Long Range Capital Improvement Program for the Dos Rios Water Recycling Center

San Antonio Water System

Refreshing Ideas

Dos Rios Re-rating Background

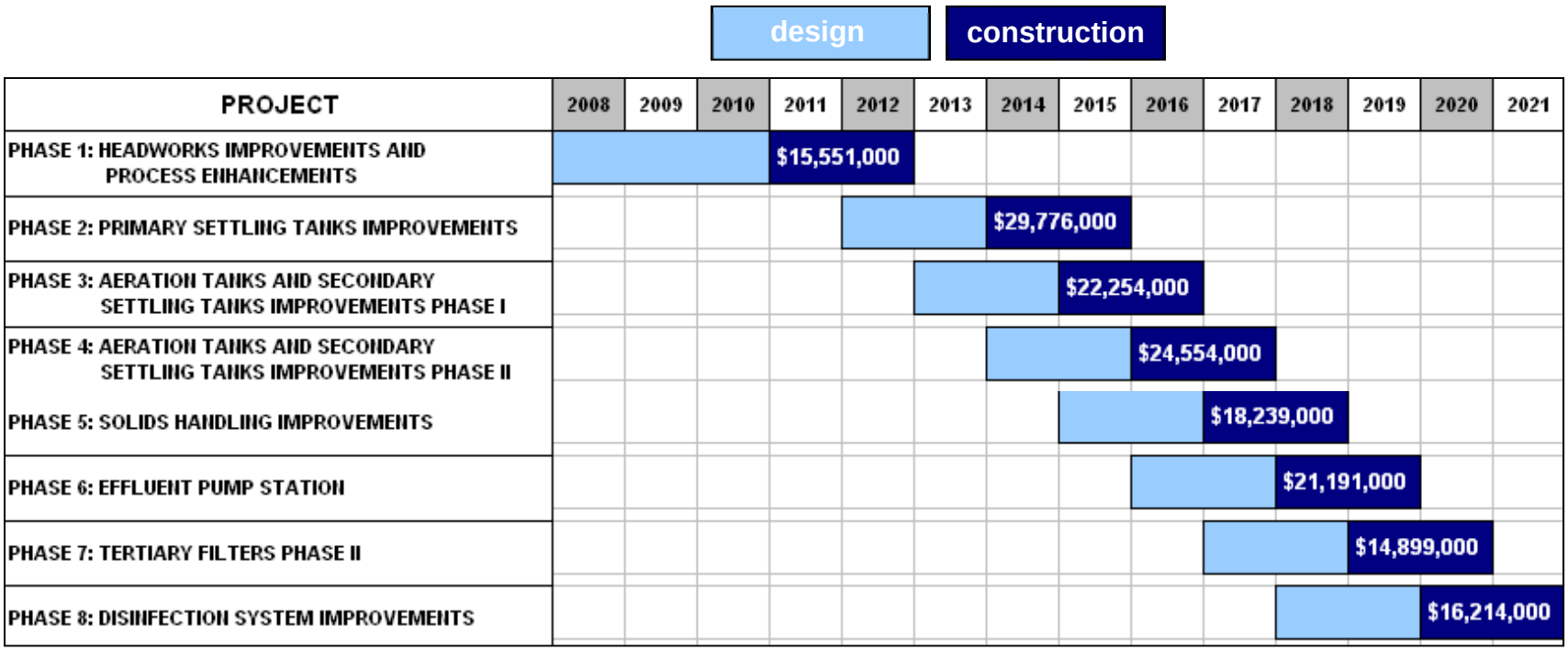
- In 2003, SAWS hired CDM to conduct a study to evaluate the feasibility of re-rating the Dos Rios WRC to a higher permitted capacity at a low cost.
- The study concluded that the Dos Rios WRC could be re-rated to 217 MGD annual average daily flow (AADF), and it recommended modifications in a phased approach.

Goals for Dos Rios WRC Re-rating

- Maximize use of existing plant capacity
- Provide additional capacity when needed
- Be prepared for peak wet-weather events
- Minimize rate impacts through sequencing re-rating projects

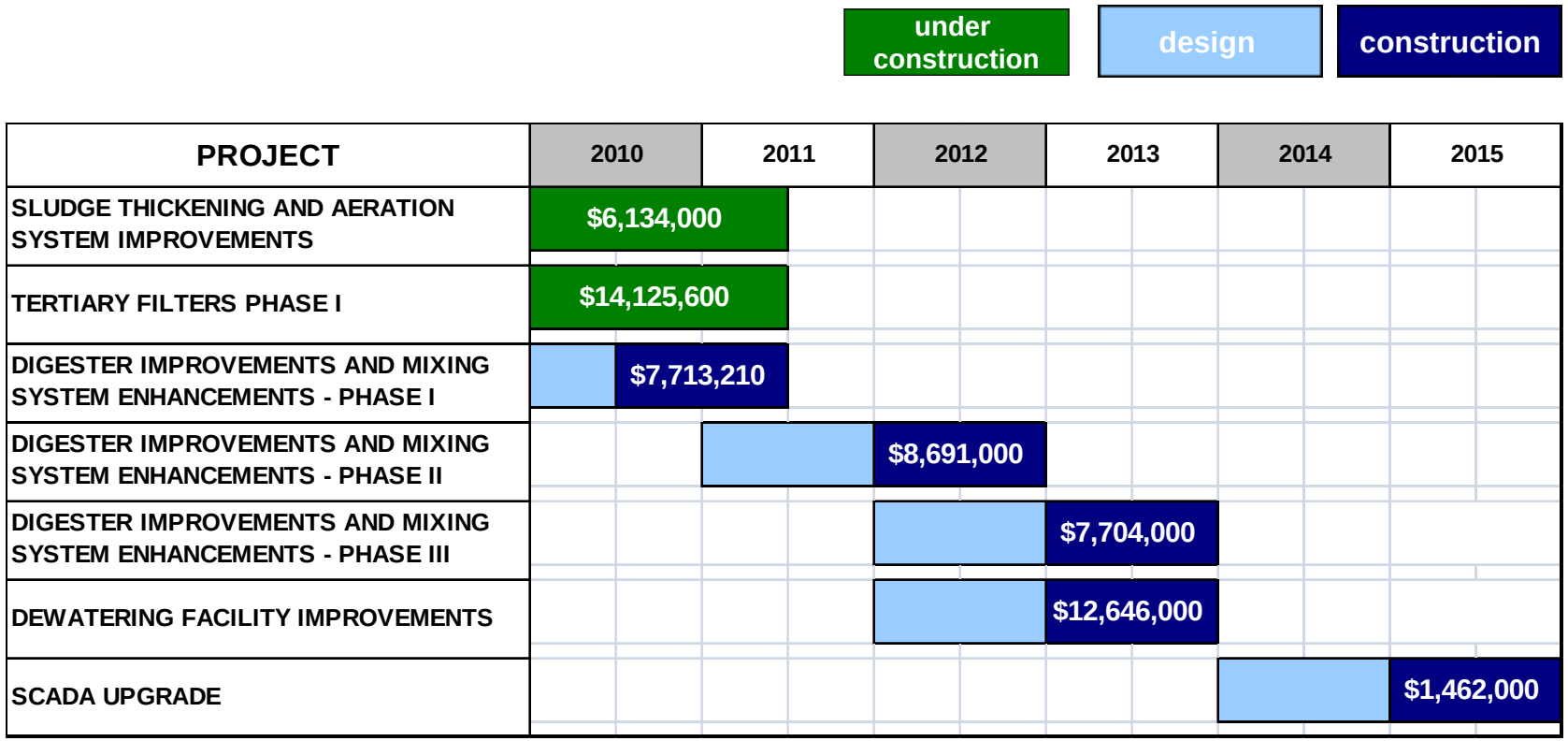
Dos Rios WRC Re-rating Timeline

- Dos Rios WRC “re-rating" is a series of phased improvements
- Will result in 217 mgd capacity at Dos Rios
- Will also address some deficiencies in current infrastructure
- Total cost $163 million: includes design and construction (in 2010 dollars)



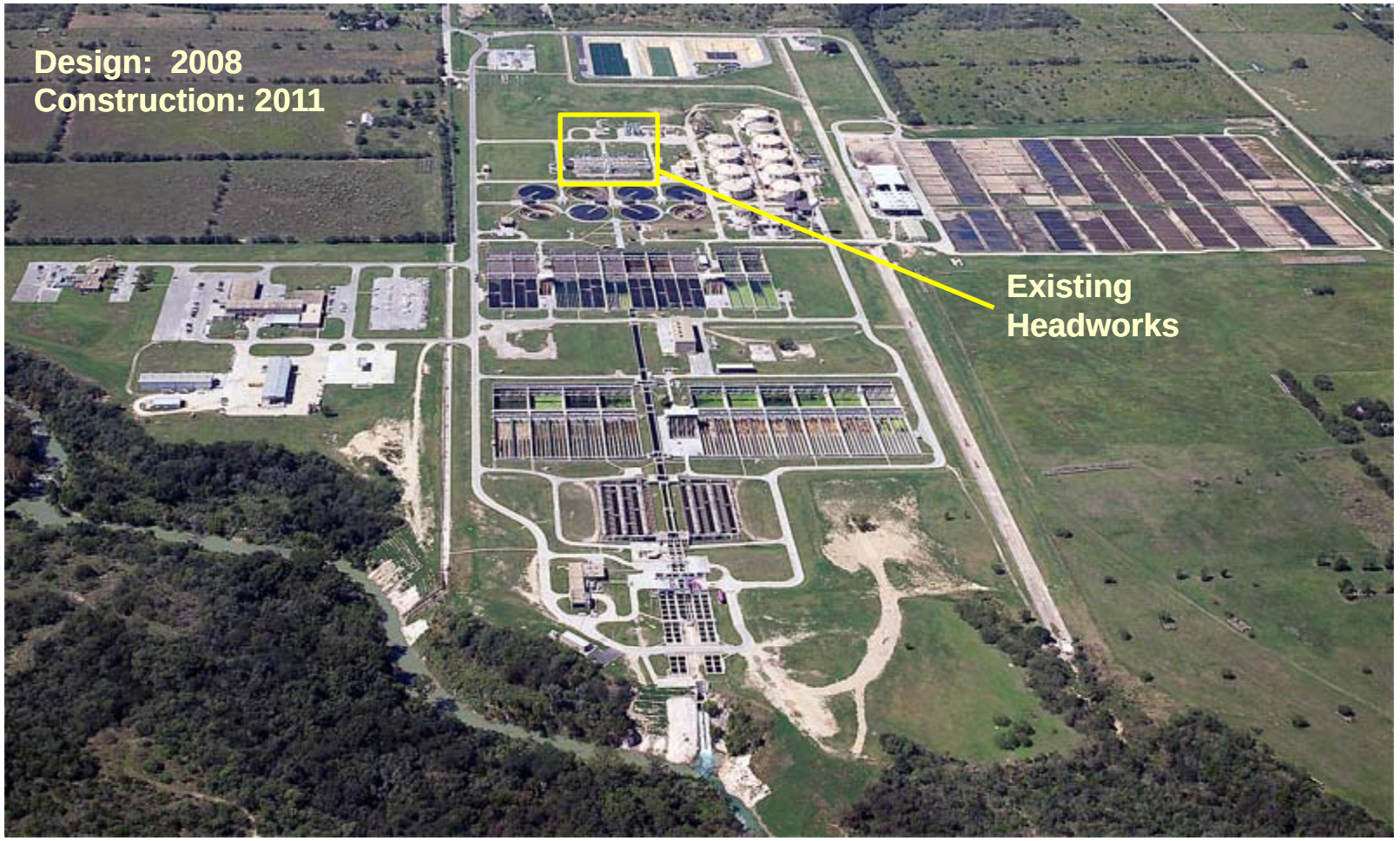
Other Improvements at Dos Rios

Over $60 million: includes design and construction (in 2010 dollars)



Dos Rios WRC Re-rating

Phase 1: Headworks Improvements and Process Enhancements



Dos Rios WRC Re-rating

Phase 1: Headworks Improvements and Process Enhancements

- Construct a parallel 104-inch influent line with flow meter
- Add two (2) step screens and two (2) manual screen bypass channels
- Bypass the aerated grit tanks and demolish the clam shell bucket system

Dos Rios WRC Clam Shell Bucket System

Dos Rios WRC Aerated Grit Tank

Dos Rios WRC Re-rating

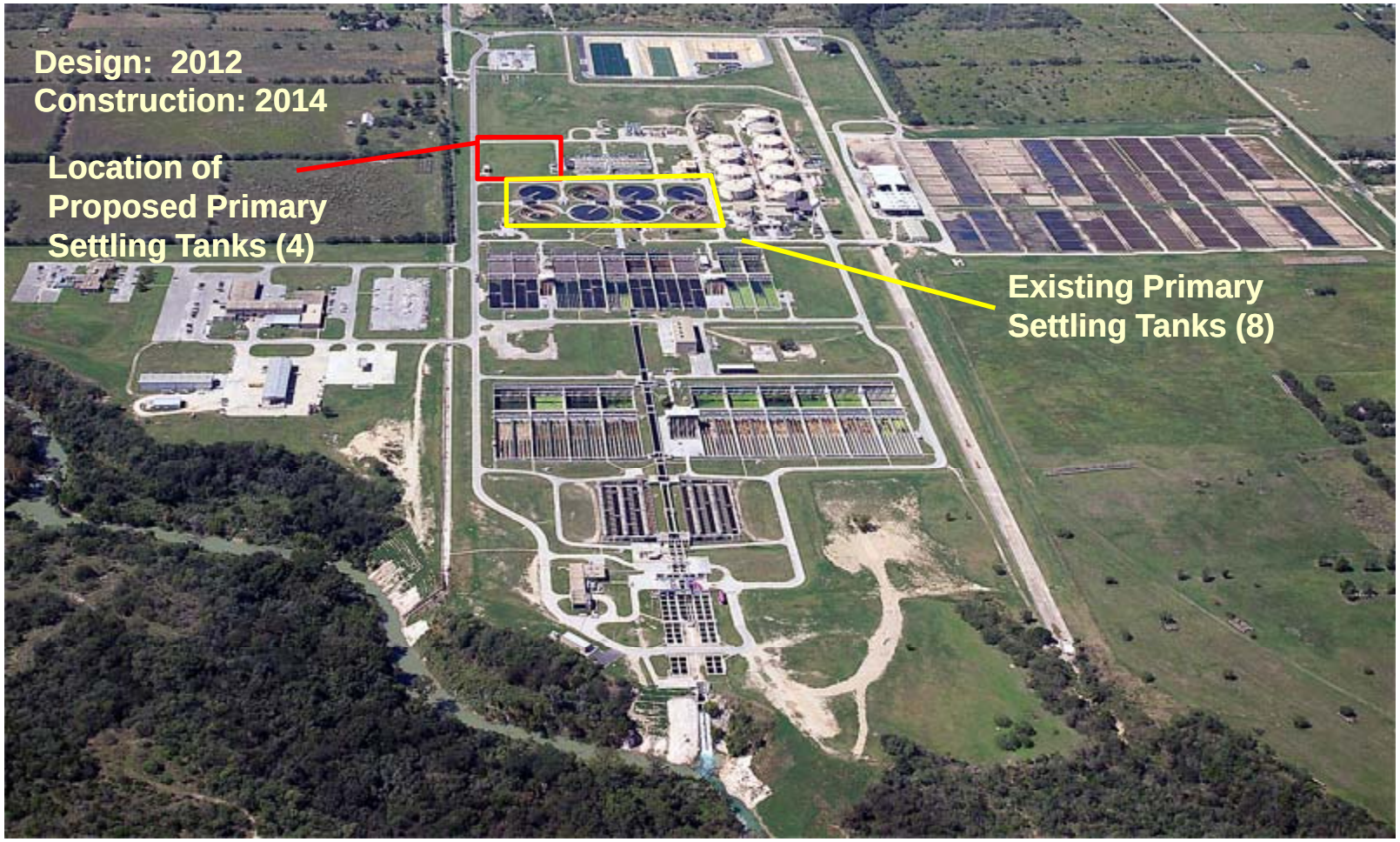
Phase 1: Headworks Improvements and Process Enhancements

Dos Rios WRC Pre-aeration Tanks

- Eliminate the pre-aeration process
- Retrofit the Pre-aeration Tanks with eight (8) induced vortex grit removal systems
- Install four (4) grit washer / classifier units

Dos Rios WRC Re-rating

Phase 2: Primary Settling Tanks Improvements



Dos Rios WRC Re-rating

Phase 2: Primary Settling Tanks Improvements

- Add four (4) 175-ft Ø x 15-ft SWD Primary Settling Tanks (PSTs), including primary sludge and scum pump station
- Construct new Secondary PST Distribution Box to split flows among the four (4) new PSTs

Dos Rios WRC Primary Settling Tanks

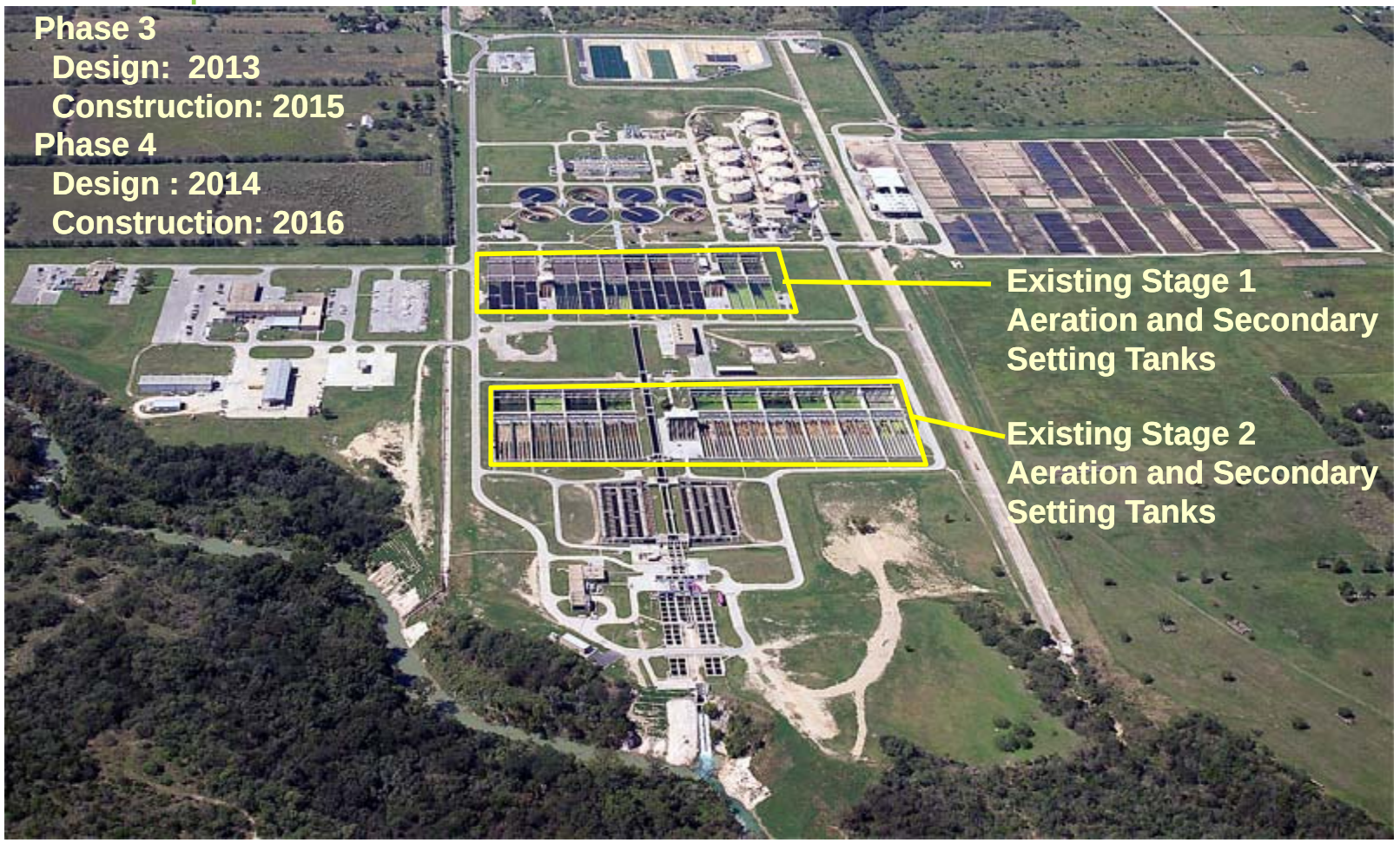
Dos Rios WRC Re-rating

Phase 2: Primary Settling Tanks Improvements

- Construct new Primary PST Distribution Box to split flows among the new Secondary PST Distribution Box and the two (2) existing Secondary PST Distribution Boxes
- Improve existing PSTs to increase capacity by 15%
- Modify existing Secondary PST Distribution Boxes

Dos Rios WRC Re-rating

Phases 3 & 4: Aeration Tanks and Secondary Settling Tanks Improvements



San Antonio Water System

Dos Rios WRC Re-rating

Phases 3 & 4: Aeration Tanks and Secondary Settling Tanks Improvements

- Install piping modifications so that existing two stages can be destaged and operated in parallel
- Operate at an MLSS of 3,500 mg/L
- Provide an SRT of 4.5 to 5 days

Dos Rios WRC Re-rating

Phase 3: Aeration Tanks and Secondary Settling Tanks Improvements Phase I

- Install an Activated Sludge Flow Distribution Box to split flow between first and second stage aeration tanks (and associated piping modifications)
- Install an Anoxic Bio-selector to improve the “settleability” (SVI) of the sludge and increase treatment capacity

Dos Rios WRC Re-rating

Phase 4: Aeration Tanks and Secondary Settling Tanks Improvements Phase II

- Compartmentalize aeration tanks to simulate plug flow pattern (add baffles)
- Replace the existing ceramic diffusers to improve oxygen transfer efficiency
- Sufficient blower capacity, but may consider blower replacement if energy costs increase significantly

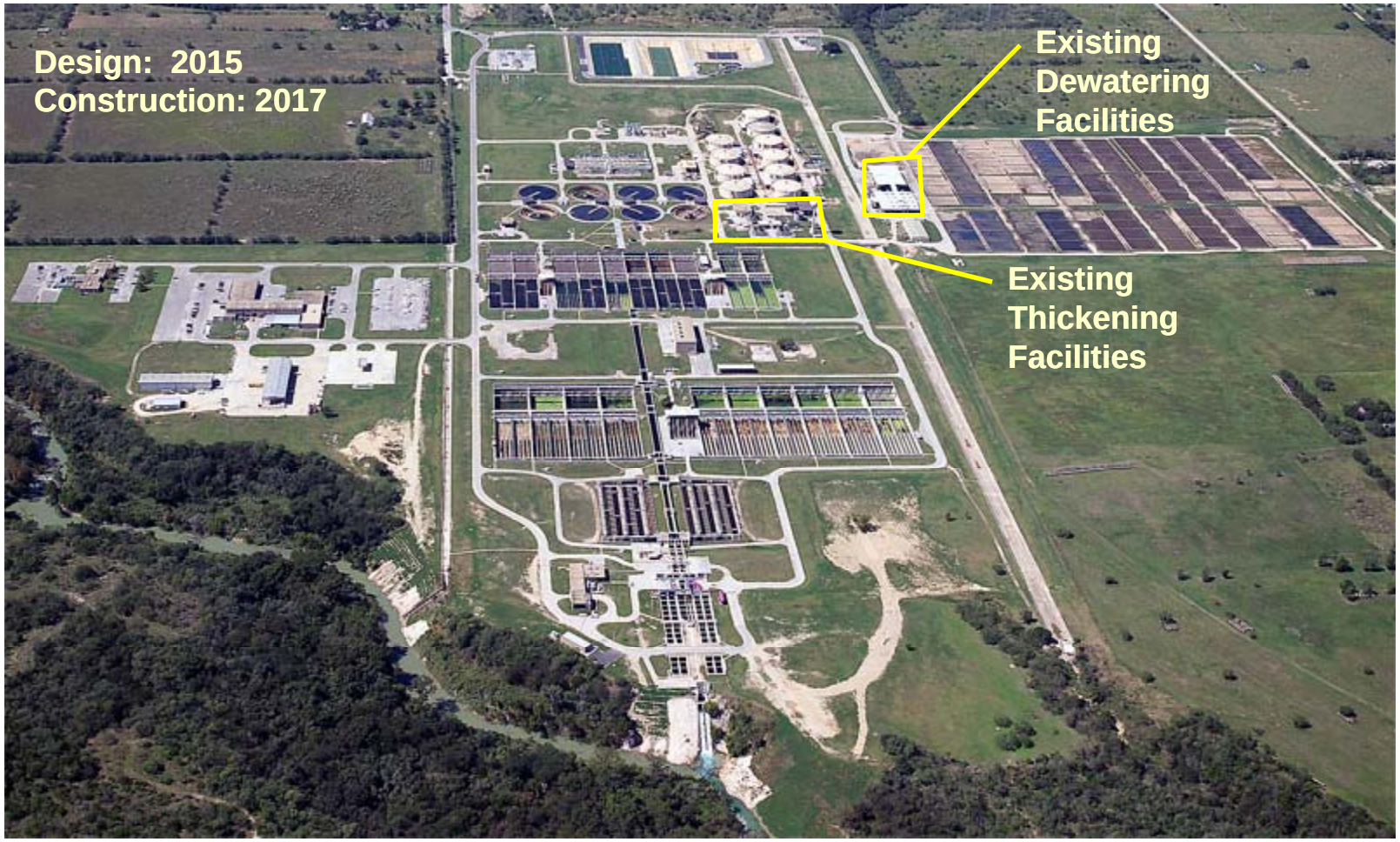
Dos Rios WRC Re-rating

Phases 3 & 4: Aeration Tanks and Secondary Settling Tanks Improvements

- Minimal modifications to the Secondary Settling Tanks
  - Add additional inlet ports
  - Add baffle plates to the inlet ports
- Sufficient capacity at the RAS pump stations

Dos Rios WRC Re-rating

Phase 5: Solids Handling Improvements



Dos Rios WRC Re-rating

Phase 5: Solids Handling Improvements

- Add thickening capacity?
  - Two existing 3.0M GBTs
  - Two 3.0M GBTs to be added by the Sludge Thickening and Aeration System Improvements Project
  - Contingent on updated solids production projections and the desire for redundancy, an additional GBT may be required in the future

Dos Rios WRC Gravity Belt Thickener

Dos Rios WRC Re-rating

Phase 5: Solids Handling Improvements

- No additional digestion capacity
  - 8 existing 2.2 mg anaerobic digesters
  - 2 sludge holding tanks, but one to be converted to a digester as part of Digester Mixing and System Enhancements Phase I
  - Higher TWAS solids content (>6%) from GBTs “increases capacity” (DAFTs produced <4% solids content)

Dos Rios WRC Anaerobic Digesters

Dos Rios WRC Re-rating

Phase 5: Solids Handling Improvements

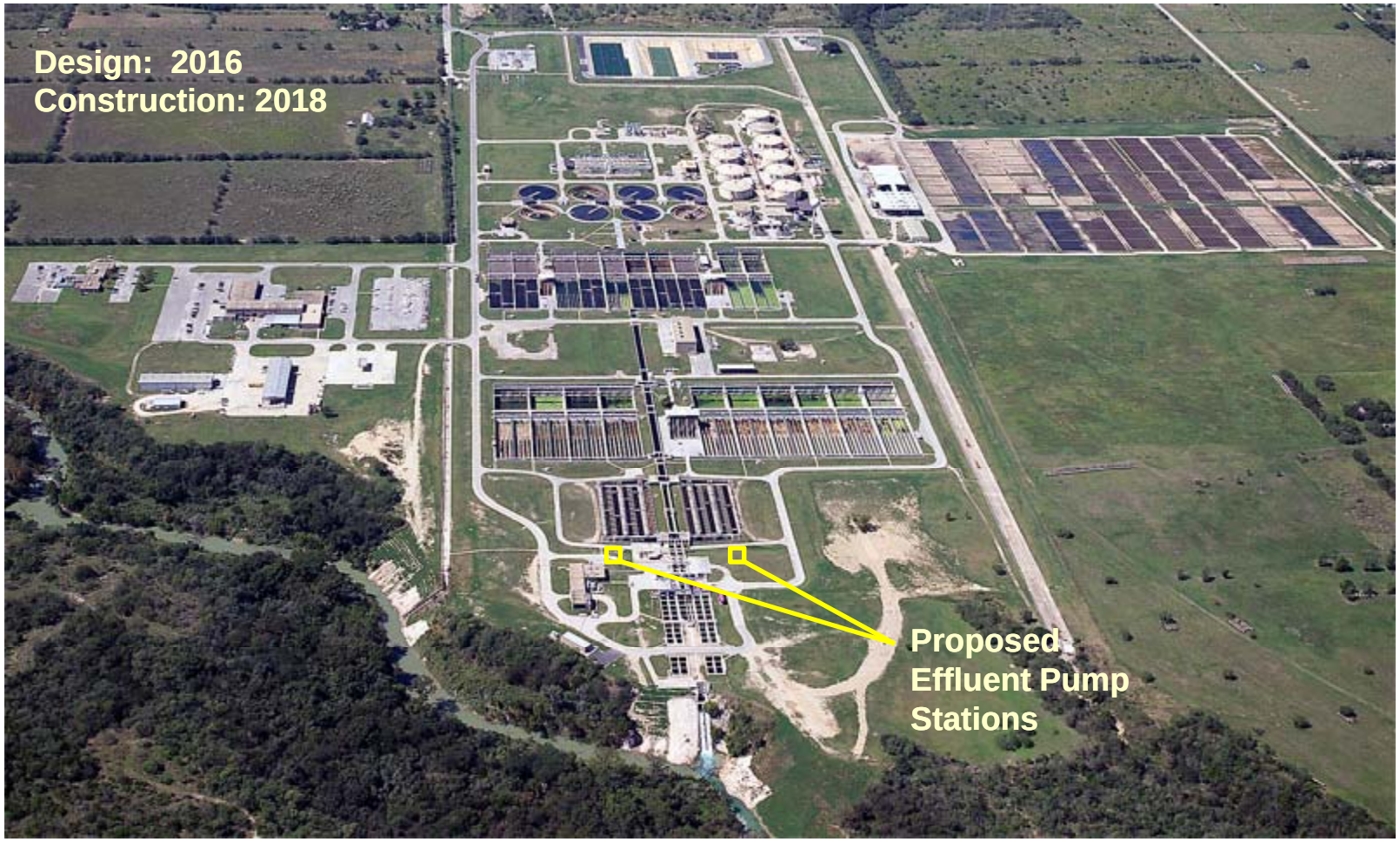
- Add dewatering capacity?
  - 12 existing 2.0M BFPs
  - 132 sludge drying beds, but not all usable
  - Existing BFPs will likely be replaced by Dewatering Facility Improvements project
  - Depending on future operational strategy, additional BFPs may be desired

Dos Rios WRC Belt Filter Press

Dos Rios WRC Sand Drying Beds

Dos Rios WRC Re-rating

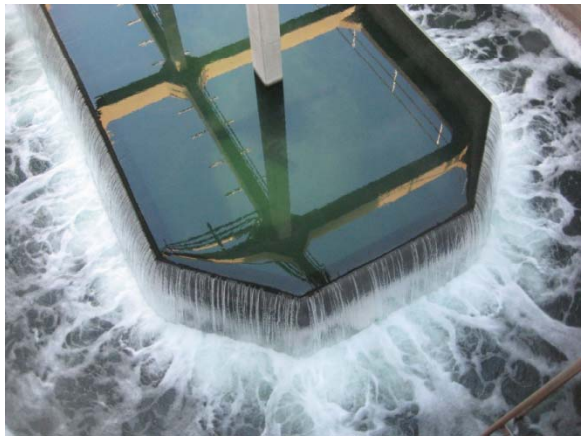
Phase 6: Effluent Pump Stations



Dos Rios WRC Re-rating

Phase 6: Effluent Pump Stations

- The hydraulic grade line (HGL) at the Chlorine Contact Tanks is too low to provide 20 minutes of contact time at future peak flows
- In lieu of additional Chlorine Contact Tanks, pumps could be used to raise the HGL and maximize the treatment volume in the existing tanks



Dos Rios WRC Chlorine Contact Tanks

Dos Rios WRC Re-rating

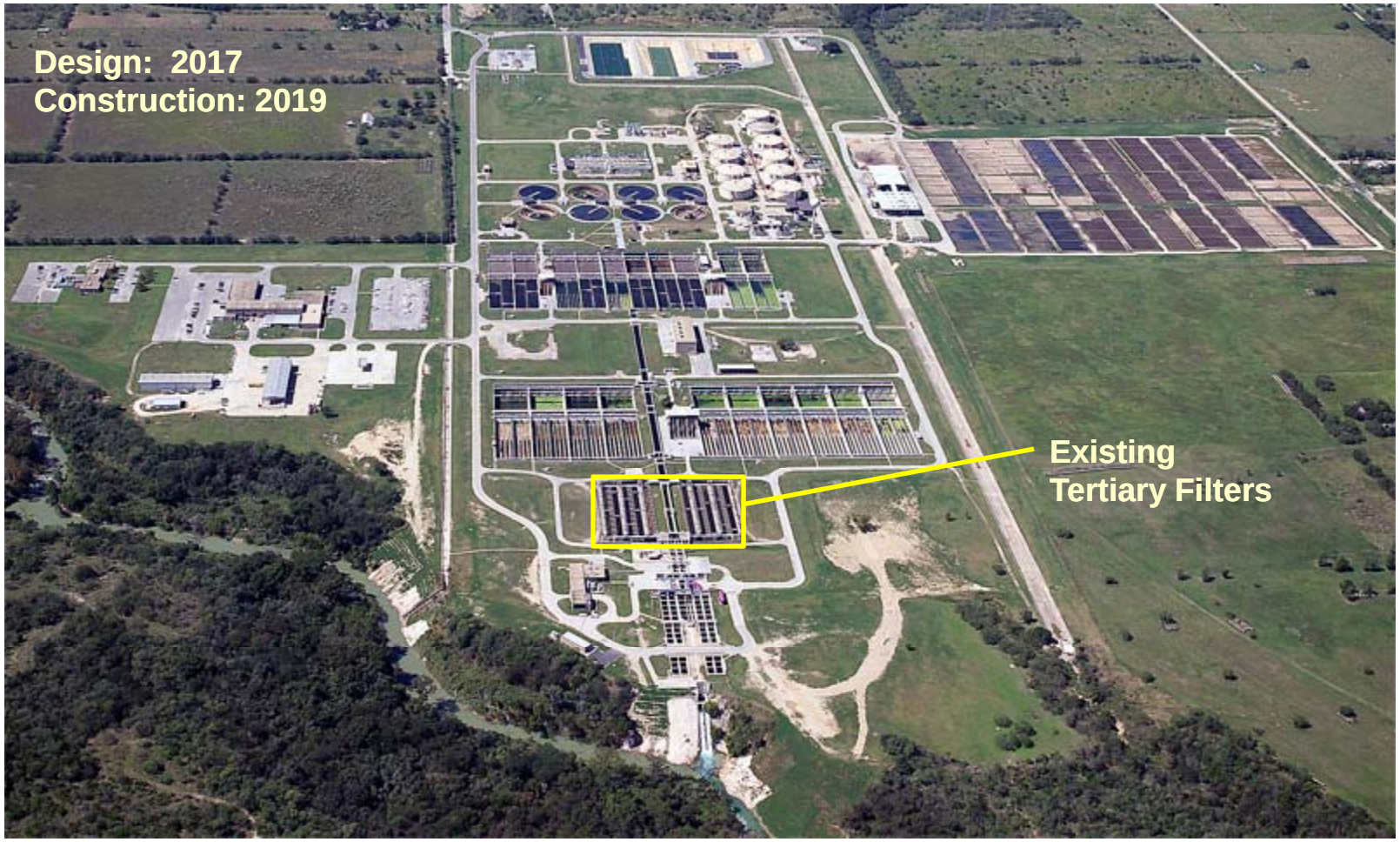
Phase 6: Effluent Pump Stations

Medina River (at Dos Rios) in 2002

- Only use pumps when:
  - Plant flow exceeds 250 mgd
  - Flooding is occurring in the Medina River preventing gravity discharge of disinfected wastewater
- Other alternative is to add Chlorine Contact Tanks
  - Will not address flooding concerns
  - But eliminates maintenance concern (pumps)

Dos Rios WRC Re-rating

Phase 7: Tertiary Filters Phase II



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Phase 7: Tertiary Filters Phase II

- 120 mgd AADF / 240 mgd P2HF of cloth media filter capacity is being installed as part of the Tertiary Filters Project (Phase I)
- With existing sand filters, total filtration capacity will be 170 mgd AADF / 340 mgd P2HF

Sand Filter

Cloth Media Filter

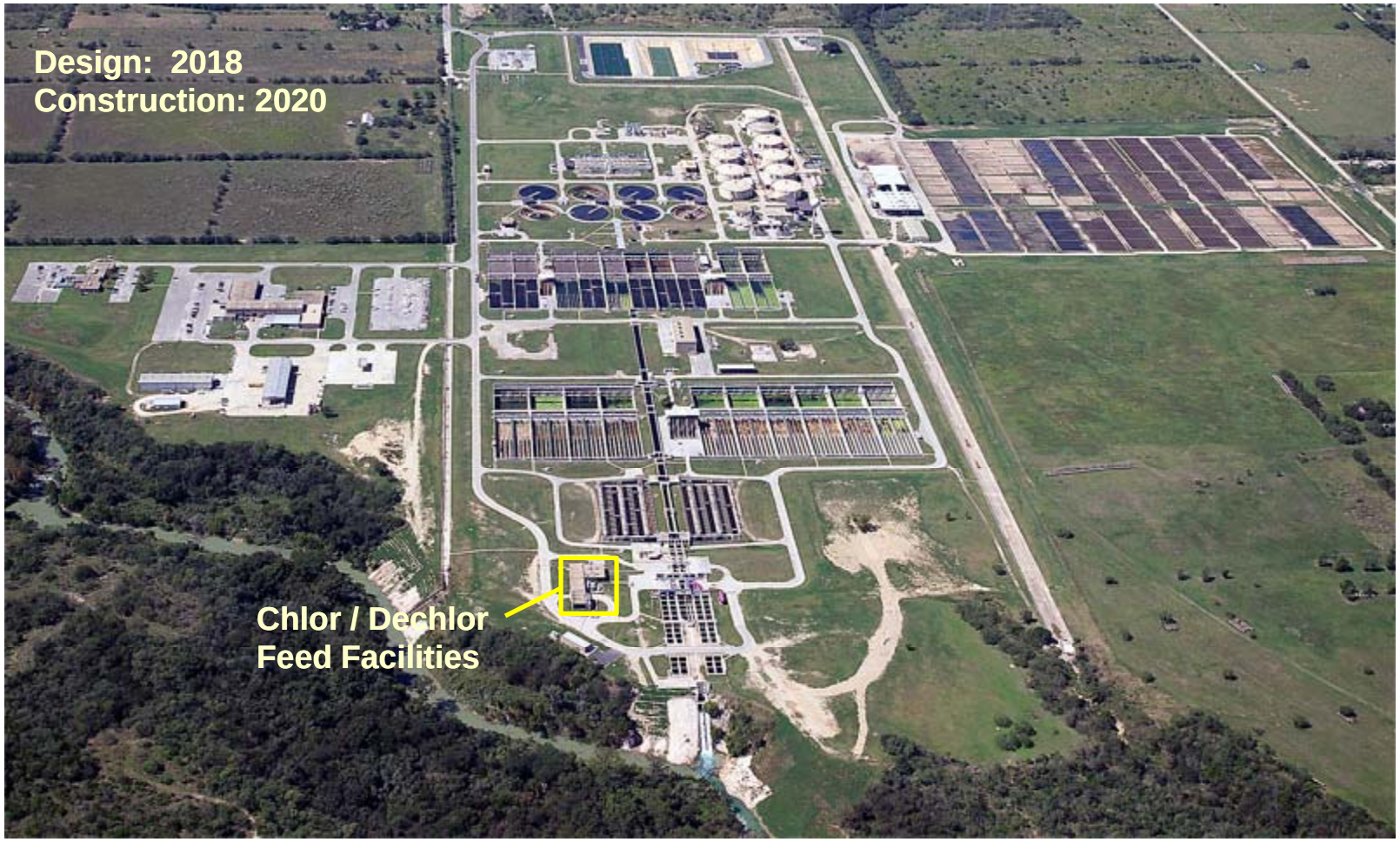
Dos Rios WRC Re-rating

Phase 7: Tertiary Filters Phase II

- While effluent can be blended and meet current TPDES permit requirements, future requirements cannot be fully predicted
- Remaining sand filters provide some additional capacity, but if that capacity is needed, they will eventually need to be replaced with new equipment

Dos Rios WRC Re-rating

Phase 8: Disinfection System Improvements



Dos Rios WRC Re-rating

Phase 8: Disinfection System Improvements

Dos Rios WRC Sulfonator

- Replace chlorinators with larger capacity units
- Chlorine evaporators have sufficient capacity
- Replace sulfonators with larger capacity units
- Sulfur dioxide evaporators have sufficient capacity