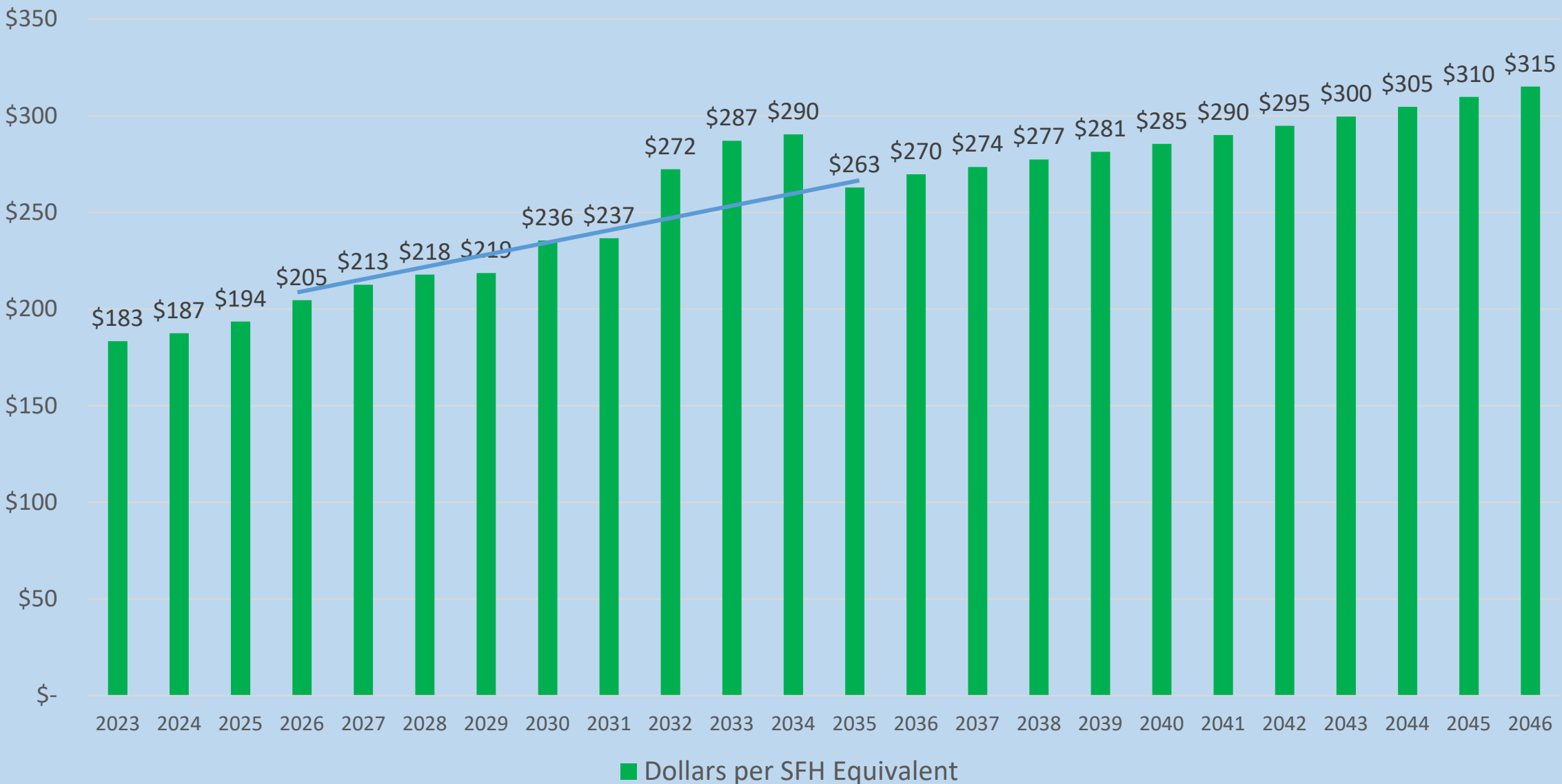
SWA Current Debt Service

Date	Series 2015	Series 2019	Series 2021	Aggregate
10/1/2025	\$13,386,500	\$11,831,616	\$19,731,241	\$44,949,357
10/1/2026	\$13,498,000	\$49,669,592		\$63,167,592
10/1/2027	\$13,526,750	\$55,346,192		\$68,872,942
10/1/2028	\$16,595,250	\$56,691,232		\$73,286,482
10/1/2029		\$71,483,800		\$71,483,800
10/1/2030		\$71,999,376		\$71,999,376
10/1/2031		\$72,540,688		\$72,540,688
TOTAL	\$57,006,500	\$389,562,496	\$19,731,241	\$466,300,237

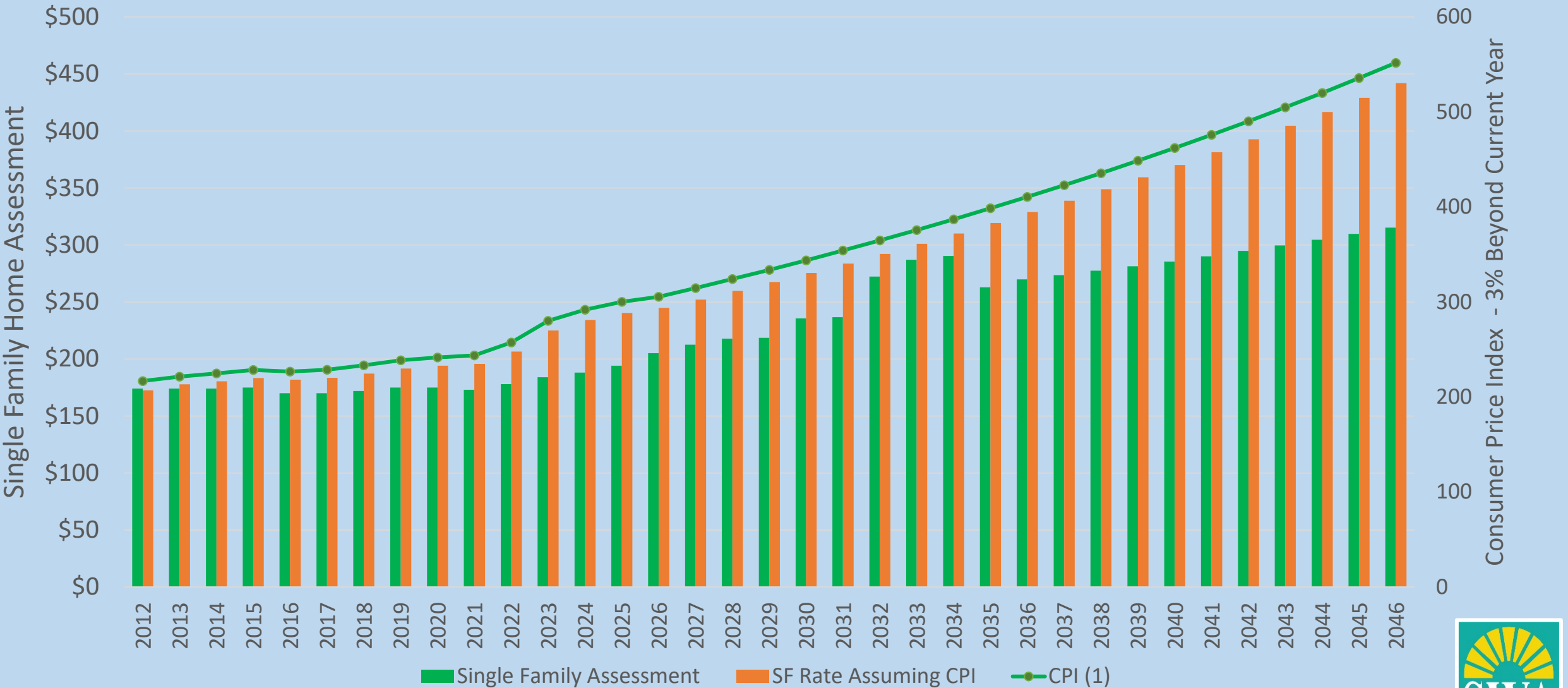
Assessment Rate – Northern Site Location

- Location on Northern Site
- Extend REF1 operations through 2034
- Capital Cost assumed at \$1.54 Billion
- Bond Proceeds at \$1.54 Billion @3.5% for 20 years
- Single Family Assessment Rate in 2035 of \$263
- Annual Debt Service \$108 million
- Debt Service Coverage of 1.5 (Dependent on R&R and Capital)

Projected SFH Assessment - Replace REF1 in 2034/2035 - Northern Site Location



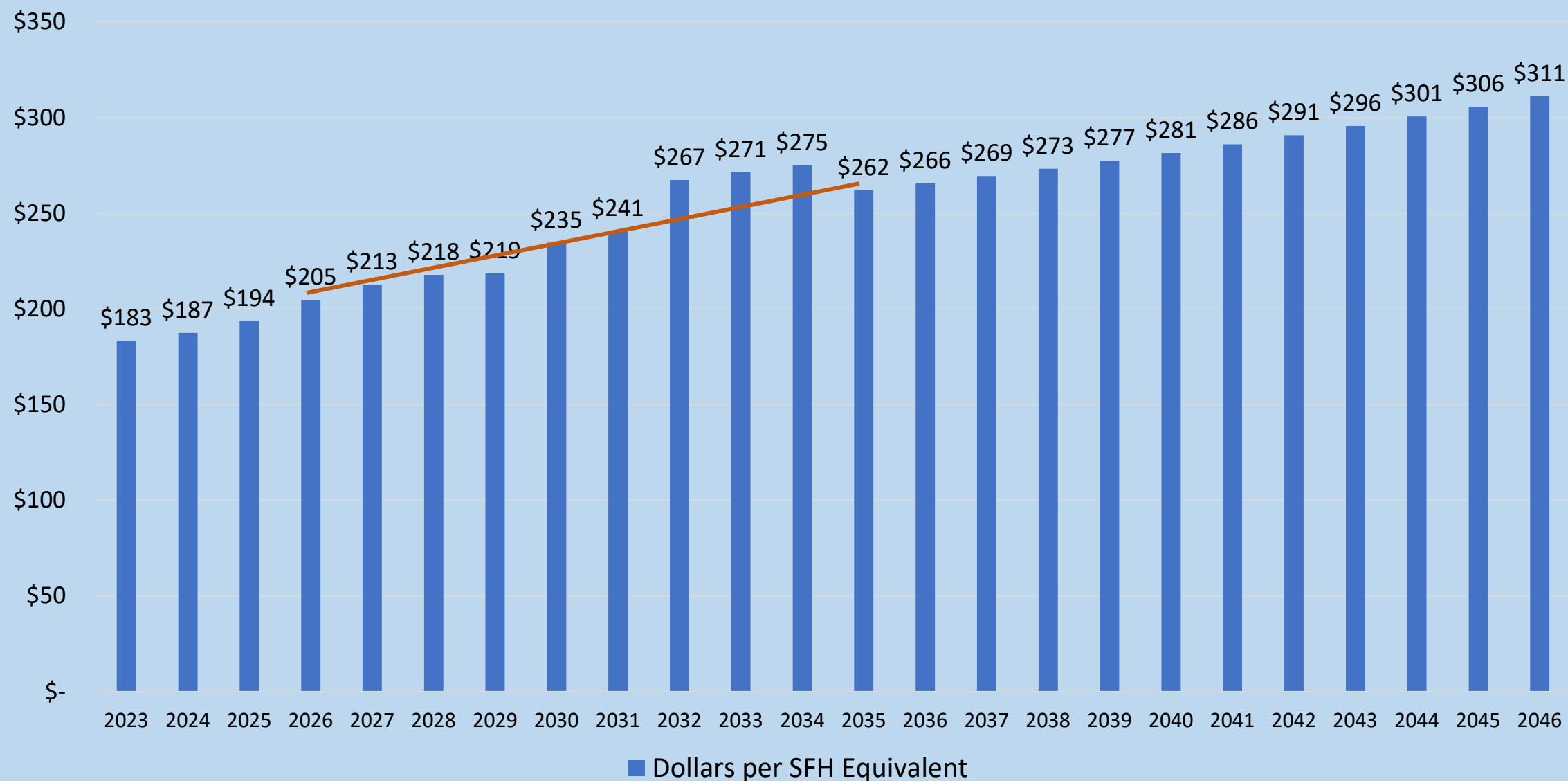
Projected SFH Assessment - Replace REF1 in 2034/2035 - Northern Site Location



Assessment Rate - REF1 Site Location

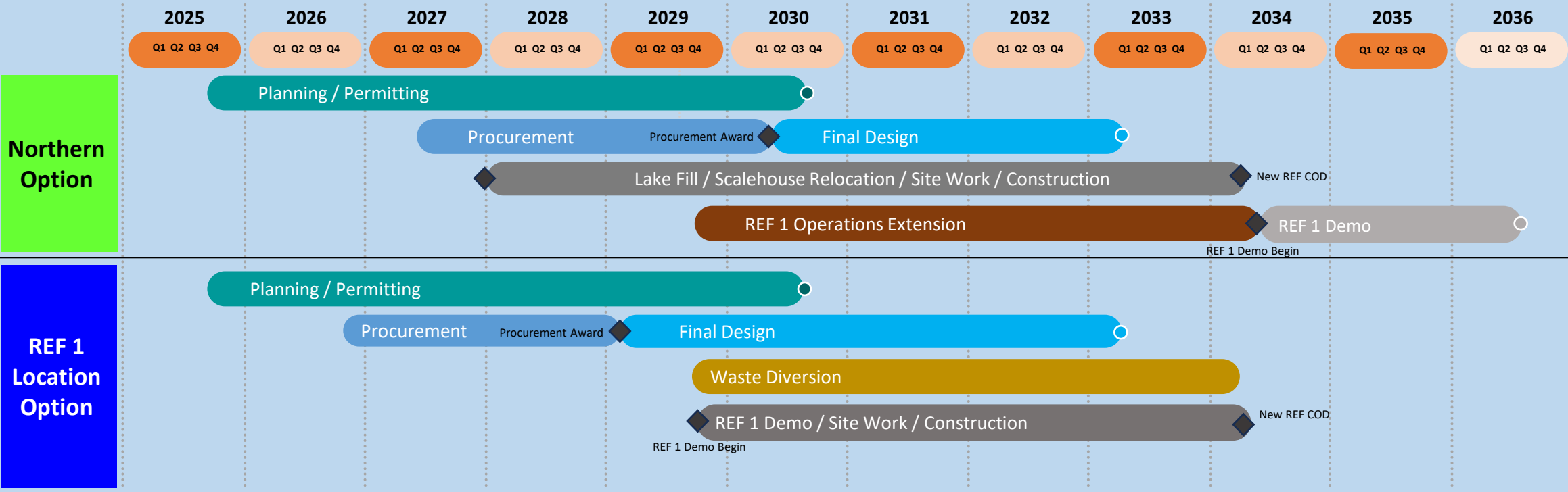
- Location on REF1 Site Footprint
- REF1 shut down – October 2029
- Diversion of 500,000-600,000 tons per year (waste + vegetation)
- Capital Cost assumed at \$1.46 Billion
- Bond Proceeds at \$1.46 Billion @3.5% for 20 years
- Single Family Assessment Rate in 2035 of \$262
- Annual Debt Service \$103 Million
- Debt Service Coverage of >1.5 (Dependent on R&R and Capital)

Projected SFH Assessment – Shut REF1 in 2029 - REF1 Site Location



Schedule Summary

Schedule Summary



Activities Prior to Contract Award

Start of Upcoming Activities	North Site	REF 1 Site
FY 2026	➤ Lake Fill Permitting (ERP/404) Immediate Start ➤ REF 1 O&M Extension and Capital Planning ➤ Site Geotechnical Improvements • Preliminary Design/DCP • PPA Negotiations/PSC Process • PPSA/PSD/ERP Permitting Process • Financing Team Engagement ➤ Planning and Procurement of Construction/Operations	➤ Planning and Procurement for Demo/Construction/Operations Immediate Start • Site Geotech and Boundary Survey • Preliminary Design/DCP • PPA Negotiations/PSC Process • PPSA/PSD/ERP Permitting Process • Financing Team Engagement • Legal Counsel Engagement
FY 2027	➤ Lake Fill Procurement and Construction • Legal Counsel Engagement	• Continuation of Ongoing Activities
FY 2028	• Continuation of Ongoing Activities	• Continuation of Ongoing Activities
FY 2029	➤ Relocation of Scale House Procurement, Design, and Construction	➤ Permitting for Demolition of REF 1 • Award Contract (FYQ2) January 2029
FY 2030	• Award Contract (FYQ3)	➤ Waste Diversion initiates

Critical path and activities specific to site

Sites Comparison and Risks

Critical Factors for REF1R Implementation by Site

Factors to Consider	Northern Site Location	Existing REF1 Location
Offsite Waste Diversion		✓
Geotechnical Improvements	✓	
Lake Backfill and Scalehouse Relocation	✓	
Wetlands and Habitat Assessment	✓	
Permitting Uncertainty	✓	
Air Dispersion Modeling	✓	✓
Proximity to Ironhorse	✓	
REF1 O&M Extension - Capital Costs, MACT Compliance	✓	
Financial & Rate Assessment	✓	✓
Construction/Demolition Schedule Impacts	✓	✓
Schedule (Commercial Operations Date)	✓	✓

Next Steps

Seeking Board Approval

- Seeking Board Direction to locate REF1R at one of the two sites (Northern site or REF 1 site) presented today.
- Seeking Board approval to proceed with the planning, permitting, and the development of procurement documents for REF1R at the site chosen by the Board.
- Staff will come back to the Board to issue the solicitation and bond financing

QUESTIONS?



Thank You

