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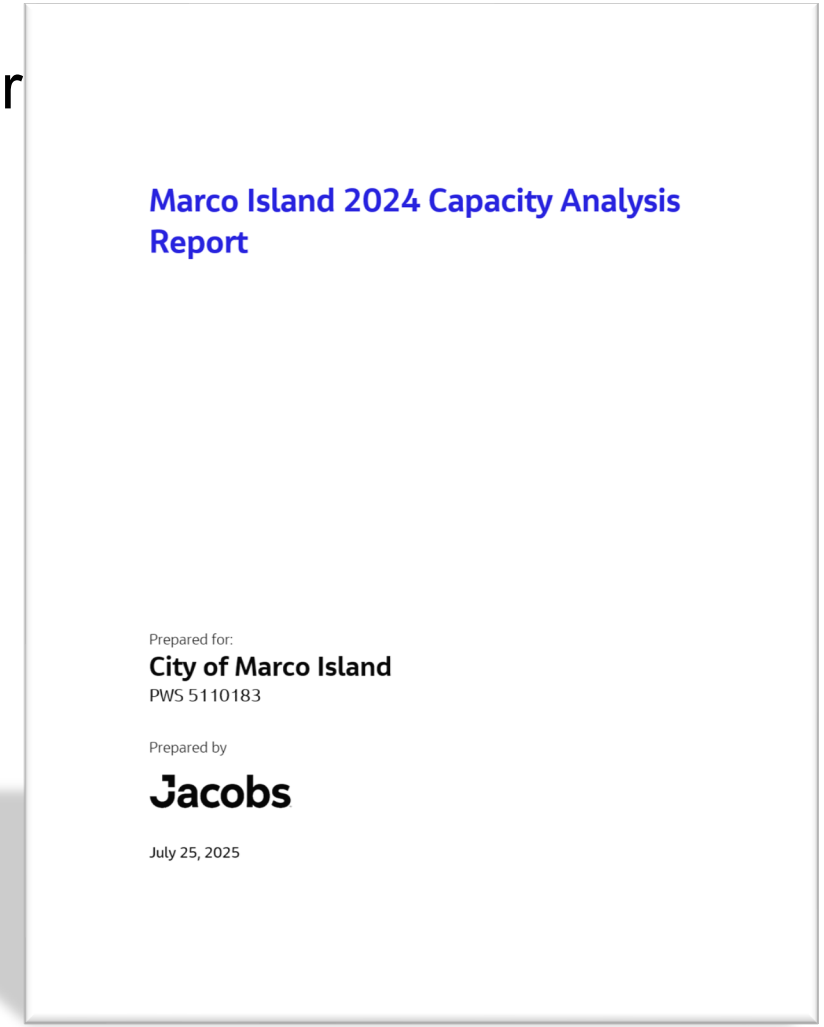
Meeting Marco Island Future Water Demands

2024 Capacity Analysis Report Summary

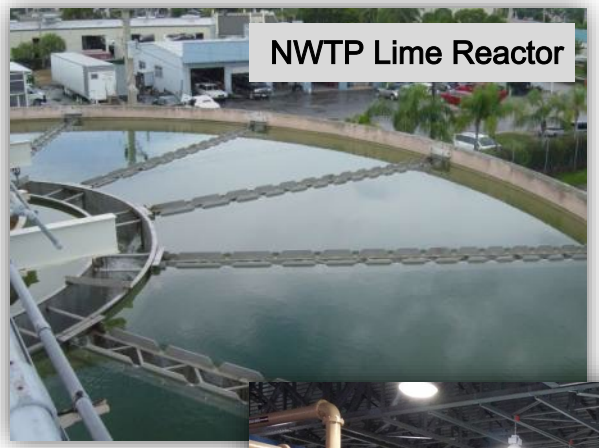
Capacity Analysis Report Overview

- Jacobs worked with the Marco Island Water and Sewer Department (W&SD) to complete a Capacity Analysis Report (CAR) reviewing data through December 2024
- The CAR evaluates current and projected water demands and the capabilities of the City of Marco Island's potable water system including:
  - Water source facilities
  - Treatment facilities
  - Treated water storage and pumping
- The CAR was prepared in accordance with Florida Department of Environmental Protection (FDEP) rule 62-555.348
- FDEP requires a CAR when potable water demands exceed 75% of treatment facility capacity and treatment capacity is not sufficient for buildout



Existing Marco Island Potable Water Treatment Facilities

- Marco Island's potable water system is supplied by two facilities
- North Water Treatment Plant (NWTP)
  - Treats surface water diverted from Henderson Creek
  - A lime softening and membrane filtration (MF) process is permitted to produce 6.67 million gallons per day (MGD)
- The South Water Treatment Plant (SWTP)
  - Treats brackish groundwater from the Mid-Hawthorn Aquifer
  - A reverse osmosis (RO) process is permitted at 6.0 MGD
- Together, the two plants have a combined permitted capacity of 12.67 MGD

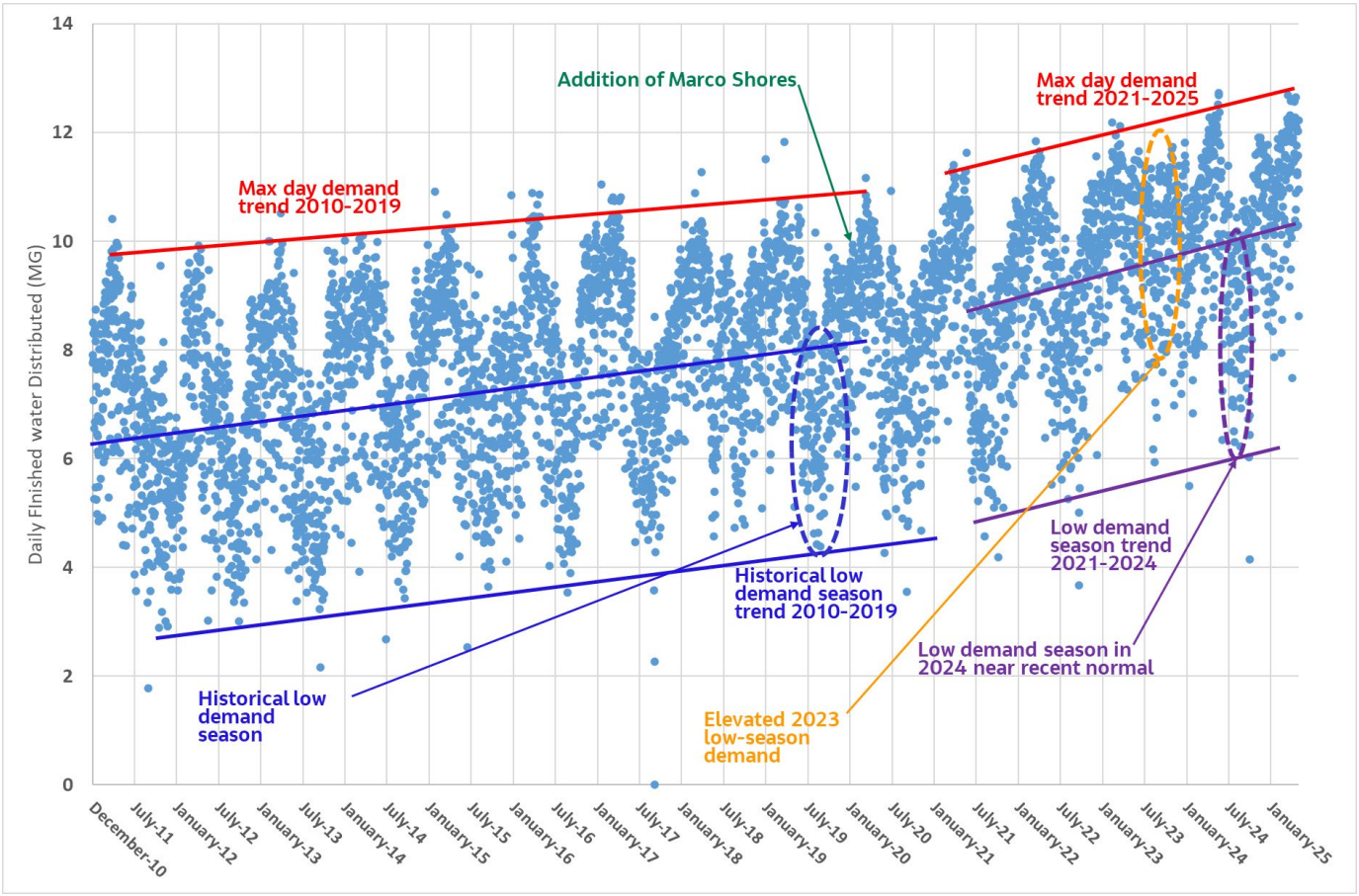

NWTP Lime Reactor


NWTP MF Treatment


SWTP RO Treatment

Potable Water Demand Trends

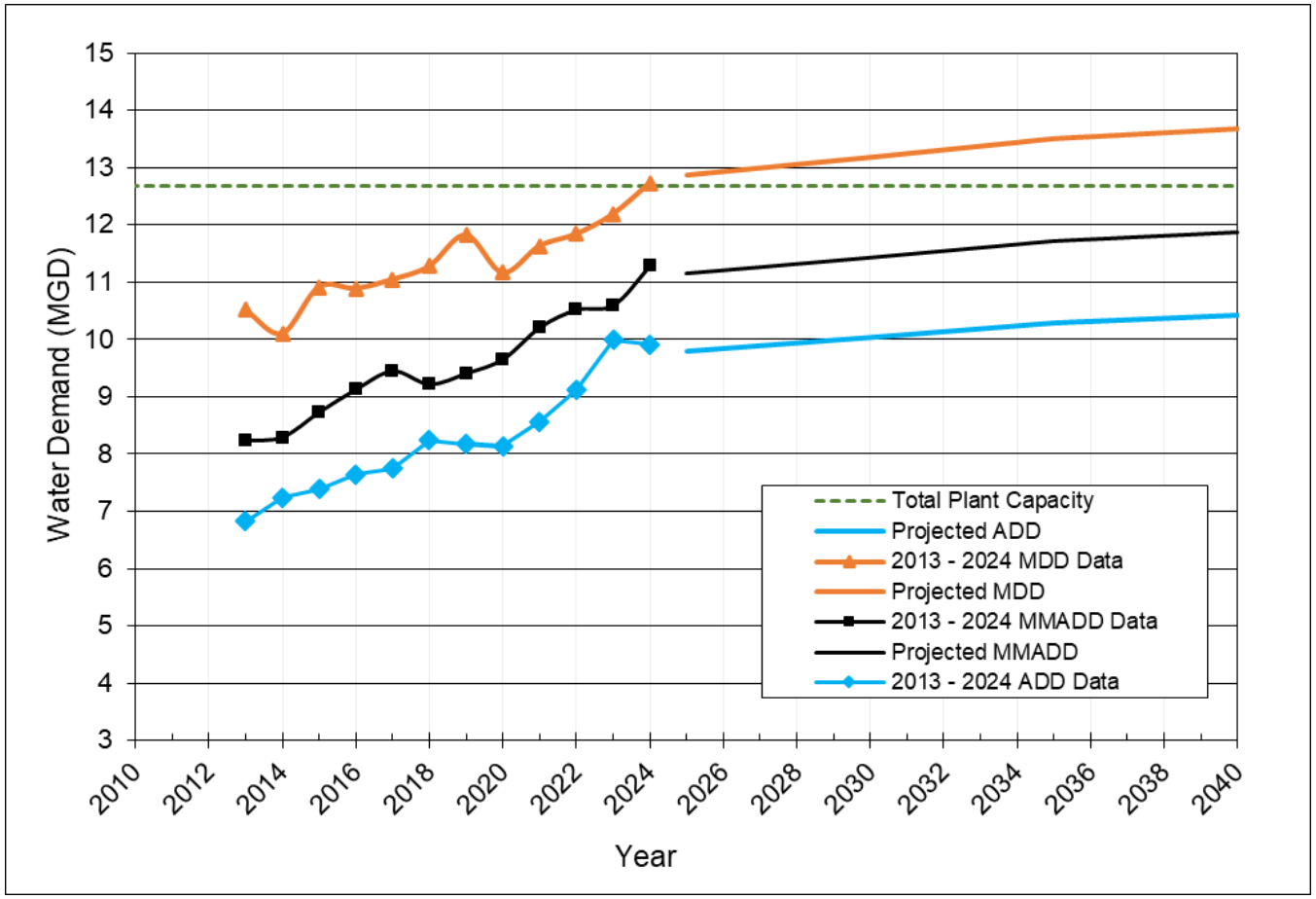
- Water demand has grown significantly over the past decade, with increased growth since 2020
- Between 2014 and 2024, average daily demand (ADD) increased from 7.24 MGD to 9.92 MGD
- In 2024, the max day demand (MDD) exceeded 12 MGD on 13 days, and12.67 MGD on 2 days, straining system capacity
- Through July 2025, this trend has continued with 20 days above 12 MGD and 2 days above 12.67 MGD



Marco Island Potable Water Demands 2011 through July 2025

Potable Water Demand Projections

- Projections indicate demands continuing to exceed current treatment capabilities
- Buildout in 2040:
  - ADD expected to reach 10.41 MGD
  - MDD rising to 13.67 MGD
  - Max month average daily demand (MMADD) forecasted at 11.86 MGD



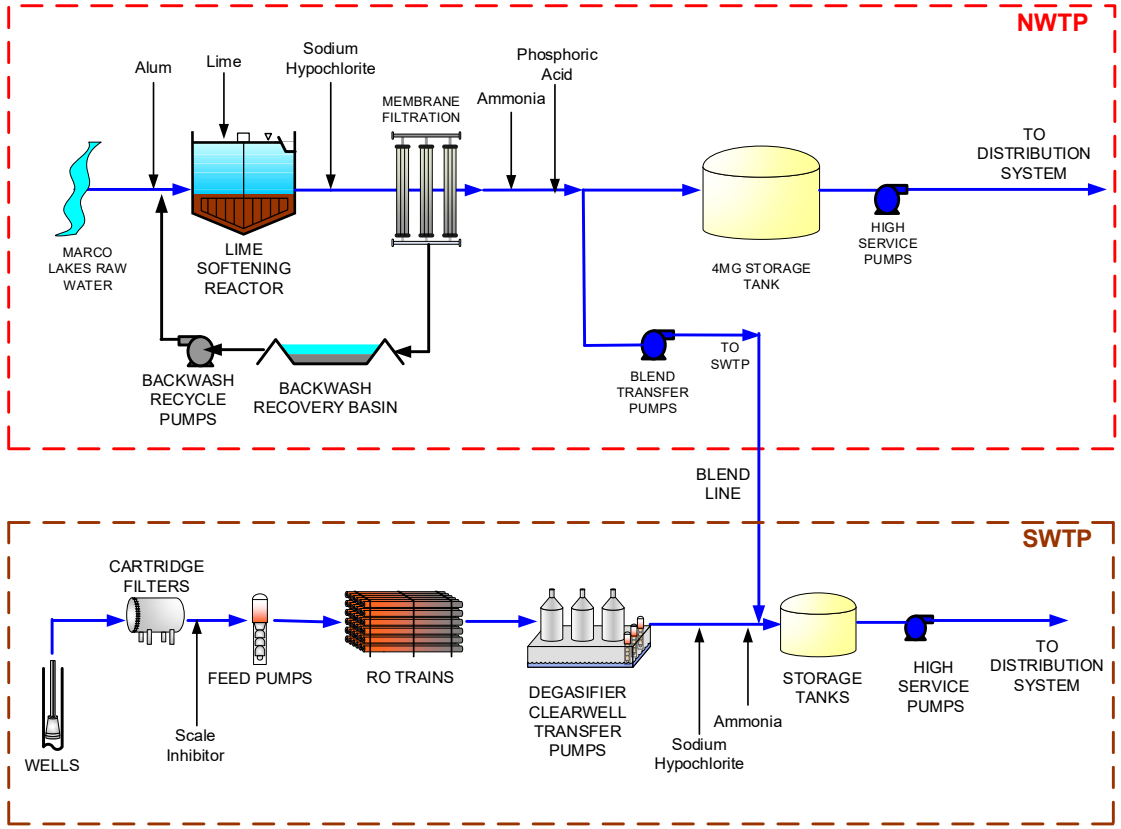
Projected ADD, MDD and MMADD Potable Water Demands through 2040

Water Supply

- The NWTP's raw water supply, drawn from Marco Lakes and supported by Aquifer Storage and Recovery (ASR), is adequate to sustain its 12.67 MGD permitted capacity
- The SWTP is constrained by strict withdrawal limits and a modest RO recovery rate, producing only about 2.72 MGD of the 6.0 mgd permitted capacity on average
- Combined, the current permitted AAD supply to both plants totals 7.83 MGD well below:
  - current 9.92 MGD demand
  - 2040 projected 10.41 MGD demand

Water Facility Capacity

- NWTP
  - Upgraded in 2013, but has not been re-rated to reflect its enhanced capacity (est. 8.5 MGD)
  - Future improvements may include Low-Pressure Reverse Osmosis (LPRO) to increase capacity and treat emerging contaminants such as PFAS
- SWTP
  - Aging infrastructure and declining wellfield performance remain challenges
  - Well rehabilitation program launched in 2019 has restored some capacity and reliability
  - Continued investment in well maintenance, replacement, and equipment upgrades are essential
  - Recommend exploring new technologies to improve RO recovery and long-term system sustainability by increases AAD production using the current water allocation by approximately 20 percent



Storage and Distribution

- Despite current supply/treatment constraints, Marco Island's storage and distribution infrastructure remains robust
- Treated water storage
  - The W&SD currently maintains a total of 12 million gallons of finished water storage
  - The projected 2040 requirement is 6.7 million gallons, which accounts for both operational and fire flow needs
- Treated water pumping
  - Ongoing replacement of the SWTP West High-Service Pump Station (HSPS) - est. completion in November 2025 will boost the system's combined high-service pumping capacity to 33,000 gallons per minute (gpm)
  - Projected 2040 peak hourly flow is 27,500 gpm
- Current facilities comfortably surpass build-out needs, ensuring reliable pressure and delivery as demand continues to grow

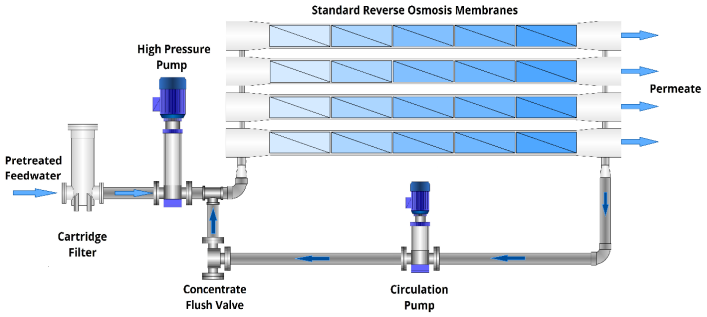
Recommendations for Meeting Future Demands

- Re-rate the NWTP up to 8.5 MGD, leveraging the 2013 NWTP MF system improvements understanding that this short-term increase may not be sustainable without significant investment due to facility age and emerging regulations
- Consider LPRO to increase NWTP capacity while helping future regulatory compliance, reducing operating cost, increasing treatment efficiency and improving potable water quality
- Work with the South Florida Water Management District (SFWMD) to increase water allocations, particularly for the SWTP, where limitations are most severe
- Conduct an annual review of the Marco Island potable water flow data to monitor growth trends and project when WTP capacity will become critical after re-rating NWTP

Recommendations for Improving Reliability

- Address NWTP MF system fouling through
  - improved cleaning methods
  - pilot testing alternative membranes
- Conduct condition assessment of the SWTP focusing on
  - Modernizing infrastructure
  - Optimizing performance
  - Increasing recovery rates
- Monitor system-wide treatment performance quarterly to assess needs for optimization and upgrades
- Conduct annual reviews to guide strategic investments and ensure timely upgrades

MF System Pilot System



High Recovery Closed-Circuit RO Treatment Option

PFAS Considerations

- In response to the potential presence of PFAS and other emerging contaminants W&SD is
  - Conducting seasonal monitoring
  - Preparing to implement advanced treatment technologies
- Prepare to meet PFAS standards by 2031 regulatory compliance deadline if necessary

Sources of PFAS

Compound	Health Effect	MCL	MCLG
PFOA	Cancer	4 ng/L	0 ng/L
PFOS	Cancer	4 ng/L	0 ng/L
PFHxS	Thyroid Effects	1.0 (Hazard Index)	1.0 (Hazard Index)
PFNA	Developmental Effects		
GenX	Liver Effects		
PFBS	Thyroid Effects		

PFAS Regulated Compounds and Levels

Water Facilities Upgrades Timeline

- 2025
  - Re-rate Lime WTP to 8.5 mgd
  - Conduct condition assessment and options evaluation of SWTP
  - Negotiate an increase in the water use permit with SFWMD
  - Update evaluation of future treatment / expansion options for NWTP
- 2026
  - NWTP biofilters commission
  - Replace NWTP MF train 5 &6 membranes
  - Implement preliminary RO upgrades to increase efficiency (I suspect there is some relatively low cost options to start with)
  - Begin design of NWTP expansion, water quality and reliability improvements
- 2027
  - Begin construction of NWTP improvements
- 2029
  - Begin design of long-term SWTP RO upgrades
- 2030
  - Complete construction of NWTP improvements
  - Begin construction of SWTP RO upgrades
- 2031
  - PFAS compliance deadline
- 2033
  - Complete construction of SWTP RO upgrades

Conclusions

- Marco Island’s water infrastructure is approaching critical capacity
- Strategic, proactive investment in treatment expansion, source water allocation, and regulatory readiness is essential to ensuring safe, reliable service through 2040 and beyond

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