

PNWS • AWWA



# Umpqua River Water Treatment Plant: Design, Construction, Commissioning

Sean Negherbon

Bob Ward

Simon Hernandez

Alex Mofidi

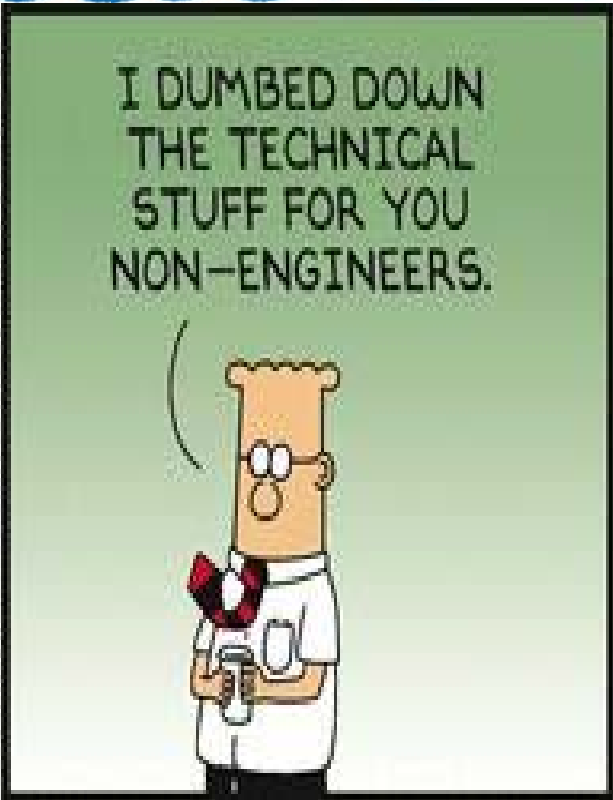
# Discussion



- Background
- Design
  - Intake
  - Water Treatment Plant
- Construction
- Commissioning
- Summary and Lessons Learn't, Mate!



Dilbert.com DilbertCartoonist@gmail.com



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↑  
Bob

↑  
Alex



AECOM



# Discussion



- Project started in 2008 when City started looking for funding
- Treatment Plant is complete and operational
- Still looking for an intake screen
- Original team had a different city administrator, different PW Director, different AECOM team

# Alex turned Australian...



# Bob Ward changed jobs



- Went from an semi-honorable profession of consulting engineer to the more despicable occupation of manager of consulting engineers

# Bob Ward changed jobs



# Sean and Andy changed jobs...



Sean went from Treatment Plant operator to PW Director to City Administrator

Andy went from a larger profitable water district to become Myrtle Creeks PW Director



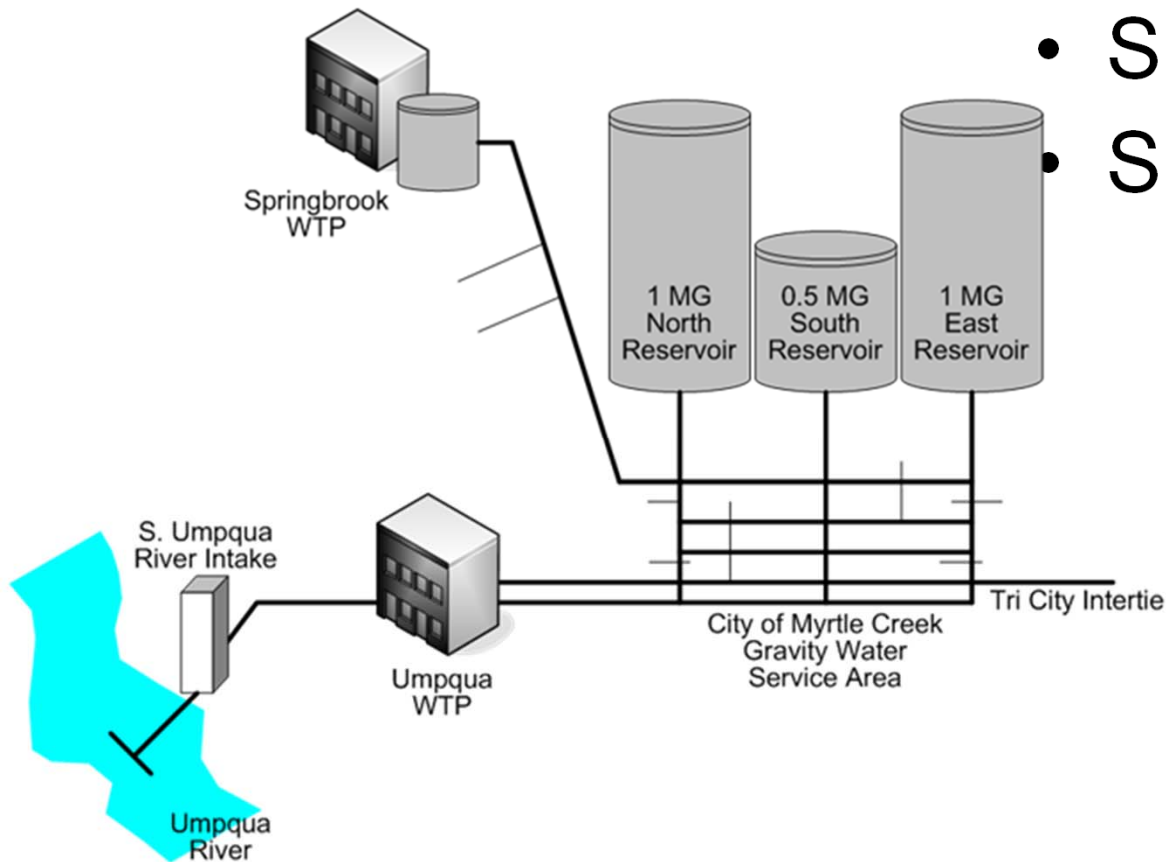
# Sean and Andy changed jobs...



# Background: Sources



- Dual Sources
- South Umpqua
- Springbrook Springs



# Background: South Umpqua WTP

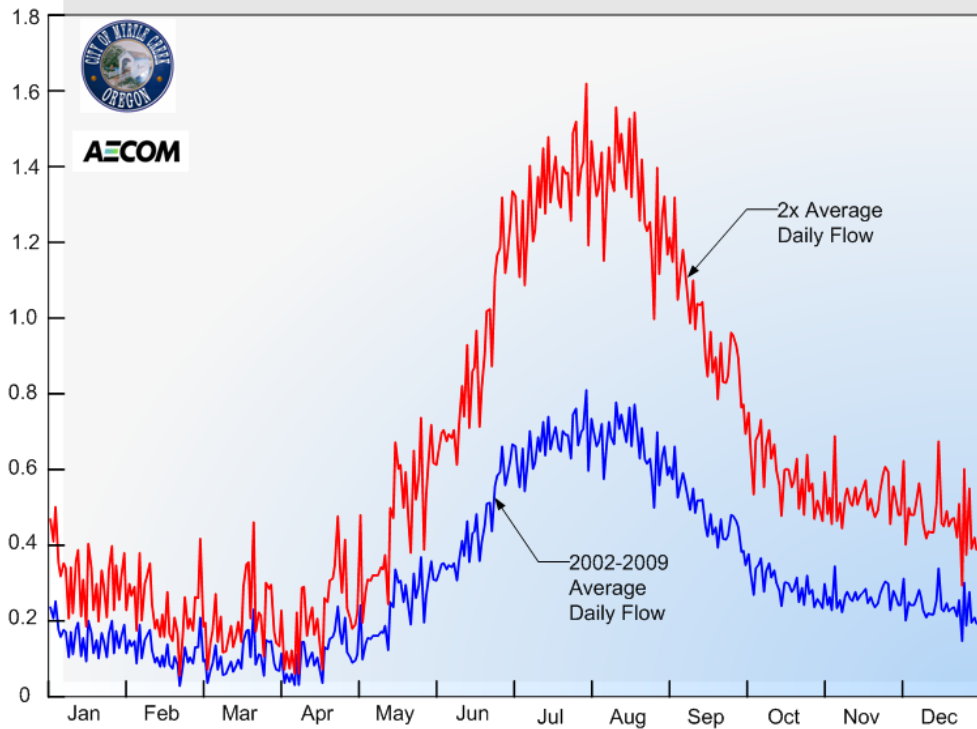
- Dual Sources
- South Umpqua  
– Old Plant



# Background: South Umpqua WTP

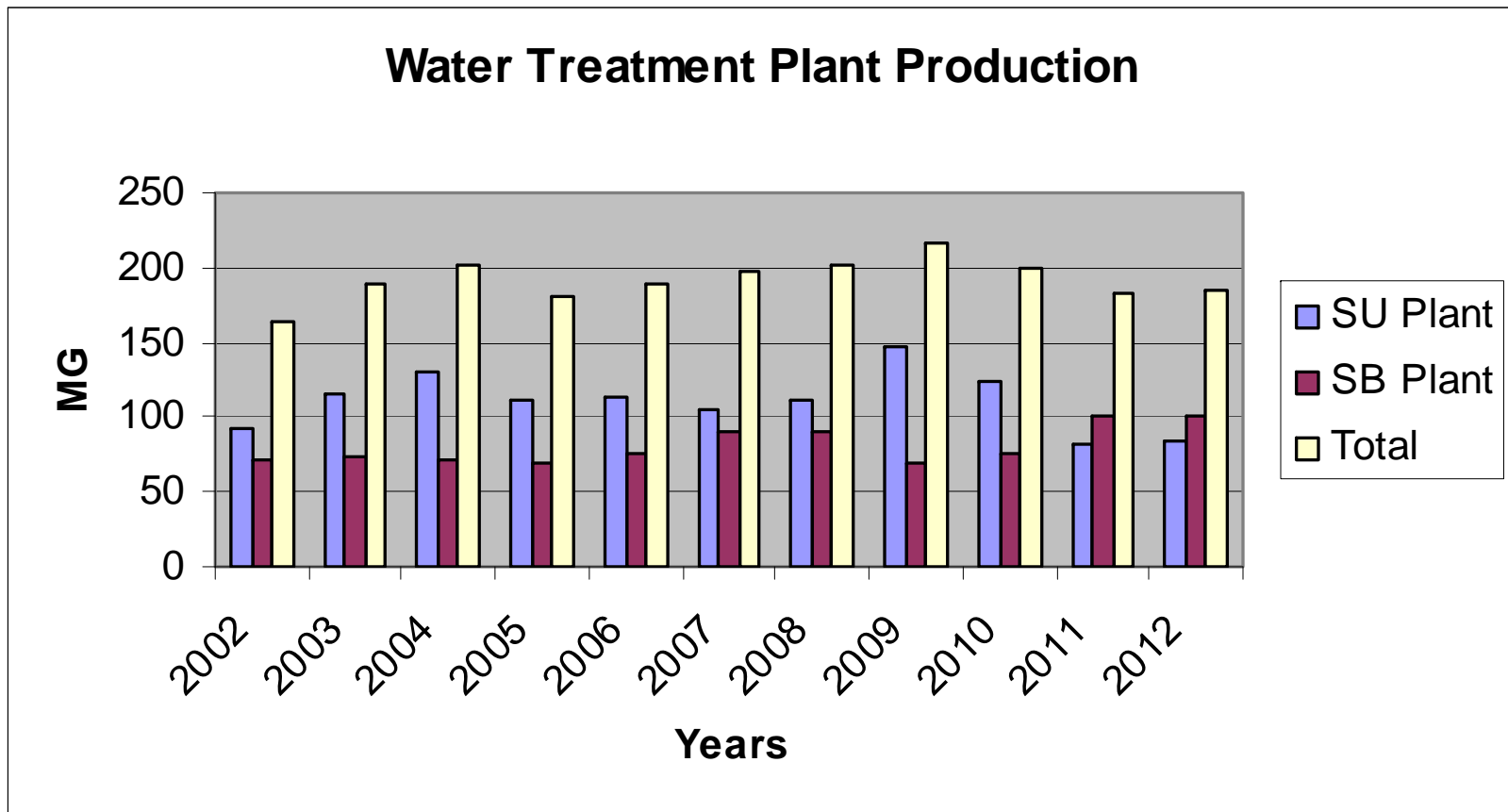


Flow (MGD) average from 2002-2009, and projected



- Dual Sources
- South Umpqua (SU)
  - Old Plant
  - 0.1 to 1.1 MGD
  - Future flow increase
  - This is not system demand, this is the SU Plant production. Actual system demand is higher.

# Background: South Umpqua WTP



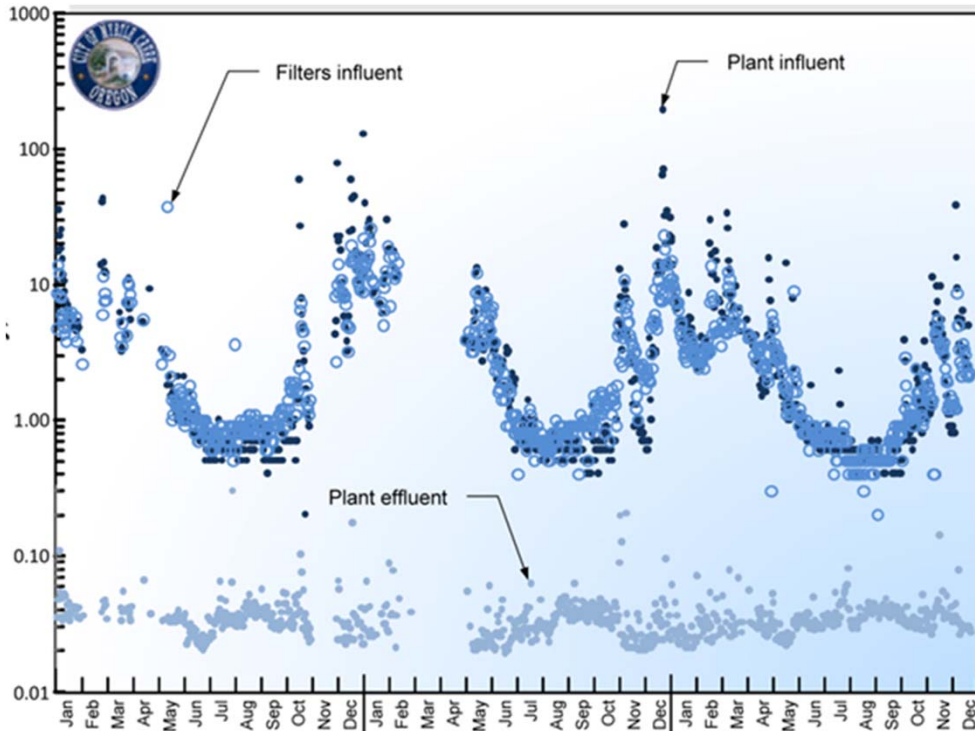
# Innovative fixtures....



# Background: Umpqua WTP



Turbidity (NTU) from 2007-2009



- Dual Sources
- Umpqua
  - Old Plant
  - 0.1 to 1.1 MGD
  - Future flow increase
- Treatment Required
  - Flashy turbidity

# Background: Umpqua WTP



Sample Date	Springbrook E.Coli Data per 100 mL	Springbrook Running Average E.Coli / 100mL	S. Umpqua River E.Coli Data per 100 mL	S. Umpqua River Running Average E.Coli / 100 mL
Oct. 7, 2008	37	37		
Oct. 22, 2008	34	36	194	194
Nov. 4, 2008	1990	657	210	202
Nov. 19, 2008	11	515	1410	605
Dec. 2, 2008	14	417	45	465
Dec. 16, 2008	19	351	15	375
Dec. 30, 2008	5	301	7	314
Jan. 13, 2009	0	264	144	290
Jan. 27, 2009	0	234	—*	
Feb. 9, 2009	3	211		
Feb. 16, 2009	5	193		
Feb. 23, 2009	70	183		
Mar. 10, 2009	10	169		
Mar. 22, 2009	4	157		
Apr. 5, 2009	70	152		
May 2, 2009	6	143		
May 17, 2009	4	134		
Jun. 1, 2009	12	125		
Jun. 14, 2009	7	121		
Jun. 29, 2009	4	115		
Jul. 12, 2009	47	112		
Jul. 27, 2009	13	105		
Aug. 9, 2009	29	104		
Aug. 23, 2009	29	101		
Sep. 7, 2009	411	104		



**E.coli**

- Dual Sources
- Umpqua
  - Old Plant
  - 0.1 to 1.1 MGD
  - Future flow increase
- Treatment Required
  - Flashy turbidity
  - *Cryptosporidium*

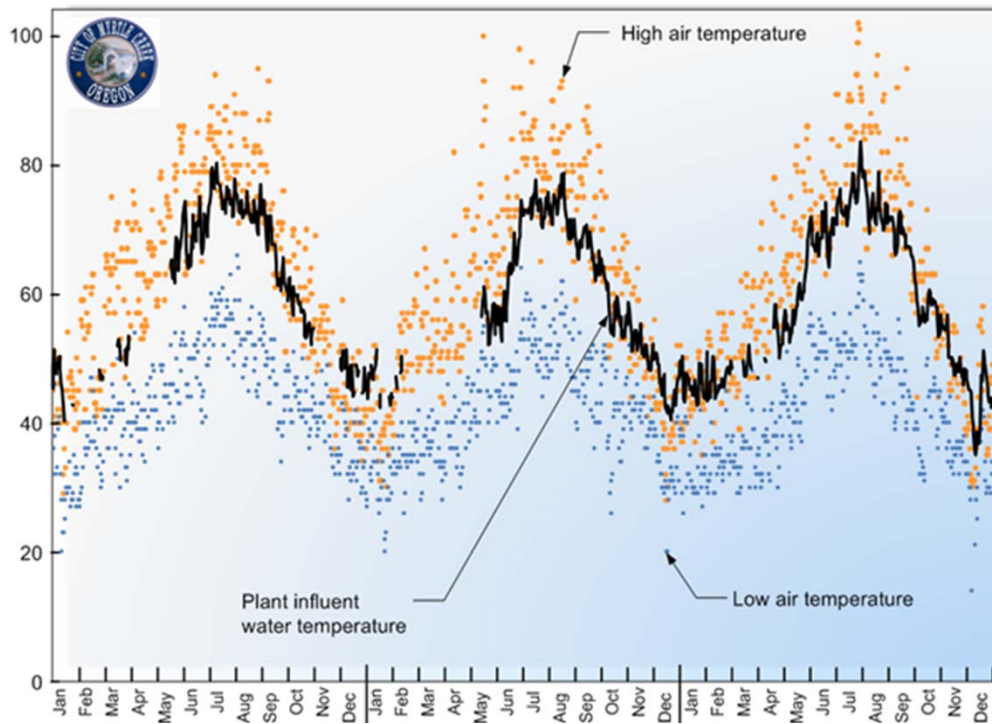
- Ranges from 7 to 1,410 per 100 mL
- Average = 290 per 100 mL
- Crypto 'trigger' = 50 per 100 mL



# Background: Umpqua WTP



Temperature (°F) from 2007-2009



## Temperature Impact:

- Algal growth/ BG toxins
- Taste and odour compounds – geosmin most likely
- Direct taste impact from warm water up to 85 degrees

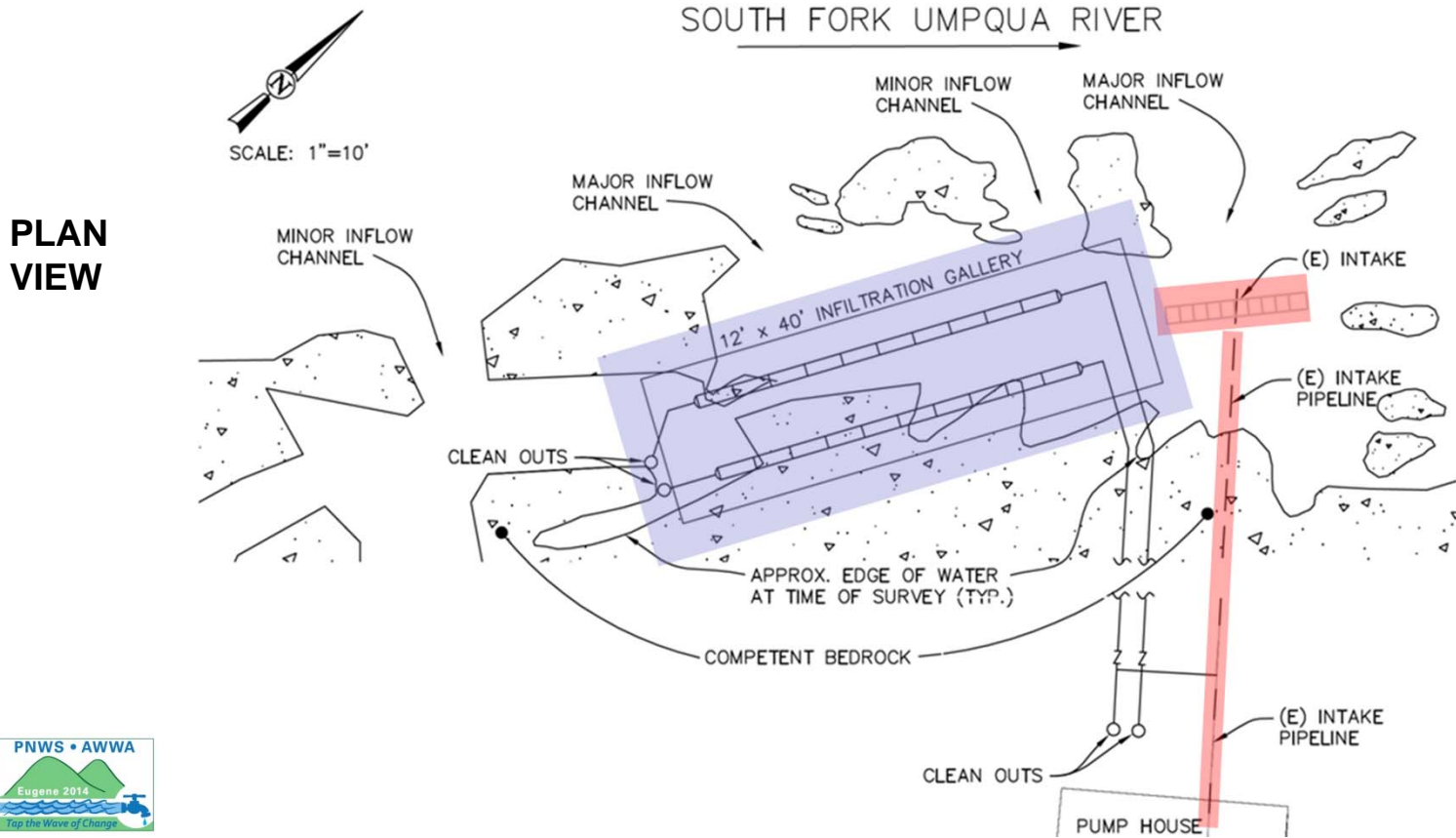
- Dual Sources
- Umpqua
  - Old Plant
  - 0.1 to 1.1 MGD
  - Future flow increase
- Treatment Required
  - Flashy turbidity
  - *Cryptosporidium*
  - Tastes and Odours



# Design Conditions

- Intake System

  - Change Tee Screen to Infiltration Gallery

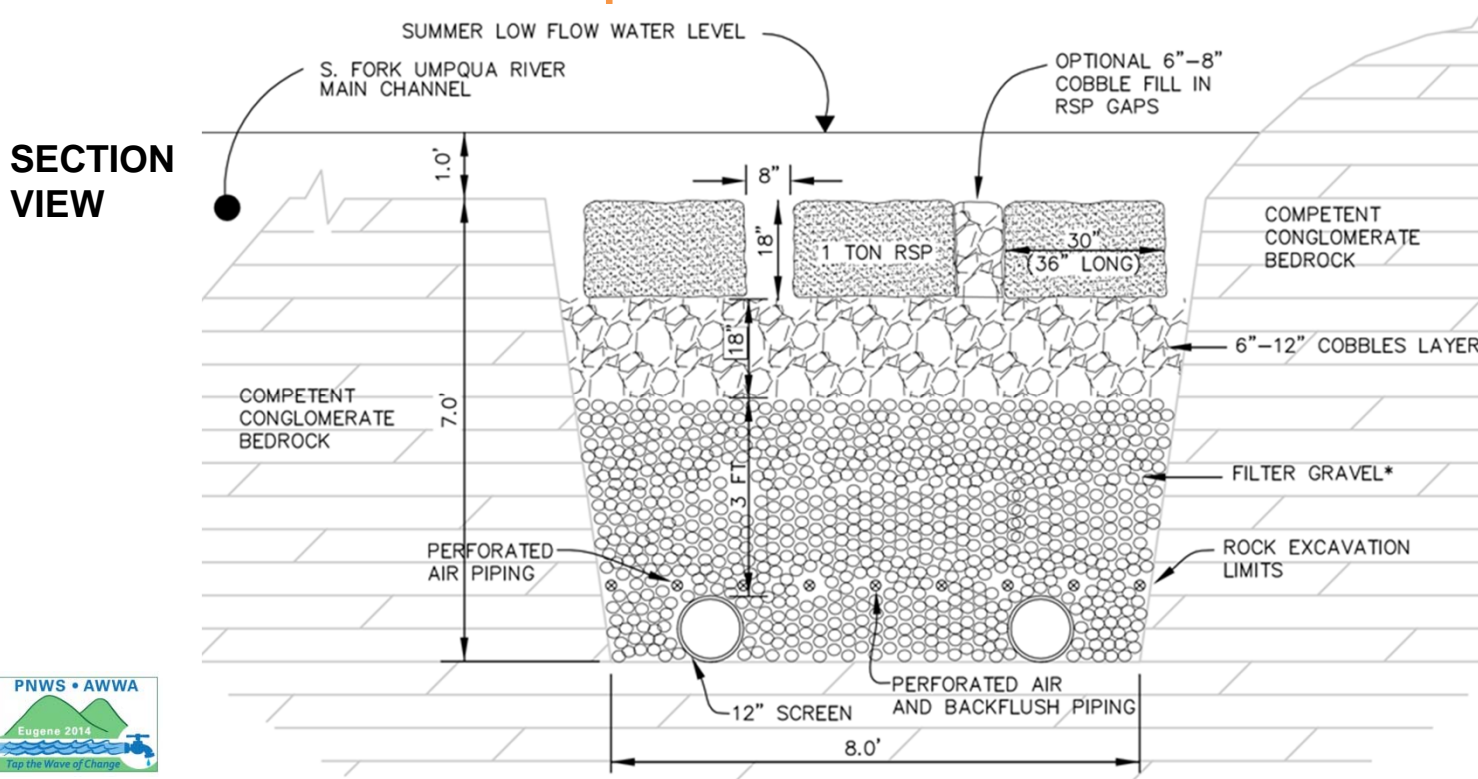


# Design Conditions



- Intake System

- Change Tee Screen to Infiltration Gallery
- To be completed summer of 2014



# Design Conditions



- Intake System
  - Change Tee Screen to Infiltration Gallery
  - To be completed summer 2014
- WTP Options

Alternative	Description	Cost Ranking (1=Best / Low) (4=Worst / High)	T&O Control (1=Best) (4=Worst)	Operability (1=Best) (4=Worst)
1	Conventional filtration with UV disinfection	2	3	3
2	Ozone, conventional filtration, UV	4	1	4
3	LP Membranes, UV disinfection	1	4	2
4	LP Membranes, GAC, UV disinfection	3	2	1

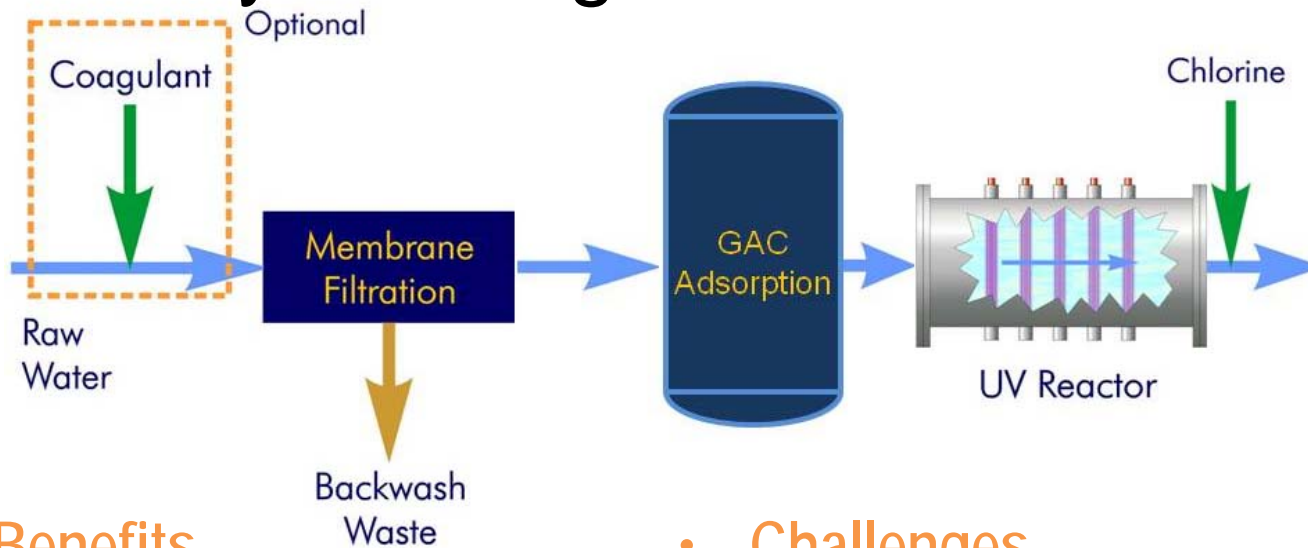


Choice = Alternative 4

# Design Conditions



- **Summary of Design**



- **Benefits**

- Minimal operator attention
- Moderate cost choice
- T&O & pathogen control
- Lower DBPs production expected
- Ability to meet future demands

- **Challenges**

- More significant carbon footprint
- Increased O&M
- Coagulant use unknown without pilot
- How to operate T&O control

# Design Conditions



- Staff and Engineers toured plants both submerged and pressure systems.
- Decision was made to go LP.
- Received bids from 3 major manufacturers
- Pall selected based on life cycle cost analysis
- City purchased membrane equipment up front

# Design / Construction Challenges



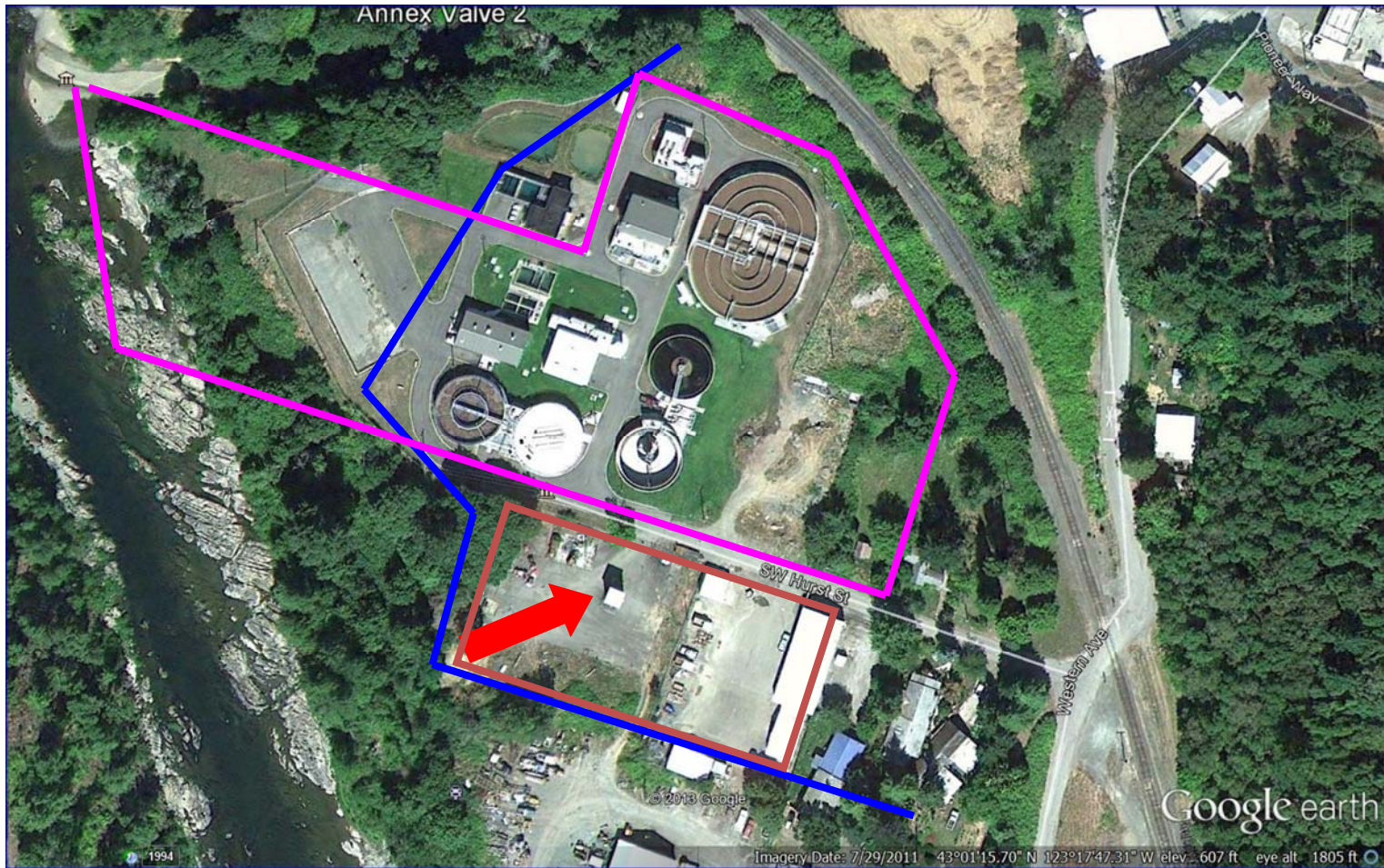
# Design / Construction Challenges



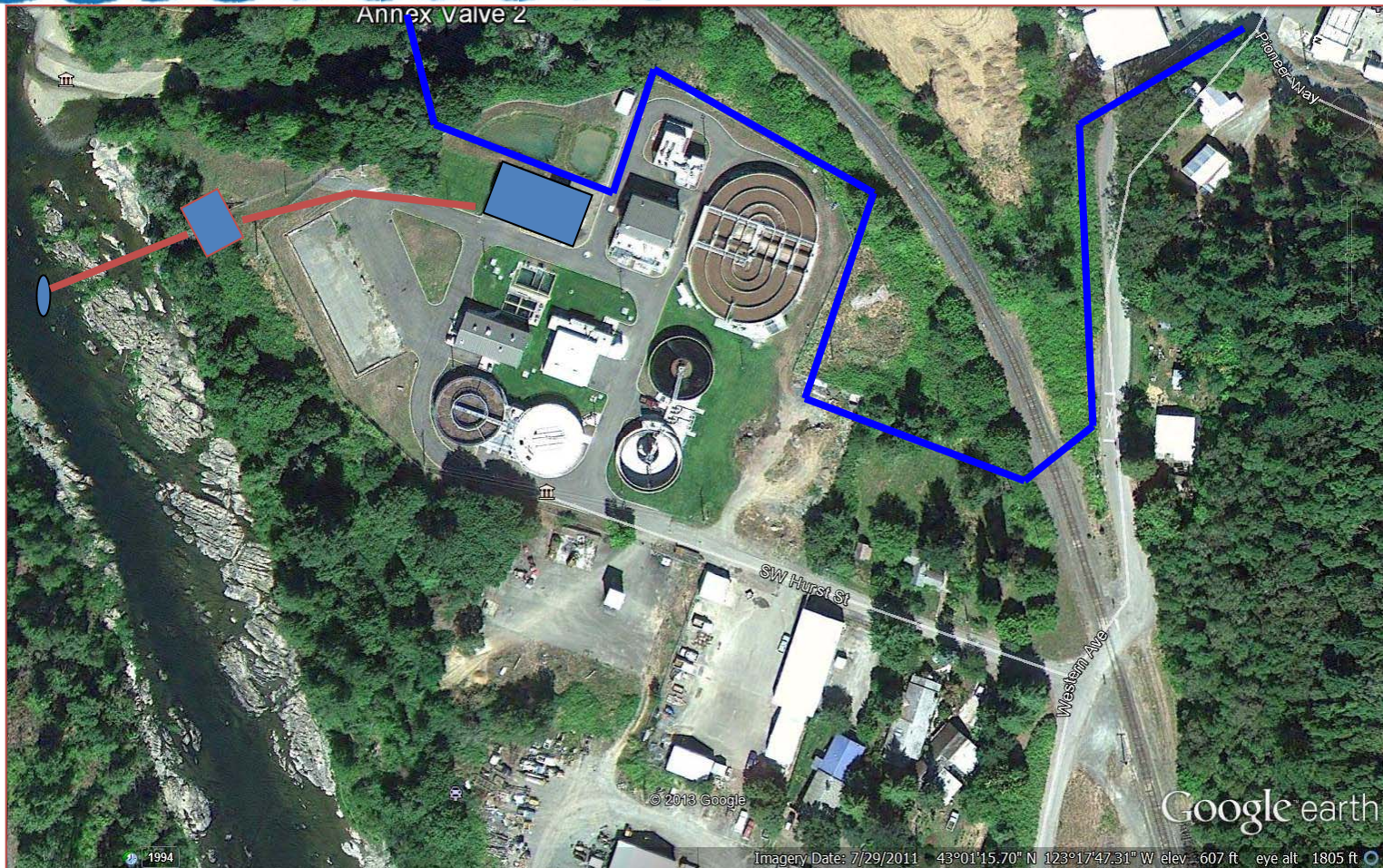
- Dual ownership of parts of compound
- Flood plain / Floodway
- Old mill pond/ fire training center
- Fire tower
- Future expansion of WWTP
- Lack of money



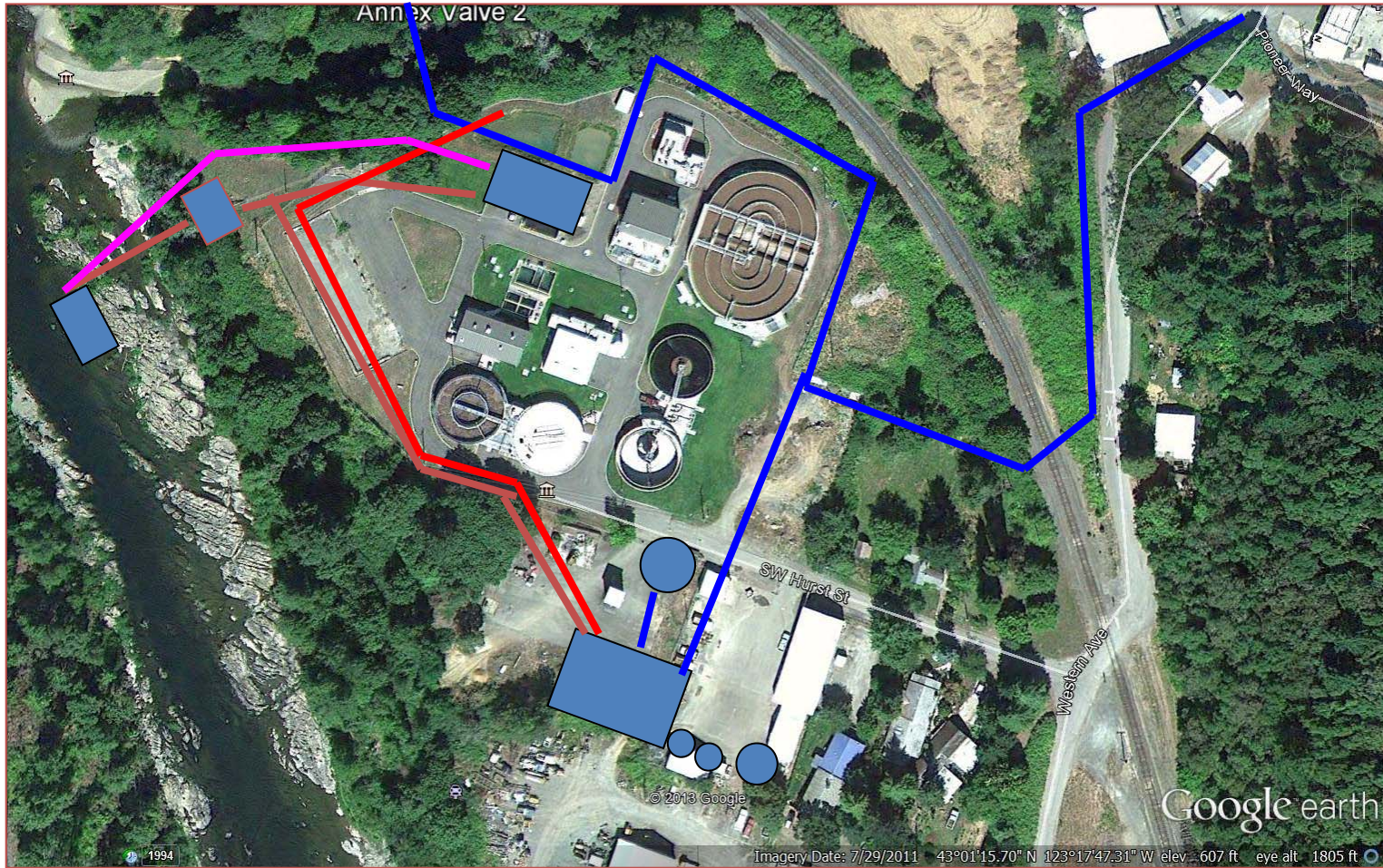
# Design / Construction Challenges



# Design / Construction Challenges



# Design / Construction Challenges



# Construction



- \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$
- We had an preliminary budget estimate of \$4.2 Million that was derived from our 1997 water master plan. This did not include any intake work
- Original project budget was for \$5.2 Million with a \$4.9 million IFA loan at 1% and \$500,000 forgiven
- Note: This was before AECOM was retained

# Construction



- AECOM in preliminary design estimated the project at \$6.8 Million with engineering
- After bids opened in May 2012 project budget revised to \$7.1 Million

# Construction



- Rates were raised \$20 per month, over 4 years, to \$52 month
- IFA loan was increased to \$6.8 Million with \$1.1 Million forgiven
- Contract awarded to R&G Excavation to begin in September 2012.

# Construction



# Construction





# Construction



# Construction



# Construction



# Construction



# Construction



# Construction



# Construction



# Construction





# Construction



# Construction



**AECOM**



# Construction



**AECOM**



# Construction



AECOM



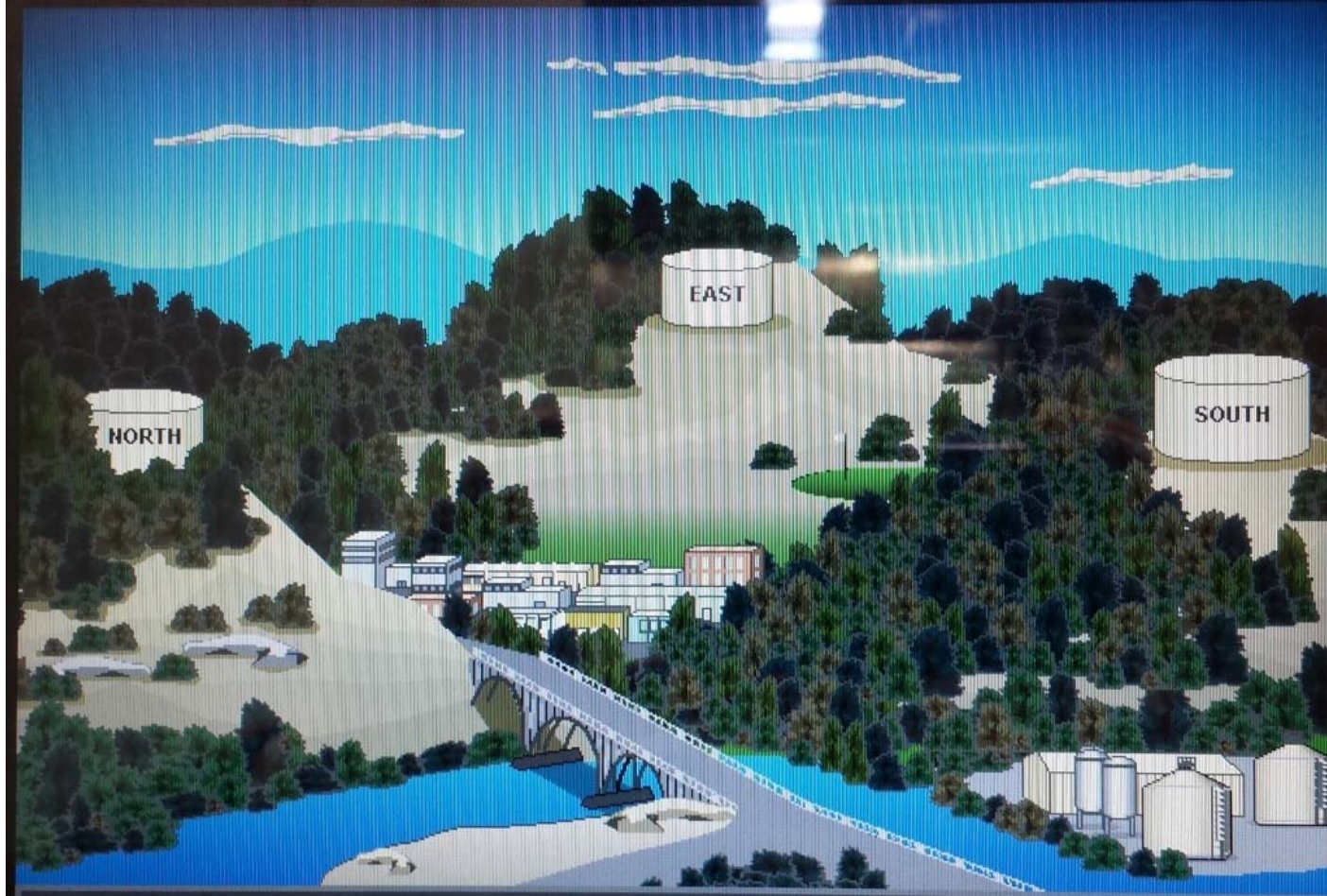
# Construction



# Construction



# Construction

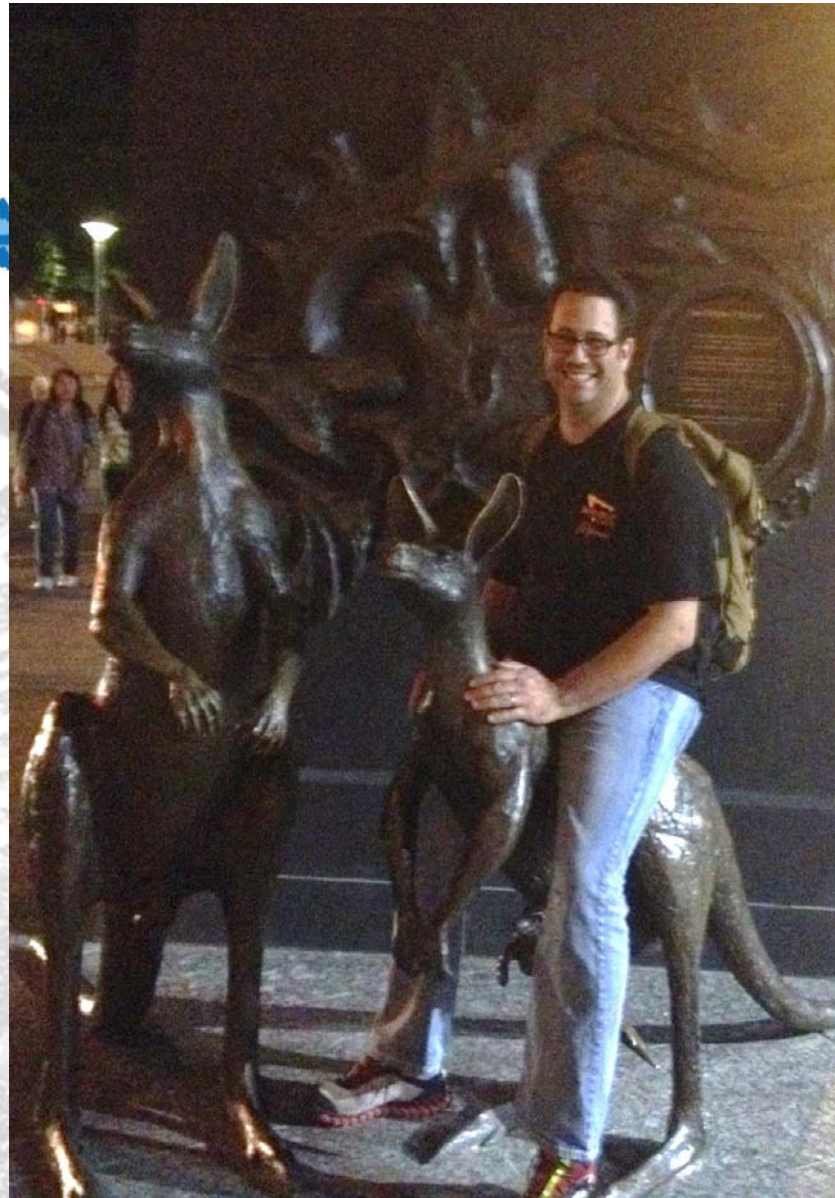


# Summary and Lessons Learnt



- Make sure the preliminary budget is very accurate
- Get your site locked in up front
- Don't let any personnel change jobs during the project
- Always Engage AECOM for WTP Design
- Alex Needs to Return to the US, mate!





AECOM

