Recycled Water Use at the Pasatiempo Golf Club

Optimizing the Use of a Local Resource

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Water resource diversification continues to be critical

- Recycled wastewater is a valuable part of a golf course water resource portfolio
- Many details to consider for implementation

Some Recycled Water Use Considerations:

- Is there enough recycled water available when it is needed for optimal irrigation application rates and timing?
- How will the water be treated to meet Title 22 Tertiary Standards?
- What happens to water not used for irrigation?
  - Daily
  - Seasonally
- What happens to the residuals developed from meeting Title 22 Tertiary Standards?

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Recycled Water Source

- Scotts Valley Water Reclamation Facility (SVWRF)
- Existing 1-mgd average flow capacity facility
- Produces consistent secondary effluent for ocean discharge
- Can produce tertiary effluent at additional cost
- Outfall pipeline runs adjacent to Pasatiempo Golf Course (7 miles from WWTP to Golf Course)
- Golf course planning on using up to a 2:1 Recycled Water : Potable Water blend.

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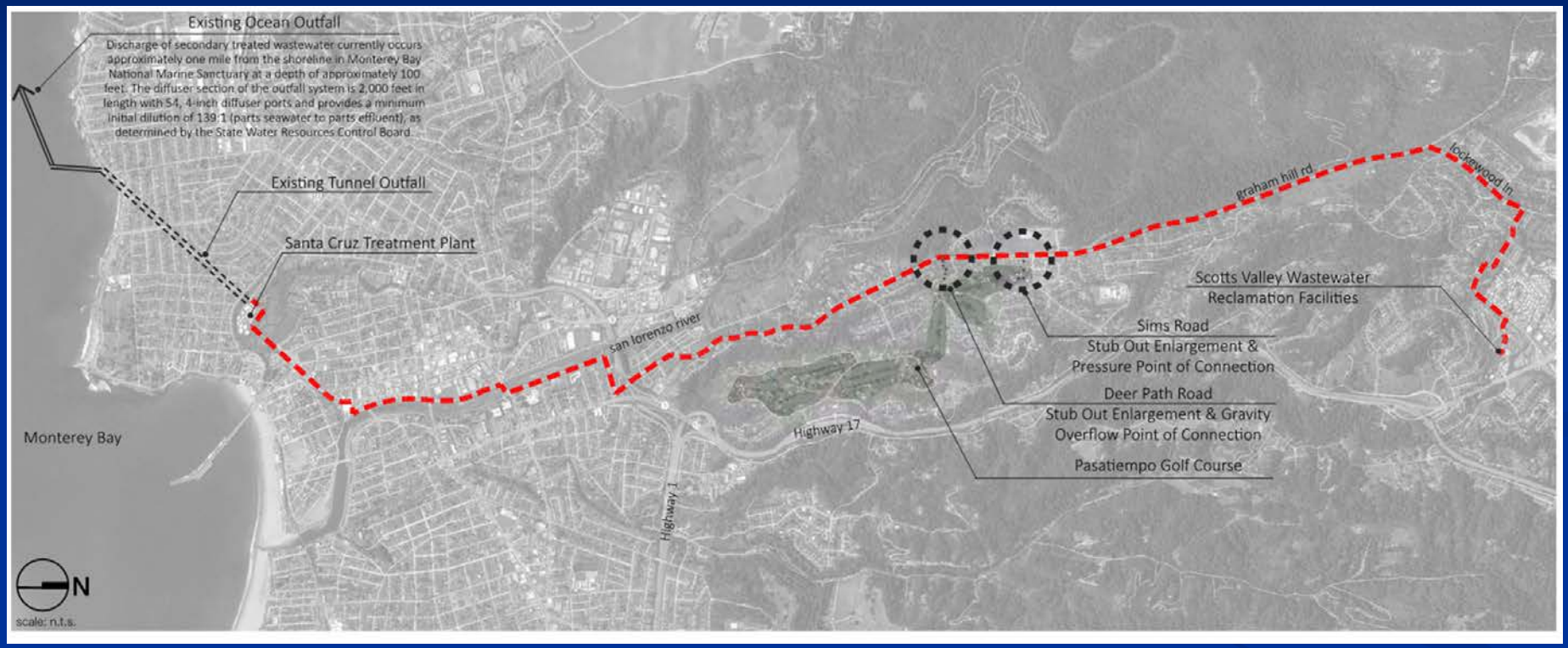
SVWWTP Effluent Pipeline Overview



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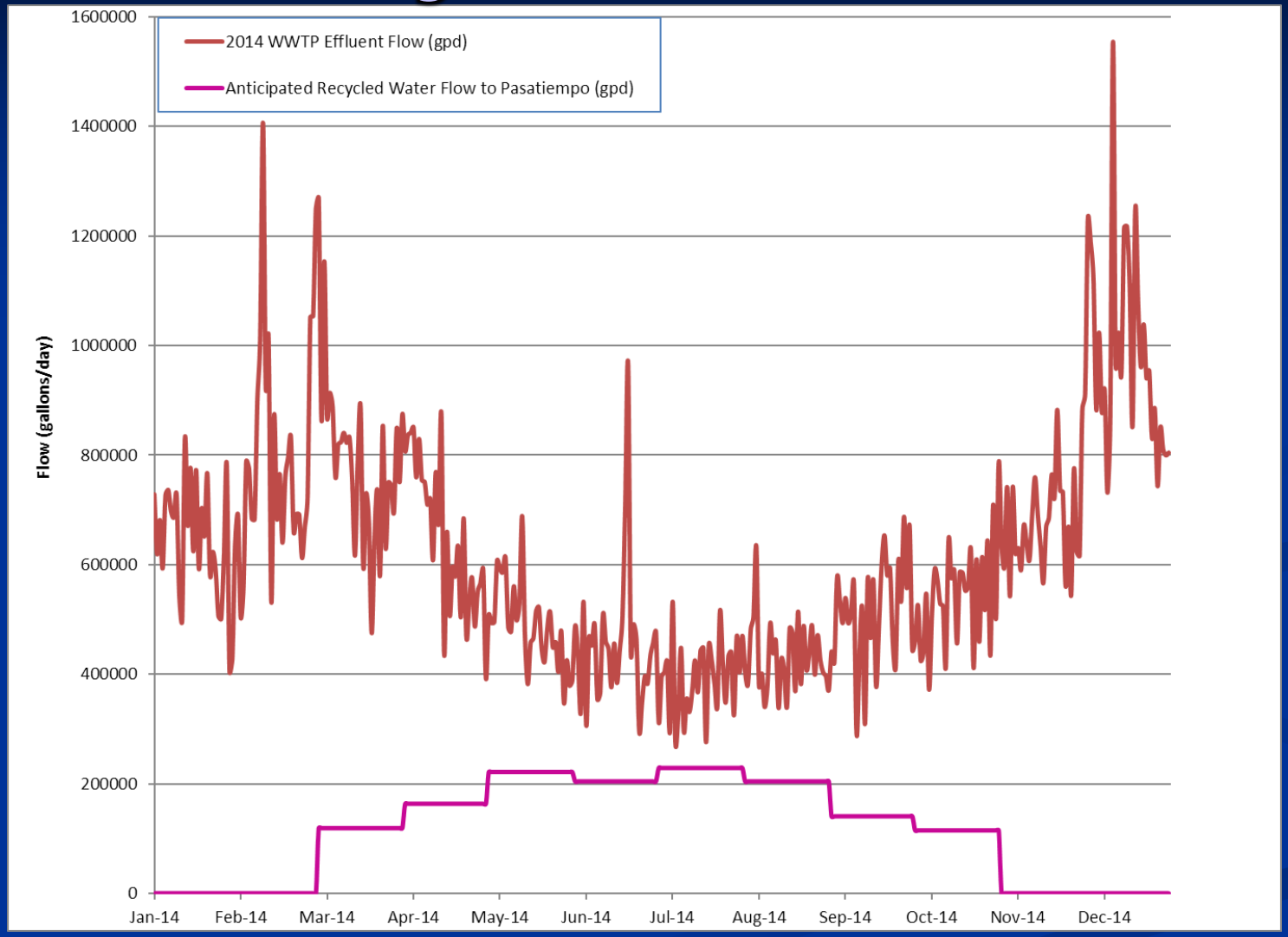
Is there enough?



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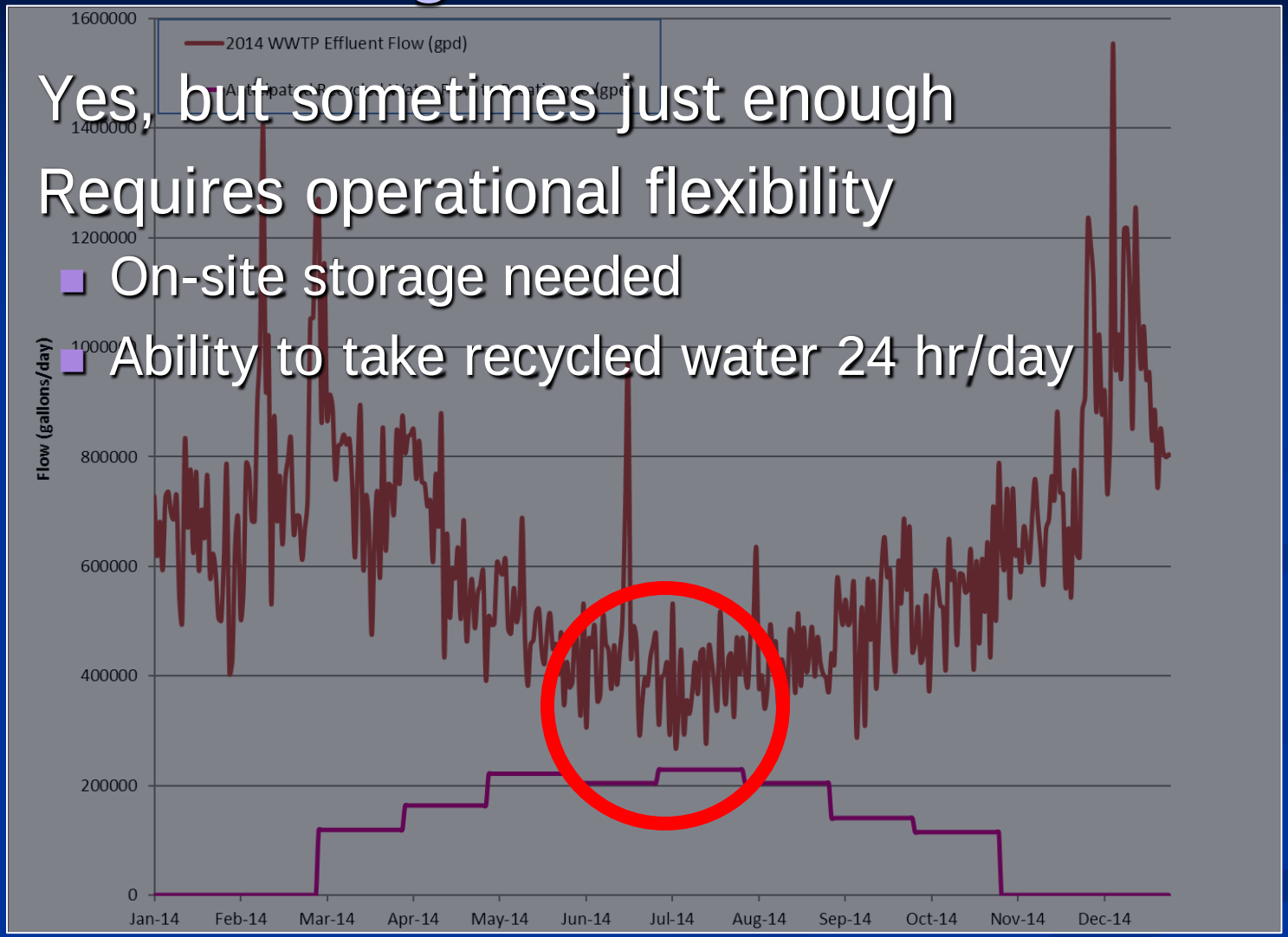

Yes, but sometimes just enough

Requires operational flexibility

- On-site storage needed
- Ability to take recycled water 24 hr/day

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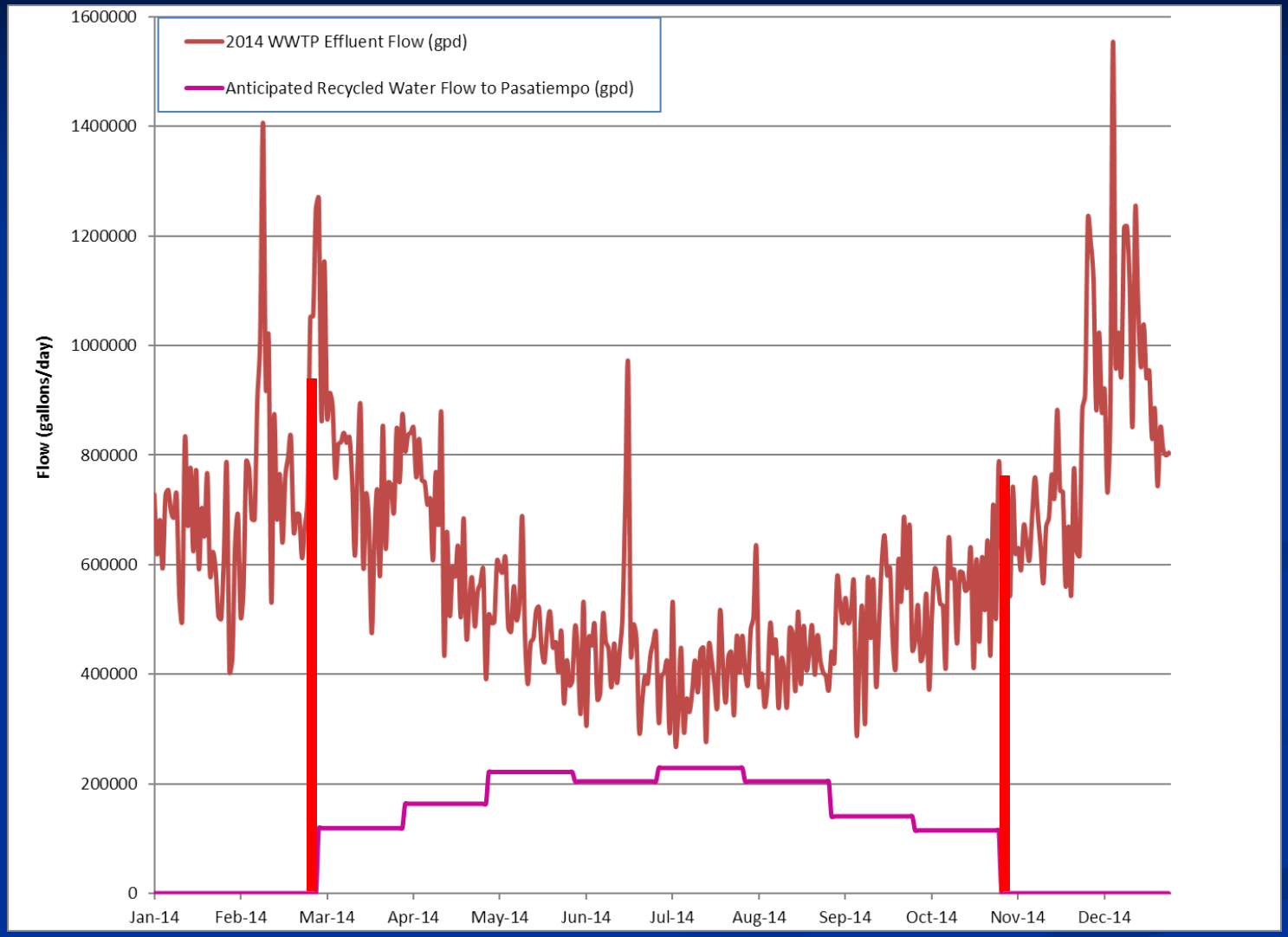
How will the water be treated?

- Option 1: Have SVWRF treat all effluent to Tertiary standards during irrigation periods
  - This is 2-8x more tertiary recycled water than is needed on a daily basis. Overall, approximately 2x the needed water would get treated each irrigation season
  - Paying to treat 2x more water than needed is not ideal

How will the water be treated?



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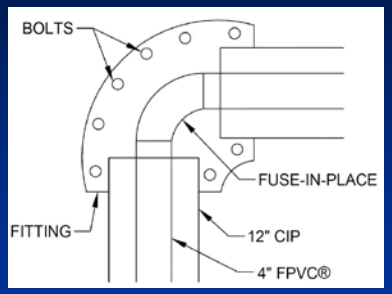
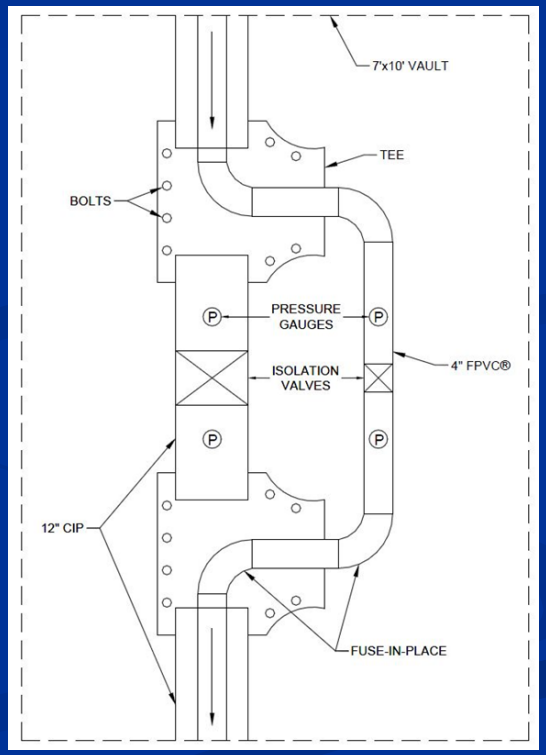
How will the water be treated?

- Option 2: Have SVWWTP treat only the water needed to Tertiary standards, separately pipe to the Golf Course
  - 7 miles of pipeline, easements, etc. – far more expensive/time consuming
  - Explored “pipe-in-pipe” alternative – expensive and problematic

Separate Pipeline?





How will the water be treated?

- Option 3: Treat secondary effluent to tertiary standards at the Golf Course
  - Allows treatment only what is used
  - Requires local operation of a filtration and disinfection facility
  - Explored different filtration options
    - Cloth
    - Microfiltration
    - Thread/Cartridge

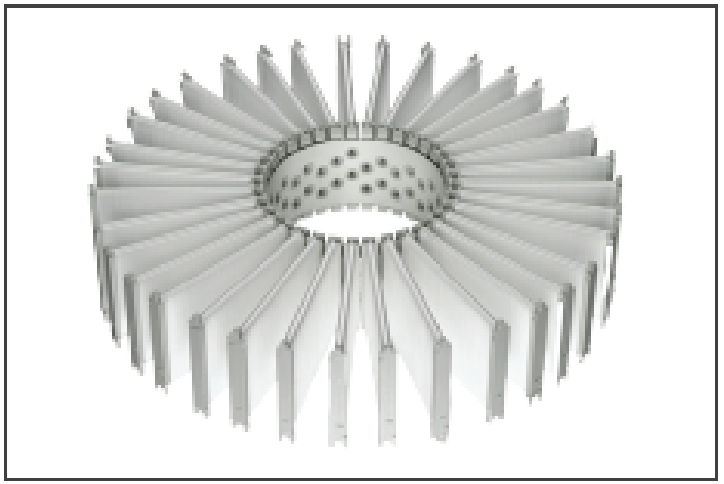
How will the water be treated?

- Based on preliminary cost assessment, decided on Option 3 – treat to tertiary standard on-site
  - Preliminary selection of Amiad AMF Thread/Cartridge filter
    - Relatively inexpensive capital (although close with cloth filters)
    - Simplest/least expensive maintenance
    - Title 22 certified (certification performed at Lincoln WWTRF)
    - Good (although limited) reports from existing user (San Simeon WWTP)
    - Existing secondary effluent of consistent very high quality, making cartridge filter system seem feasible
    - Concern about performance, flux rates, backwash rates, general operating parameters and ease of operation

How will the water be treated?

- Amiad AMF Cartridge Filter

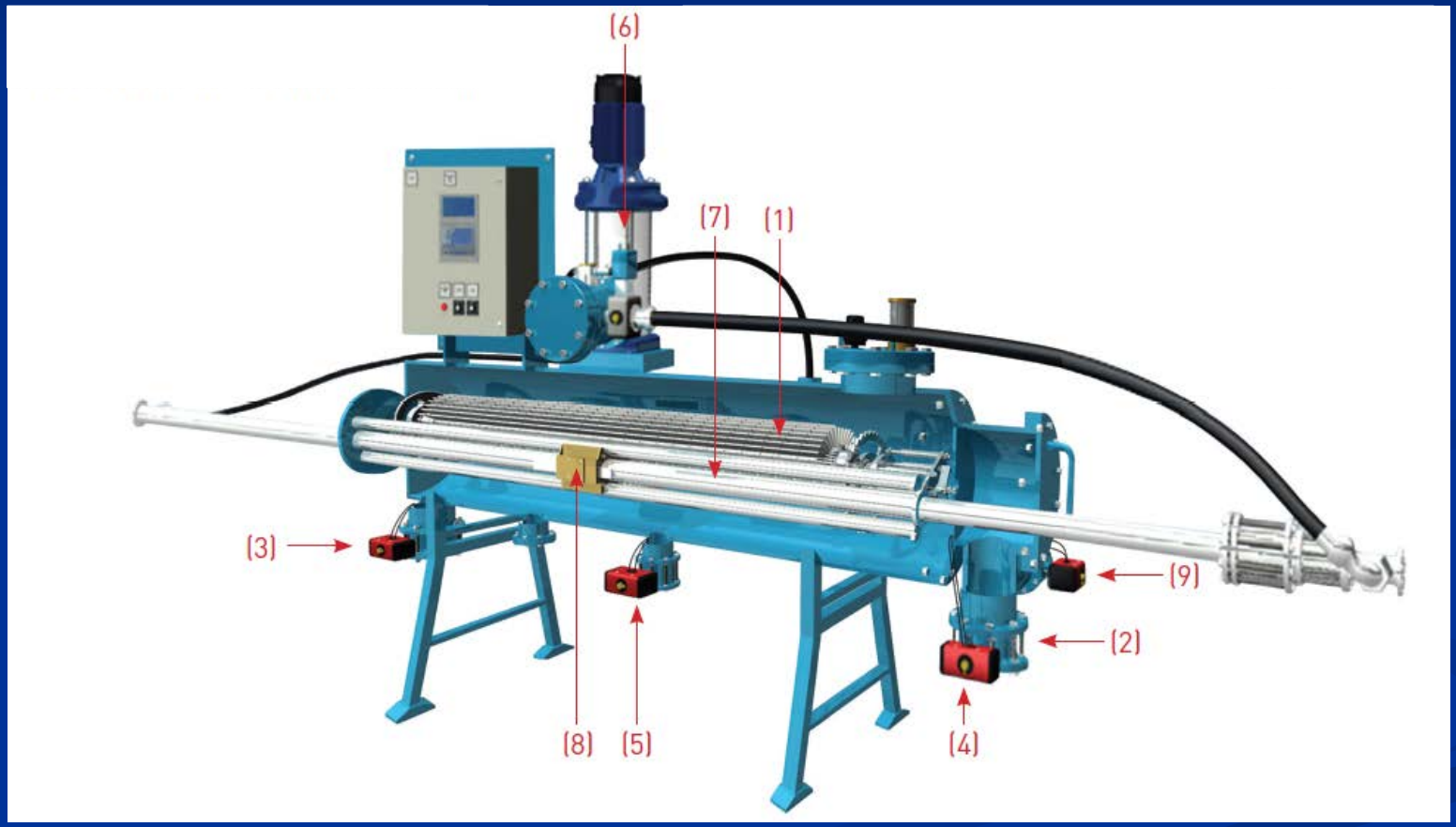
cassettes



cartridge

How will the water be treated?

- Amiad AMF Cartridge Filter



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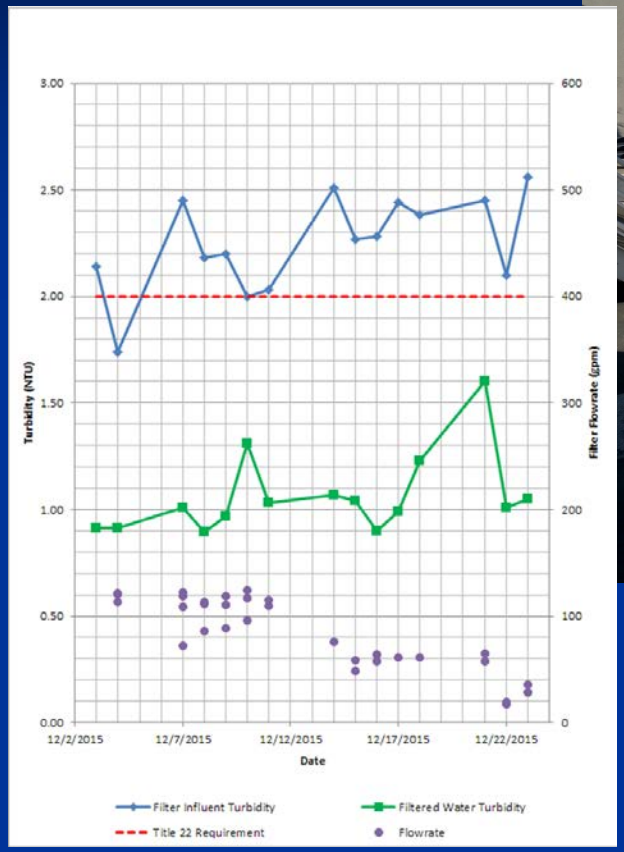
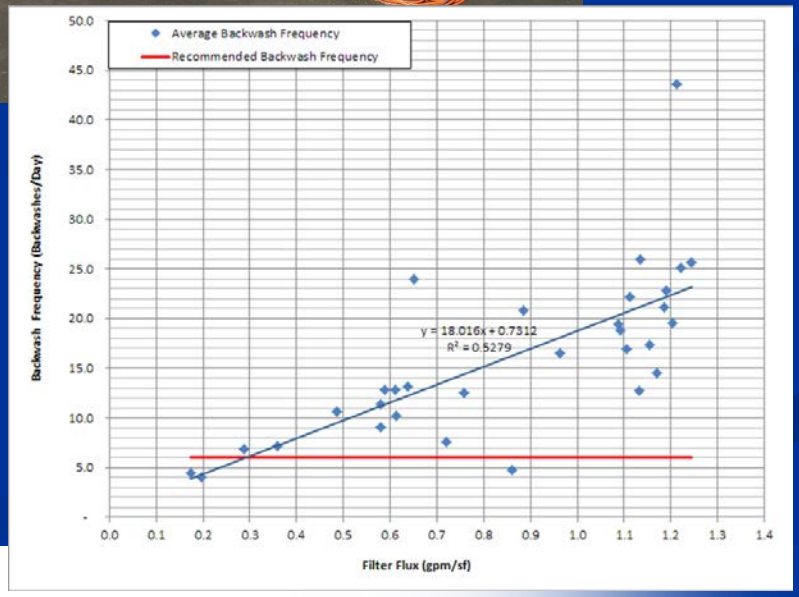
Pilot Test

- Performed 1-month pilot test
  - Worked in concert with SVWWTP personnel
  - Pilot unit supplied by Amiad (cost of pilot discounted from purchase price)
  - Good, consistent treatment performance
  - Optimized flux and backwash
    - Very low flux required to reduce backwash frequency to recommended rate
    - Resulted in specifying larger filters than originally anticipated
    - Still a cost saving
  - Operationally very straight forwad

Pilot Test



Proceeded with implementing Amiad AMF filters using operating and design parameters indicated during pilot test.



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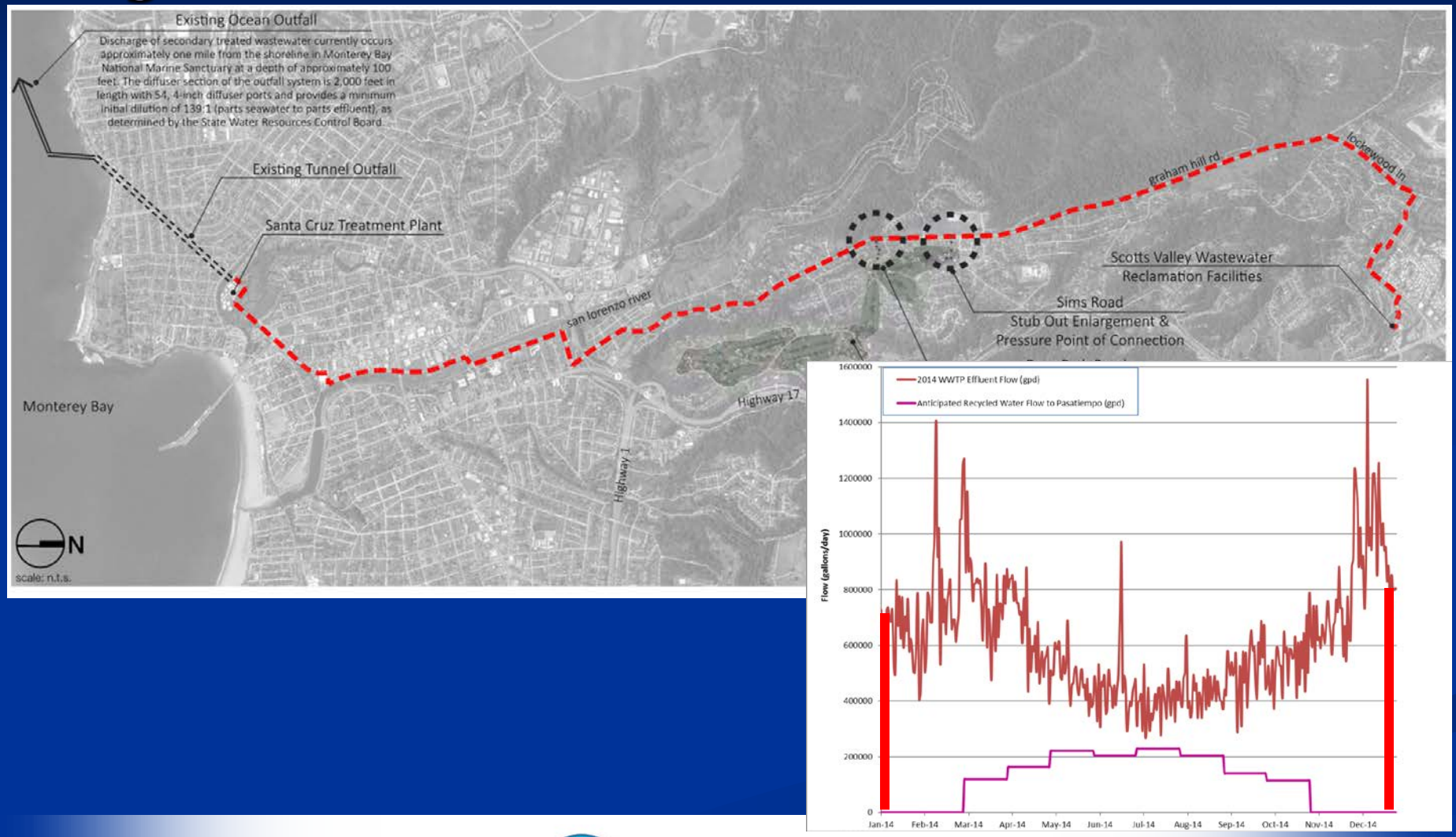
What happens to the water not used for irrigation?



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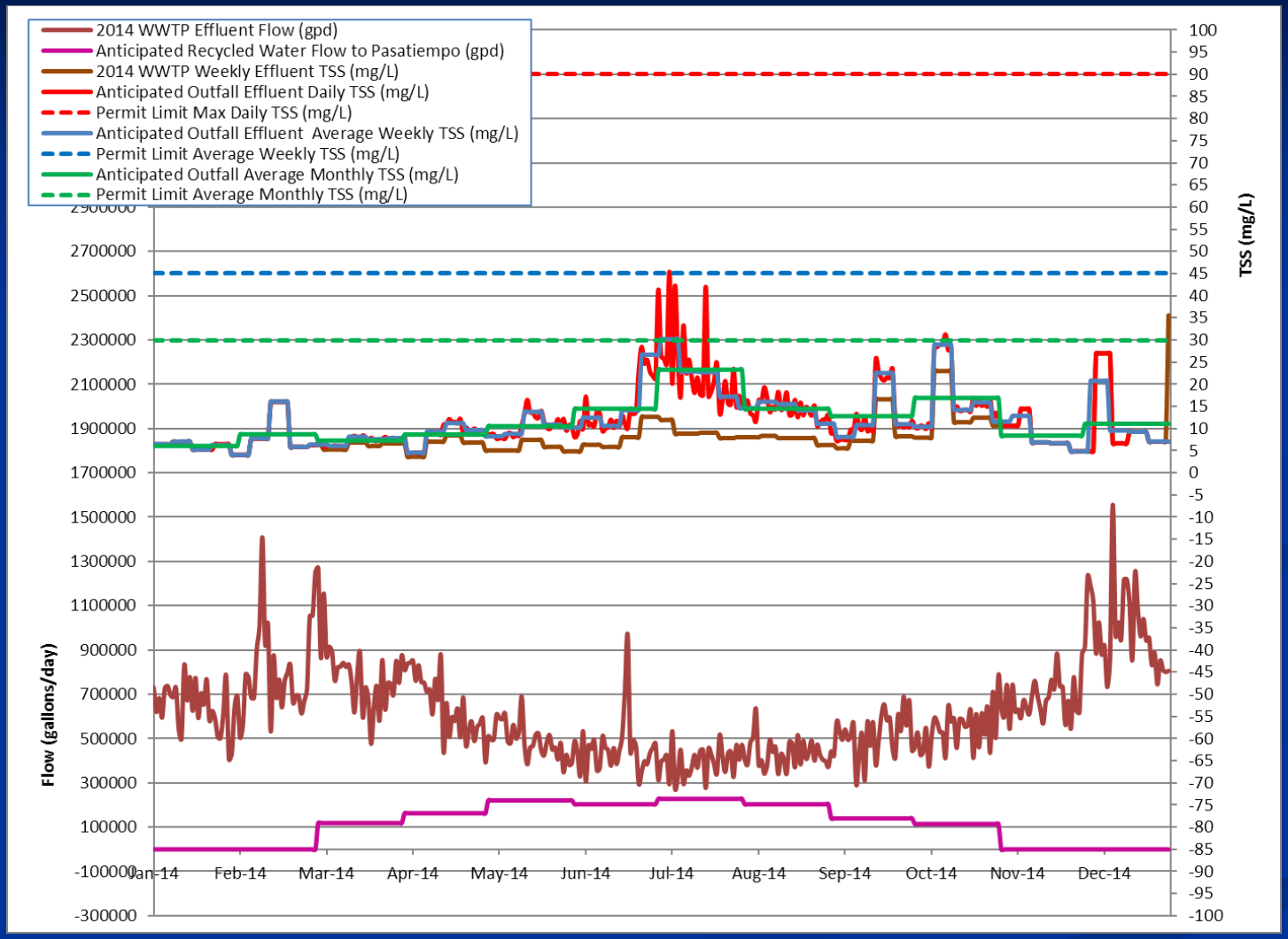
What happens to the residuals?

- Backwash waste
  - Backwash waste has concentrated levels of any suspended solids in the secondary effluent
  - Returned to secondary effluent pipeline
  - Relies on blending with secondary effluent to maintain permit compliance at ocean outfall
  - Difficult when Recycled Water use is near Secondary Effluent flowrate
  - Currently exploring enhancing operational flexibility by adding option of some portion of sewer discharge of backwash waste, returning it to SVWWTP for re-processing of suspended solids removed by filtration.

What happens to the residuals?



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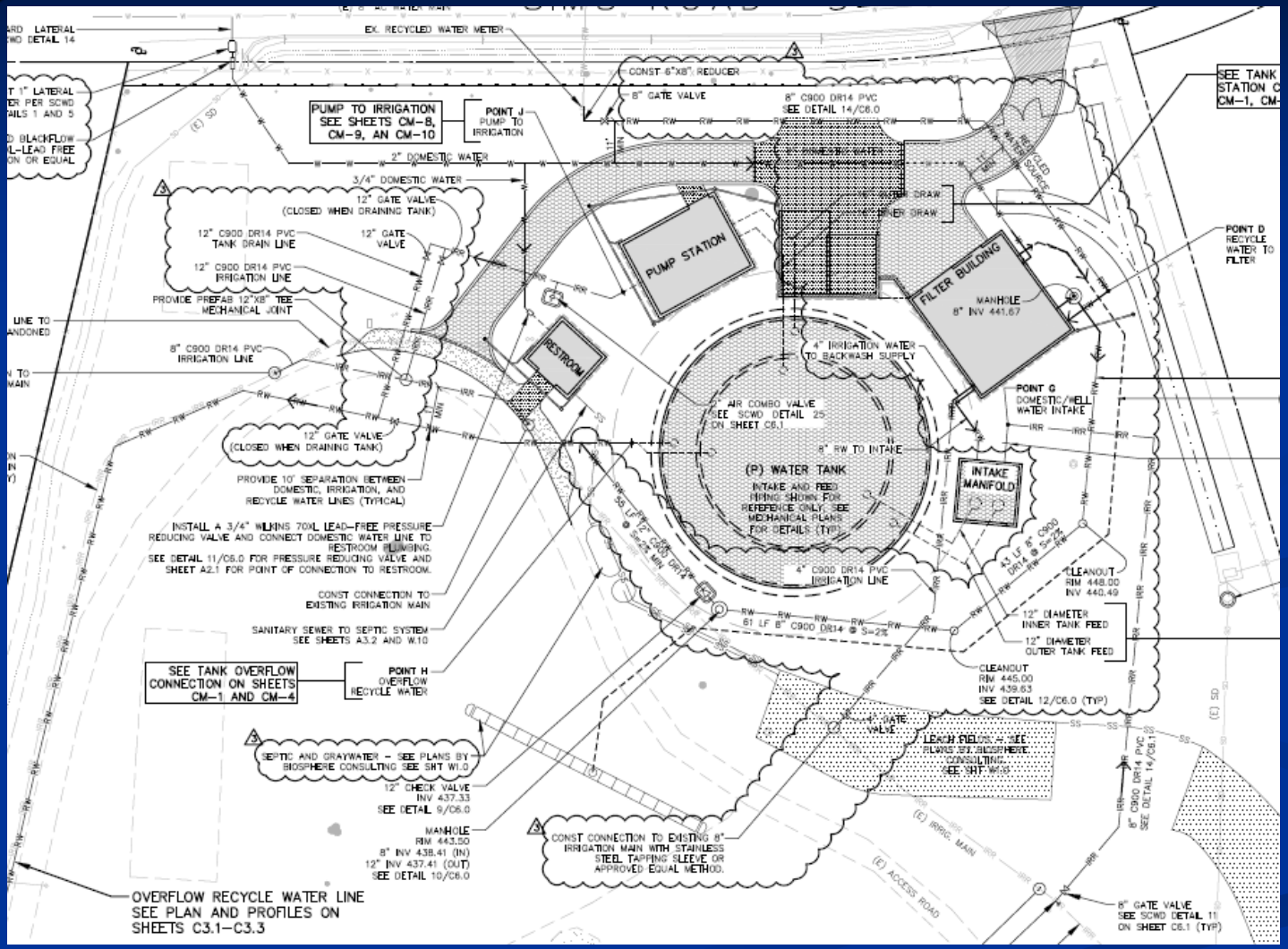
Project Overview



Model of Filter Building

Questions? Contact

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  - 530-355-7646

- Acknowledgements and Appreciation
  - Justin Mandon, Pasatiempo Golf Club
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